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**SPECIAL ISSUE: Caring and Commoning
Uncommoning and Enclosure,
Maintenance and Response-ability,
Digital Inequalities, Participation**

From Cloud to Crowd poster campaign (2022)

In collaboration with artists Batool Desouky and Cristina Cochior, NEoN and The Institute for Technology in the Public Interest (TITiPI) presented the call to action, “From Cloud to Crowd” in 2022. This campaign was part of the Trans*Feminist Counter Cloud Action Plan by TITiPI. The plan aimed to bring communities together internationally to refuse the take-over of our institutions’ resources by Big Tech, to reimagine relationships with “the cloud”, to dream of community and collective infrastructures, and to make the conditions for taking care of descent and dissent from the cloud whilst dreaming in the ruins of Big Tech.

The 18 large posters, designed by Batool Desouky and Cristina Cochior, were digitally printed and displayed near the riverfront in Dundee. Designed with inky blues, browns and greens, the spreadsheets become a different type of computational record keeping or plotting, each cell notated, from which slogans and poetry call the passerby. The spreadsheet pixels welcome a more tender relationship with the world as if blown in on the wind from the river Tay. Together, the glittering cells display slogans, statements and questions that show a commitment to cloud resistance, computational regeneration, community maintenance, and collective transformations. The slogans were inspired by, gleaned, borrowed and iterated from various sources and situations: Lumbung Glossary, TITiPI, Other Weapons, Varia, Miranda Moss, Malé Luján Escalante, Tobias Fiebig, Charlotte Eifler, Dick Reckard, The Underground Division, Lauren Berlant, Alexis Pauline Gumbs, Ren Britton, Mary Nardini Gang.

The software used to make the posters is LibreOffice Calc. This work exists in the comradeship of other spreadsheet artists and peers, such as Karl Moubarak, Suzin Kwon and To Be Determined.

The posters are available here for reuse under the conditions of the CC4r:

https://titipi.org/wiki/index.php/Digital_Depletion_Posters

CC4r: <https://constantvzw.org/wefts/cc4r.en.html>

Counter Cloud Action Plan: https://titipi.org/pub/Counter_Cloud_Action_Plan.pdf

More information about the poster campaign:

<https://web.archive.org/web/20230328212440/https://neondigitalarts.com/from-cloud-to-crowd-poster-campaign/>

The Institute for Technology in the Public Interest (TITiPI): <https://titipi.org/>

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SPECIAL ISSUE

Uncommoning and Enclosure, Maintenance and Response-ability, Digital Inequalities, Participation

Cover *From Cloud to Crowd* (2022), by Batool Desouky and Cristina Cochior in collaboration with NEoN and The Institute for Technology in the Public Interest (TITiPI)

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Caring and Commoning as World(s)-Making Practices and Sites of Ambivalence

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Abstract

This editorial introduces the special issue by examining recent developments around caring and commoning within Science and Technology Studies (STS) and offers an overview of the contributions collected. It approaches caring and commoning as both world(s)-making practices and conceptual resources for thinking and acting towards more equitable and response-able futures. By tracing how these themes have been articulated across contemporary STS debates, we argue that ambivalence constitutes a recurring feature of current engagements with care and commons. Rather than treating it as a marginal effect, we propose ambivalence as a productive analytical lens for understanding the multiple and often contradictory effects of caring and commoning practices. Two major sites of ambivalence are identified. First, caring emerges as indispensable work of maintenance and repair that sustains sociotechnical worlds while also stabilizing existing arrangements through the redistribution of responsibilities and labour. Second, commoning fosters collective governance and political opening while remaining entangled with institutional, market, and infrastructural logics that shape participation, authority, and responsibility. Echoing key STS scholarship, we conclude by positioning ambivalence as a productive analytical perspective for understanding caring and commoning as relational, more-than-human, and intervention-oriented practices through which collective worlds are continuously made, maintained, contested, and transformed.

Keywords

caring; commoning; ambivalence; maintenance; repair; participation.

1. Introduction

In the last decades, STS have witnessed a renewed prominence of critical approaches – particularly feminist, postcolonial and decolonial perspectives – and increasingly productive intersections with adjacent fields such as human geography, environmental humanities, participatory design, and human-computer interaction (e.g., Frauenberger 2019; Papadopoulos et al. 2023; Giaccardi et al. 2025). Such encounters have reinvigorated the politically engaged character

of STS and further revealed an “activist interest” (Sismondo 2008) and a “collaborative turn” (Fariñas 2016) in the field. These trading zones have also become more visible at venues such as the Society for Social Studies of Science (4S) and the European Association for the Study of Science and Technology (EASST)’s Making and Doing section, which promote scholarly practices that produce STS knowledge and expertise that extend beyond the academic traditional formats, such as papers or research monographs. Engaging in STS through collaborative, committed, and intervention-oriented forms of research grounded in dialogue, participation, and knowledge co-production (Epstein 1996; Martin et al. 2015) brings into focus the ethical, affective, and political dimensions of research practice, as well as its situated, material, and inherently ambivalent character (Marres 2012; Mol et al. 2010). It is within this context that we locate our interest in caring and commoning, both as world(s)-making practices and as conceptual resources for thinking and acting towards more just, equitable and response-able futures (Sciannamblo et al. 2021).

This special issue builds on this commitment by foregrounding the intersections between caring and commoning across a range of empirical and conceptual settings. Consistent with the rich STS literature on care (Lindén and Lydahl 2021), this issue adopts an open and expansive understanding of caring as a practice of maintenance and repair, an ethos, and a conceptual resource for thinking with and acting (Martin et al. 2015; Mol et al. 2010; Puig de la Bellacasa 2017). Likewise, drawing on a still emerging but growing STS engagement with the commons (Papadopoulos 2018; Sciannamblo et al. 2021), it approaches commoning as the collective practices through which people govern, sustain, and reproduce things held in common, thereby enabling forms of life in common (De Angelis 2019). At its core, this issue is concerned with both the political commitment (Velicu and García-López 2018) and the affective engagement (Poderi 2020) involved in nurturing and sustaining what is held in common (Poderi 2021; Singh 2017). Commoning and caring prompt us to reconsider human-nature and more-than-human relationships in ways that challenge dominant extractivist models of contemporary Western capitalism, and which foster the production of ourselves as a common subject (Caffentzis and Federici 2014; Federici 2018). In this spirit, this special issue reflects our (the guest editors) long-standing collaborative engagement with these concerns, bringing together STS perspectives on knowledge-making and intervention-oriented practices to examine caring and commoning as situated processes of world-making.

Against this backdrop, the development of this editorial project has unfolded against a profoundly changing global landscape. The outbreak of new wars and extreme forms of violence, including the ongoing genocide in Palestine, has led us to reflect on what it means to remain committed to research practices grounded in caring and commoning when the world around us appears increasingly shaped by their opposites: systemic uncaring, dispossession, enclosure, and the erosion of shared resources. From this historical and political conjuncture emerges a broader question about how caring and commoning are currently articulated within contemporary STS. To what extent do these themes continue to inform the field? Through which concepts, empirical domains, and political concerns are they being addressed today? Have caring and commoning remained visible as explicit analytical and political commitments, or have they been reconfigured through adjacent conversations and emerging areas of inquiry?

We approached this inquiry from the shared impression that caring and commoning had become less visible as explicit categories in major STS venues compared to a few years ago.

In this spirit, we mapped recent STS discussions by examining journal publications in *Social Studies of Science* and *Science, Technology, & Human Values* published during the past three years (2023-2026, the period corresponding to the development of this special issue) as well as conference programmes, panel descriptions, and calls for participation associated with recent editions of 4S (Toronto 2026) and EASST (Krakow 2026). We treat these materials not as evidence of settled debates, but as indicators of emerging interests and concerns among STS scholars. At the same time, we acknowledge that STS has historically been shaped by a predominantly Euro-Atlantic intellectual trajectory (Mongili 2025), and that many of the concerns surrounding care, relationality, and collective life have also been developed through postcolonial, decolonial, Indigenous, and Global South scholarship (e.g., Bocarejo 2024; Kothari et al. 2019). Our mapping should therefore be read as a situated and partial account rather than a comprehensive representation of contemporary debates. Nevertheless, this exploratory exercise offers useful insights into the recurring concerns and analytical sensibilities about caring and commoning within STS, while also helping to situate the contribution of this special issue within a broader intellectual movement concerned with care, commons, relationality, and collective forms of world-making. What emerges is not their disappearance from the debate, but their rearticulation through a range of adjacent topics and empirical domains. More importantly, across these diverse discussions we identified a recurring concern with the tensions, frictions, and uneven effects that accompany practices of caring and commoning. It is this recurring concern that leads us to foreground *ambivalence* as a key analytical lens for understanding their contemporary articulations.

2. Sites of Ambivalence in Caring and Commoning Practices

A central insight emerging from the contributions collected in this special issue is that ambivalence constitutes a key analytical lens for understanding practices of caring and commoning. Rather than being intrinsically emancipatory, these practices are situated processes that may simultaneously enable transformation while contributing to the stabilization of existing arrangements, the delegation of responsibility, or forms of institutional capture. This may occur, for example, when care and solidarity networks are mobilized to compensate for the retrenchment of public services under austerity measures, effectively redistributing responsibilities from public institutions to individuals, families, communities, and grassroots organizations. As STS scholars have repeatedly shown, care is never innocent, neutral, or universally beneficial as it entails situated choices, exclusions, attachments, obligations, and uneven distributions of work and responsibility (Mol 2008; Puig de la Bellacasa 2017). Similarly, commons and commoning are not inherently emancipatory arrangements but emerge through ongoing negotiations over access, participation, governance, and the reproduction of collective life.

From this point of view, rather than treating these tensions as anomalies or failures, we approach them as constitutive features of practices of caring and commoning themselves. The key question, therefore, is no longer whether care- or commons-oriented practices are normatively desirable, but under what conditions, through which sociotechnical arrangements, and with what political effects they operate.

The contributions gathered in this special issue offer empirical insights into these questions, showing how ambivalence runs through diverse practices of caring and commoning and shapes their possibilities, limits, and consequences. Un-commoning practices emerge as ways of resisting enclosure while simultaneously revealing how digital infrastructures and AI systems generate new forms of enclosure, exclusion and foreclosure (Light, *this issue*). Software maintenance appears as a practice of care that sustains digital worlds, yet one that also exposes maintainers to dependency, exhaustion, and obsolescence (Ojala, *this issue*). Telecare initiatives developed by civil society actors during the COVID-19 pandemic demonstrate how ICT-enabled forms of care can foster solidarity and inclusion while at the same time compensating for institutional shortcomings and uneven distributions of support (Cibin, *this issue*). Finally, Senft shows how foraging can be understood as a form of response-ability that sustains both human livelihoods and more-than-human commons, foregrounding the entanglement of environmental care, subsistence, and more-than-human relations (Senft, *this issue*).

Ambivalence thus emerges as an analytical lens for understanding how caring and commoning appear as practices that hold together repair and vulnerability, openness and closure, collective support and unequal responsibility.

3. Care between Necessary Work and Devices of Stabilization

A first major site of ambivalence concerns care itself. We adopt a broad understanding of care – as maintenance, repair, ethos, and conceptual tool – while insisting that caring is never neutral or cost-free. In this framing, maintenance and repair are not only examples of care but also the material practices through which care becomes visible (Ojala, *this issue*; Denis et al. 2015). They render tangible the selective decisions that caring always entails: what is maintained, what is repaired, what is allowed to decay, whose needs are prioritized and whose are deferred (Mattern 2018; Denis 2019). These dynamics are already manifest in Annemarie Mol’s reflections on the “logic of care” in the context of diabetes treatment (Mol 2008), where “care” is framed as an ongoing process of adaptability and tinkering with bodies, technologies, and knowledge to find what works for a specific person’s complex life. More STS literature repeatedly shows that care is sustained through invisible, precarious, and unevenly distributed labor, enabling the everyday functioning of healthcare systems, research infrastructures, and environmental management without being fully recognized or valued (Puig de la Bellacasa 2017). Recent studies explicitly frame maintenance and repair as forms of political and epistemic work rather than residual activities – for example in analyses of infrastructural maintenance as affective and contested practice (Hetherington and Jalbert 2023), or of innovation regimes that depend on ongoing maintenance labor while rhetorically marginalizing it (Cuevas-Garcia et al. 2024), and care infrastructures whose maintenance sustains continuity while simultaneously dampening pressures for structural change (Goggins 2025).

Here, one of the central ambivalences of care becomes visible: it is indispensable for sustaining sociotechnical systems, yet precisely for that reason it may also function as a mechanism of stabilization, mitigating crises without challenging their root causes. This ambivalence is further intensified when care is translated into technical or organizational solutions.

Recent discussions at 4S 2026 and EASST 2026 on AI (Alcaras and Ricci 2026; Lee and Yoo 2026; Khan 2026; Wienroth et al. 2026; Troszynsju and Bielinski 2026) and on digital health and welfare technologies (Søraa et al. 2026; Oldenhof et al. 2026; Nickelsen et al. 2026) has shown how care-oriented technologies can operate as devices of responsibility delegation, shifting burdens from collective and institutional arrangements onto individuals, families, or communities, while framing this shift as innovation or empowerment.

The ambivalence here does not lie in technological failure, but in how care is reconfigured as a distributive mechanism, normalizing disinvestment and austerity under the sign of caring solutions.

4. Commoning between Political Opening and Institutional Capture

A second, closely related site of ambivalence concerns commoning. This issue approaches commons as matters of care and commoning as practices of reproducing life in common. Yet literature recently showed that commoning processes are rarely autonomous or harmonious as they are deeply embedded in institutional, economic, and infrastructural regimes.

This ambivalence is particularly evident in historical and contemporary analyses of knowledge commons. For example, Sturdy's (2025) account of the *genomic commons* demonstrates how commons-based rhetoric can be mobilized to manage intellectual property and commercial interests, revealing commoning as a negotiated and strategically ambiguous practice rather than a straightforward alternative to enclosure.

Other very recent contributions document attempts to build research commons through alliances with local communities and public funding (Benedito and Sanabria 2026), while also exposing how public infrastructures and data regimes are reconfigured through platformization and assetization (Faulkner-Gurstein and Wyatt 2023). Across these cases, commoning emerges as a double-edged practice: it can open spaces for collective governance and solidarity, yet it can also serve as a legitimating discourse for market-oriented or extractive arrangements.

Similarly, the programmes and panel proposals for the 2026 meetings of 4S and focused on health (Moore et al. 2026), data governance (Jeffrey and Gehl 2026), environmental stewardship (Filipe 2026), and AI governance (Seabrook 2026) reveal how commons-based imaginaries often coexist with commercial logics and remain entangled with powerful institutional actors. The tension is therefore not between "authentic" and "corrupted" commons, but between different modes of institutionalizing the common.

Moreover, commoning requires continuous social and relational maintenance connected to rule-making, conflict management, and infrastructural upkeep. Research on environmental stewardship and data activism (Filipe 2026), among other domains, shows that this labor is often unevenly distributed and may generate new forms of fatigue, exclusion, or responsibility shifting, particularly when commoning is positioned as a lightweight alternative to public provision.

These tensions also extend to the intervention-oriented methodologies through which caring and commoning are enacted within STS. While action research, co-design, co-production, and citizen science have become central to collaborative engagements, recent work questions the assumption that participation automatically produces transformation (Landström et al. 2024) and shows how collaborative processes remain shaped by institutional and

sociotechnical arrangements (Tsouvalis et al. 2025). Rather than assuming collaboration to be inherently democratic or emancipatory, these studies foreground the conditions under which it can meaningfully redistribute authority, responsibility, expertise, and labour.

5. Conclusion: Rethinking Caring and Commoning through Ambivalence

Across the diverse strands of STS scholarship discussed above, a common insight emerges: ambivalence is not a marginal effect of caring and commoning, but a constitutive condition through which these practices unfold. This becomes particularly visible in more-than-human contexts, where recent work on contamination, environmental repair, extraction, and environmental governance shows that caring for some entities often entails new forms of exclusion, vulnerability, or harm for others (Underhill and Barad 2025; Delgado 2024; Delgado and Bauer 2024; Dey 2025). Across these discussions, caring and commoning in ecological contexts emerge as deeply ambivalent practices, redistributing vulnerability and responsibility rather than resolving them.

Approaching caring and commoning through the lens of ambivalence allows us to move beyond normative expectations that cast these practices as either inherently emancipatory or inevitably co-opted. It is precisely the STS commitment to overcoming technological determinisms, normative binaries, and simplified accounts of technoscientific phenomena that makes such an approach possible. Rather than reducing caring and commoning to celebratory narratives or cynical dismissal, STS invites us to attend to the multiple, situated, and often contradictory effects through which these practices are enacted.

This special issue adopts precisely this analytical perspective. Rather than asking whether care and commoning are desirable in the abstract, the contributions explore *how* these practices operate, *for whom*, under *which conditions*, at *what costs*, and with *what* stabilizing or transformative *effects*. In doing so, they position ambivalence as a productive lens for understanding caring and commoning as practices of world-making that hold together solidarity and conflict, responsibility and power, hope and limit.

The contributions presented here approach world-making as situated commoning and/or caring practices through which shared worlds are continuously sustained, negotiated, and sometimes strained¹. Across AI imaginaries, digital infrastructures, pandemic responses, and forest ecologies, the articles collected in this special issue trace how commons emerge through everyday acts of maintaining, caring, attuning, and responding – often beyond institutional designs or political programs. Together, they invite STS scholars to conceive care as relational, more-than-human, and non-innocent – embedded in precarity and unequal conditions, yet central to the ongoing livability of collective worlds – and at the same time to rethink commons as fragile achievements of world-making, enacted through practices that hold open possibilities for shared futures while remaining attentive to their limits and exclusions.

In her contribution, Ann Light advances un-commoning as a performative, processual practice of care that keeps worlds open, provisional, and responsive to difference. Through this she interrogates enclosure as a linguistic and infrastructural process through which both land and data are appropriated and futures foreclosed. The contribution mobilises feminist

STS, as well as indigenous and decolonial scholarship to argue that AI and data practices actively make static and exclusionary worlds. In so doing the contribution foregrounds un-commoning as ongoing world-making that resists enclosure not only materially, but at the level of language, knowledge, and computation itself.

On the same note, Mace Ojala focuses on maintain-ability as the ability to both give and receive care within sociotechnical worlds shaped by constantly-aging software. His work relies on ethnographic fieldwork with software maintainers, and it foregrounds software maintenance as a form of everyday commoning that sustains livelihoods, identities, and infrastructures through fragile continuous relations of care. The article challenges innovation-centric imaginaries and effectively reveals how contemporary software-based infrastructures rely on maintaining – not just building – technological commons. Ultimately, maintain-ability names a condition for sustaining shared worlds in a broken, obsolescence-prone digital present.

The contribution by Roberto Cibilin reflects back onto the role of telecare practices to address the information crisis and intersecting inequalities during COVID-19 pandemic. By focusing on nearly 300 civil society initiatives across Europe and using STS perspectives on care and commoning, Cibilin shows how helplines, platforms, and mutual aid infrastructures supported forms of care beyond professionalised healthcare settings. The analysis highlights varying degrees of participation and reveals care as a collective, infrastructural achievement which is also shaped by vulnerability and inequality.

In the last essay, Lukáš Senft defines foraging response-ability as an everyday commoning practice through which humans and forest collectives co-constitute multispecies worlds of care. His ethnographic work in Czech forests clarifies how foragers enact non-innocent, and non-instrumental forms of care that sustain both foragers' livelihoods and surrounding ecosystems without necessarily buying into either extractivist or activist logics. By foregrounding attunement, maintenance of openness, and reciprocal human-nonhuman care, Senft reinforces the idea of commons as fragile, lived relations continually made and remade through practice.

The *Crossing Boundaries* section "World(s)-making through data work, activism, and more-than-human encounters" brings together three reflective interventions that approach care and commoning from different angles. Yana Boeva foregrounds the convergence of care and commoning in data, automation, and AI, showing how invisible data work and digital commons sustain contemporary technoscience while remaining structurally undervalued and politically contested. Cindy Kohtala examines scholar-activism "out here" in grassroots and alternative technology milieus, articulating the interstice or milieu of the "between" as a fragile space where researchers become commoners themselves, negotiating care, conflict, and complicity across academic and activist worlds. Finally, Jonas Fritsch offers an autoethnographic account of affective, more-than-human encounters at the margins of research, tracing how being touched by a place can generate careful forms of world-making that blur boundaries between research, life, and ethical commitment.

Overall, this special issue does not seek to resolve the ambivalences that traverse caring and commoning, but rather to dwell with them as necessary conditions for thinking with and practicing more just and livable worlds. In doing so, we echo the approach of several STS pivotal works that position ambivalence as a central condition of world(s)-making practices concerning science and technology (e.g., Bowker and Star 1999; Mol 2008; Puig de la Bellacasa 2017; Papadopoulos 2018). When examined through the lens of caring and commoning, these practices

bring to the fore tensions between visible and invisible work, openness and closure, collaboration and capture, while also foregrounding the condition of operating in “high tension zones” (Star 1990) as scholars and practitioners – neither fully at the centre of networks nor entirely outside them – while continuously questioning the unequal distribution of power. In this sense, the special issue contributes to sustaining a space for inquiry that remains open to ambivalence and committed to engagement within more-than-human entanglements.

Notes

¹ The development of this special issue builds on earlier discussions initiated through panels on caring and commoning at the Danish Association for Science and Technology Studies Conference (2022) and the STS Italia Conference (2023). Following the call for papers (May 2023), 18 abstracts were received, 8 full papers were solicited, and 4 articles were selected after peer review, complemented by three invited contributions included in the *Crossing Boundaries* section.

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Caring for an Information Crisis: Civil Society and ICTs against Inequalities during the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic intensified existing inequalities among vulnerable populations, particularly where multiple factors, such as gender, age, nationality, and socioeconomic status, intersected. For these groups, one critical yet underexplored dimension of the crisis was informational: many faced uncertainty in accessing essential services and navigating daily life. Public policies often failed to address these challenges adequately, leaving civil society actors (CSAs), including NGOs, associations, and informal groups, to fill the gap, frequently through the use of information and communication technologies (ICTs). This article investigates how CSAs across Europe employed ICTs to support vulnerable groups during the pandemic. Drawing on data from nearly 300 initiatives mapped by the EU-funded RESISTIRÉ project, we apply the lens of care and telecare practices from Science and Technology Studies (STS) to analyse these responses. Our findings, based on a reflexive thematic analysis, suggest a diverse range of sociotechnical assemblages, from helplines and educational platforms to lobbying campaigns and mutual aid networks. ICTs were used not only to deliver remote health-related support but also to address emotional, educational, and structural needs. These practices varied in their level of user involvement and often relied on familiar technologies to reach digitally excluded populations. By highlighting bottom-up telecare practices, this study contributes to expanding the scope of crisis informatics and telecare research towards intersectional “matters of care” concerning vulnerable populations, emphasizing the role of CSAs and ICTs in shaping inclusive responses to information uncertainty during emergencies.

Keywords

care; telecare; ICTs; crisis; commons; intersectionality.

1. Introduction

The COVID-19 pandemic has exacerbated existing inequalities among vulnerable populations, particularly in relation to gender, age, nationality, socioeconomic status, ethnicity, and other factors (Fisher and Ryan 2021; Razavi et al. 2022). These inequalities have been

particularly severe when multiple of these factors intersected (Lokot and Avakyan 2020; Maestripieri 2021) and were amplified by the “information crisis” (Xie et al. 2020, 1420).

This information crisis resulted in situations where it suddenly became unclear how to carry out everyday activities or access essential services, a challenge that was even more pronounced for the most vulnerable populations. For example, elderly individuals were left isolated without guidance on how to protect themselves; victims of gender-based violence were confined at home with their perpetrators, lacking the tools or channels to seek help and support; and people with disabilities faced significant obstacles in accessing public services or even purchasing food. Public policies designed to mitigate the effects of the crisis often failed to consider the needs of these vulnerable groups, offering few solutions to navigate an already difficult situation (Cibin 2023).

Various studies highlighted how these situations of uncertainty have been mitigated through activities carried out by civil society actors (hereafter referred to as CSAs, e.g., NGOs, associations, individuals) (e.g., Andersen et al. 2020; Mao et al. 2021). These activities often involved the use of information and communication technologies (ICTs) (e.g., Carlsen et al. 2021; Parolin and Pellegrinelli 2022) such as mutual aid platforms or simple telephone chains of support for older adults. The Science and Technology Studies (STS) debate around the use of ICTs for care practices is well developed, mostly around the debate on telecare practices (for instance, Pols 2012), but also in the area of crisis informatics and emergency response (for instance, Palen and Hughes 2018). However, with few known exceptions (for instance, Sciannamblo et al. 2021), these studies have primarily focused on the use of ICTs by professionals in the medical and disability sectors, or on actions undertaken to provide support to the general population following critical events. These studies rarely examine how such technologies have been employed by civil society to support gender and other intersectional vulnerabilities in navigating uncertainty.

This article contributes to bridging this gap by providing empirical evidence of the various ways in which ICTs were used by CSAs during the pandemic to support vulnerable populations. To this goal, these activities, and not only those in the medical sector, are examined through the lenses of care and telecare practices, concepts that have gained recognition and legitimacy within STS (Lindén and Lydahl 2021), as they aim to “maintain, continue, and repair our ‘world’ so that we can live in it as well as possible” (Tronto and Fisher 1990, 34). An overview is provided of the main challenges that ICTs helped to identify, as well as the care practices they supported and shaped in responding to the information crisis among vulnerable people. To this end, the research is guided by the following questions, inspired by Pols (2010): How do ICT systems support telecare practices for vulnerable people in situations of information uncertainty? How do ICTs shape the ways vulnerable people engage in these telecare practices, across varying degrees of participation?

To answer these questions, the analysis focuses on the mapping conducted within RESISTIRÉ, a COVID-19-focused, EU-funded research project aimed at analysing the impact of the pandemic and related policies on gender inequalities and other axes of inequality. A reflexive thematic analysis (Braun and Clarke 2019) was conducted on the descriptions and background information of nearly 300 initiatives led by CSAs across 30 European countries. These initiatives aimed to mitigate gender and other inequalities during the pandemic. They involved informal groups, non-governmental organisations (NGOs), advocacy groups, religious organisations, as well as online communities.

Through the observation of bottom-up telecare practices targeting vulnerable groups, it was found that ICTs can be used not only to provide remote support for health-related concerns, but also to address emotional, educational/work-related, and political/structural challenges. These practices involve users at varying levels of participation. Our findings contribute to advancing the inclusion of the most disadvantaged populations in research on the use of ICTs in delivering care and responding to crisis situations (Palen and Hughes 2018).

2. Theoretical Foundations and Analytical Frame

2.1 Pandemic and Inequalities

Within an intersectional framework (Verloo 2013), this article defines vulnerable groups (also referred to as disadvantaged groups) as women and persons belonging, or perceived to belong, to groups “that experience a higher risk of poverty, social exclusion, discrimination and violence than the general population, including, but not limited to, ethnic minorities, migrants, people with disabilities, isolated elderly people and children” (EIGE 2025). The adverse socioeconomic consequences of the pandemic and the related information crisis have affected people belonging to these vulnerable groups in different ways.

The closure of kindergartens, schools, and care centres for the elderly and disabled shifted much of the care burden onto families — especially women (Strid et al. 2022). The crisis further strained healthcare systems already weakened by years of budget cuts (Faggioni et al. 2021), disproportionately affecting women’s access to services such as reproductive health-care, cancer screenings, and abortion (Wenham et al. 2020).

Restrictions on movement during the pandemic led to a rise in domestic and gender-based violence, particularly affecting women, children, and LGBTQI individuals (Adamson et al. 2022; Dlamini 2021). Transgender people faced increased barriers to accessing hormone therapy (Dasgupta et al. 2020). The pandemic further exacerbated discrimination against persons with disabilities (Yates and Dickinson 2021) and made it harder to meet the basic needs of older adults (Armitage and Nellums 2020).

Lockdown policies intensified existing poverty, invisibility and exclusion, especially among single women, immigrants, ethnic minorities, low-skilled workers, and those in rural areas (Milan et al. 2021; Rothwell and Smith 2021). These effects were most severe at the intersections of these categories (Lokot and Avakyan 2020; Maestripieri 2021). Migrants and asylum seekers faced language and digital barriers that limited access to information and increased their exposure to discrimination and stigmatisation (Donà 2021). Meanwhile, the shift to online education widened the learning gap for children in vulnerable situations (Zheng and Walsham 2021).

All the situations discussed above share a common feature: they occurred in an unprecedented context marked by high uncertainty (Dunwoody 2020) and an information crisis (Xie et al. 2020). This context brought significant changes in how people processed information during lockdowns, while the lack of accessible communication infrastructures further hindered effective information dissemination, particularly for vulnerable groups (*ibid.*).

In the following sections, the analysis examines how civil society largely took the lead in addressing these challenges and how ICTs played a fundamental role in their caring practices.

2.2 Care, ICTs and the Management of Uncertainty in STS

The role of ICTs in crisis response is well established, with research showing that they help individuals assess situations, support official messaging, and coordinate aid (for instance, Palen and Hughes 2018). Even during the pandemic, although the sudden digitalisation of services created several challenges for vulnerable populations (Cibin 2023), ICTs offered this kind of critical opportunities by enabling mass participation and rapid responses at scale (Yang et al. 2020). These included initiatives in humanitarian collaboration, civic engagement, and broader practices of solidarity (e.g., Duguay et al. 2023; Parolin and Pellegrinelli 2022; Valle 2020), in which care ethics played a fundamental role.

Care ethics has its roots in feminism. Among the foundational works on care theory is that of Joan C. Tronto, who emphasises our collective responsibility for care and argues that care cannot be separated from addressing privileges related to gender, ethnicity, religion, and class (for instance, Parra Jounou and Tronto 2024). Within STS, reflection on care has grown, rooted in feminist and material-semiotic traditions (Lindén and Lydahl 2021). Mol and colleagues (2011), for instance, shifted attention from care as a general domain to the practices through which it is enacted, asking, “How is care being done?” This perspective opened up analysis beyond the healthcare sphere and highlighted the importance of considering the role of care receivers. Puig de la Bellacasa (2017) shifts the focus towards *matters of care* and *neglected things*, arguing that care should guide scientific and technological practices. In doing so, she calls for a form of responsibility that acknowledges power, affect, and materiality, and attends to entities, practices, and relationships that are often excluded from dominant technoscientific narratives.

STS has also drawn attention to the role of human artefacts and technologies in caring practices (for instance, Mol et al. 2010). One primary domain in which care practices and ICTs have been jointly examined is that of telecare (Pols 2012), where technical devices and professional practices are used to support chronically ill or older people living at home, including their physical and emotional capacities. The goal of telecare is to provide *care at a distance* (*ibid.*). These studies underscore the impossibility of making general judgements about the value of telecare, highlighting the need to understand its complexity by considering the diversity of patients, devices, scripts, users, and practices involved in various situations (*ibid.*). Topics include devices and applications that monitor various vital signs, such as heart-related signals (Oudshoorn 2012; Pols 2010), devices for video-based lung disease rehabilitation (Bødker and Nielsen 2015), webcams used for online consultations with oncology patients (van Hout et al. 2015), and technologies supporting online visits and safety monitoring for older people (e.g., Percival and Hanson 2006; Sánchez-Criado et al. 2014). Other examples include phone or video consultations for opioid use disorder (Caulfield 2021) and assistive technologies for people with dementia (Lariviere et al. 2021).

These studies adopt the mainstream definition of telecare, focusing primarily on professional, top-down healthcare practices. In the next section, we turn to examples where ICTs have been used for remote care from the bottom-up and with different objectives.

Therefore, from this point onwards, the term telecare is used to refer to all forms of care activities – beyond those limited to the healthcare sector or conducted by professionals – that are carried out through the use of ICTs.

2.3 Bottom-up Telecare Practices

As previously mentioned, ICTs can be used for remote care activities that extend beyond the healthcare field and institutional contexts. Ahlin and colleagues (2024) explore how migrant nurses form “transnational care collectives,” assemblages of everyday digital technologies (for instance, telephones) and kin or non-kin members, to care for their parents remotely. They emphasise the fundamental role of frequent communication, emotional engagement, technological maintenance, and the integration of digital and in-person care within these collectives. Similarly, Krüger and colleagues (2021) emphasise that technologies designed to support migrants in settling into their host countries must value existing care practices within the ecosystem of actors they already engage with, balancing innovation with maintainability.

Sciannamblo and colleagues (2021) apply the concepts of caring and commoning from feminist technoscience and political economy in codesigning a cooperative digital platform for precarious European workers. Through this approach, the platform helps make the (re) productive, affective, and political dimensions of care visible. Along similar lines, Parolin and Pellegrinelli (2022) describe how, during the pandemic, a self-organised group of citizens used social media to coordinate mutual aid, such as grocery and medicine delivery. They emphasise that social media’s role in these efforts was not fixed but adapted over time in response to shifts within the broader network of human and non-human actors involved.

All these care practices respond to the uncertainty that arises from unforeseen events in people’s lives (Jaakola 2023; López et al. 2015) and propose solutions in which “bodies, knowledge, and technology are attuned to one another in a way that takes the unaccountable into account, that is attentive to the indeterminate” (Nielsen et al. 2023, 863). Against this backdrop, this article takes a step further by proposing a systematic analysis of care practices in which CSAs and ICTs have collaborated from the bottom up. Using an intersectional lens, the analysis highlights issues affecting the most vulnerable groups, responding to calls for more responsible research that prioritises *matters of care* (Puig de la Bellacasa 2017), while *staying with the trouble* (Haraway 2016), that is, committing to work towards change within the complexity of the present through practices of care and connection. Before doing so, however, the following section outlines the key methodological elements of this research.

3. Research Design and Methodological Framework

3.1 The RESISTIRÉ Project

The article is part of the RESISTIRÉ project (Belloso and Strid 2023), which received funding from the European Union’s HORIZON 2020 programme. RESISTIRÉ aimed to investigate the impact of the COVID-19 pandemic and related policies on behavioural, social,

and economic disparities across 30 European countries. It also sought to propose solutions to address these inequalities. The project involved collecting and evaluating both qualitative and quantitative data, as well as mapping relevant policies and civil society actors’ (CSAs) initiatives. RESISTIRÉ was based on an intersectional approach (Verloo 2013), focusing on gender-related inequalities in various domains, such as the gender pay gap, the gender care gap, gender-based violence, etc. (see Figure 1). These were analysed alongside different vulnerability grounds such as social class, age, disability, nationality, ethnicity, religion, sexual orientation, and gender identity. The project spanned 30 months, from April 2021 to September 2023. The RESISTIRÉ project involved a consortium of eleven partners, mainly composed of social scientists specialising in gender and feminist studies. In RESISTIRÉ, I led the work package focused on mapping policies and CSA initiatives. With the support of my colleagues at *NKC – gender a věda* and other members of the international consortium, I designed the data collection tools, specifically the grids used by national researchers to document CSA initiatives present in their countries (a copy of the grid is available in the Appendix 3 of Cibin and colleagues (2021)), and I conducted the subsequent data analysis.

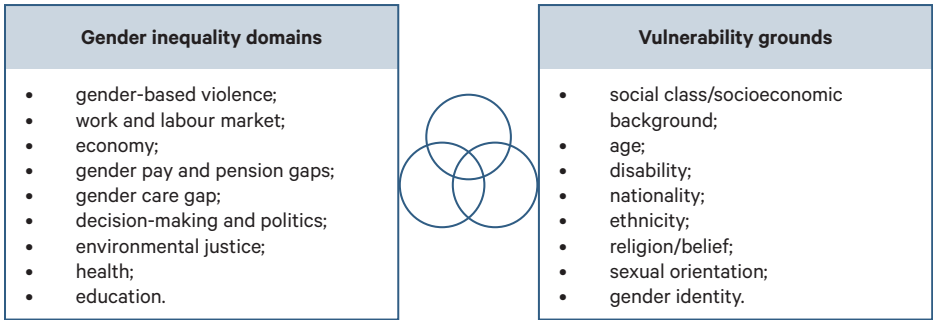


Figure 1.
Representation of the intersection between inequality domains and vulnerability grounds used in the RESISTIRÉ project to identify the study units.

3.2 Data and Analysis

The empirical data examined in this study primarily originates from a specific project activity that involved the mapping and analysis of initiatives led by CSAs to mitigate gender and other inequalities during the pandemic. These efforts involved informal groups, non-governmental organisations (NGOs), advocacy groups, religious organisations, as well as online communities. Data collection was carried out by a team of 30 national researchers (the names of the national researchers can be found in the *Acknowledgements* of Cibin and Linková (2023)). These researchers were tasked with identifying information within their respective countries concerning CSA initiatives related to the pandemic and vulnerable groups.

This information was subsequently recorded using the standardised grid developed by the author and the work package team. The grid was designed to capture data such as the type of inequality addressed, the underlying rationale, the main activities undertaken, the actors involved, and other relevant details. The 30 national researchers were not involved in the data analysis, except for occasional requests to clarify the data they had provided.

A total of 277 initiatives were mapped and described using the grids. Previous analysis conducted outside the scope of this article (Cibin and Linková 2023) involved the coding and examination of data in line with the overarching goals of the RESISTIRÉ project, which were to assess how these initiatives addressed inequalities across various domains and vulnerability grounds, as previously outlined. During this process, the significant role played by information and communication technologies (ICTs) became evident, leading to the decision to conduct a secondary analysis of the data, which forms the central focus of this article. The data were once again coded and analysed to specifically observe the interactions between CSAs, vulnerable populations, and ICTs aimed at addressing a variety of challenges, and the findings will be presented in the next section.

For the purposes of this article, the grids were analysed through reflexive thematic analysis (Braun and Clarke 2019). The analysis combined both inductive and deductive approaches. The inductive analysis aimed to identify the main types of support offered by these practices when ICTs were involved, while the deductive analysis examined the level of user engagement in these ICT-mediated communicative interactions to better understand the role of vulnerable individuals within these practices. To this end, the deductive analysis draws on the three levels of involvement between audiences and ICTs: access, interaction, and participation, as outlined in Carpentier's AIP model (Carpentier 2015). This model is widely recognised in Media Studies as a conceptual framework for examining the gradations of audience engagement with ICTs. Following the model, three levels were distinguished among: *access*, where recipients receive information in a top-down manner; *interaction*, where there is a bidirectional socio-communicative interaction that is guided by the service providers; and *participation*, where recipients actively shape and co-determine the socio-communicative process. These levels will be useful in the *Discussion* section to reflect on the varying degrees of ICT-supported involvement of vulnerable individuals within telecare practices.

4. Empirical Analysis and Findings

This section presents the themes describing the main types of sociotechnical assemblages that civil society actors (CSAs), vulnerable people and ICTs formed to carry out telecare practices aimed at mitigating inequalities during the pandemic. The analysis enabled the positioning of these different assemblages within two groups. At one end, telecare practices are primarily focused on sharing information and knowledge; at the other, practices extend further by fostering relationships among the actors involved (Figure 2). Empirical evidence is provided through the description of specific cases, grouped according to these two dimensions and drawn from different European countries.

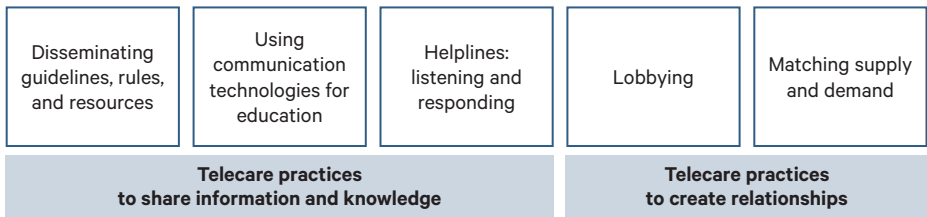


Figure 2.
Categorisation of telecare practices involving CSAs and ICTs to support vulnerable people during the pandemic.

4.1 Telecare Practices to Share Information and Knowledge

4.1.1 Disseminating Guidelines, Rules, and Resources

This theme focuses on practices in which CSAs leveraged ICTs to disseminate essential, top-down information to vulnerable groups, information that was often unavailable or inaccessible through institutional channels. These efforts primarily relied on one-way communication. CSAs supported vulnerable populations by creating websites and platforms that provided a wide range of resources: guidance on navigating the pandemic, information on reproductive and birth rights, services for survivors of gender-based violence (GBV), support for artists, students, and workers, and even recommendations for men with a history of violence.

In Slovakia, the NGO Female in Circles addressed the lack of information on reproductive healthcare for pregnant women and newborns by creating a website. This platform offered summaries of international recommendations for reproductive health during the pandemic, along with forms to file complaints with medical facilities or with the Ombudsperson.

In Sweden, the Swedish Breast Cancer Association sought to raise awareness about the importance of breast cancer prevention, especially after mammography services were suspended during the pandemic, by promoting an app they had developed for this purpose.

In Austria, the Chamber of Labour (*Arbeiterkammer*, AK) and the Austrian Trade Union Federation (*Österreichischer Gewerkschaftsbund*, ÖGB) launched a multilingual website. It provided employees with FAQs on labour law, part-time work, salaries, telework, workplace safety, infection and quarantine protocols, and included contact information for experts offering further support. In Vienna, the feminist organisation *Maiz* produced a series of videos in six languages to inform (migrant) sex workers about their eligibility for financial assistance from a hardship fund for the self-employed.

In Poland, the national NGO *Kampania Przeciw Homofobii* (Campaign Against Homophobia) partnered with Facebook to support young LGBTQI+ individuals whose mental health was severely affected by isolation, often endured in homo- or transphobic environments. The initiative featured videos that shared personal stories from people of diverse gender identities and sexual orientations, psychological advice, and contact details for support services.

Regarding gender-based violence, in addition to the helplines described below, CSAs also supported victims by providing information through dedicated websites. These included,

for example, lists of key contacts for professionals and services, as well as testimonies from women who had managed to escape domestic violence. In Slovenia, the Association for Non-violent Communication broadened the scope of its support by launching a website that also featured recommendations for men who had perpetrated violence.

4.1.2 Using Communication Technologies for Education

The second theme encompasses activities in which CSAs used digital communication platforms and channels to offer various types of educational courses. These initiatives typically took place in dialogic settings, albeit led by experts.

In Lithuania, for example, the art agency Artspace organised online classes for migrants and foreigners on topics such as language, IT education, healthcare, and leisure activities for youth.

In Italy, an NGO advocating for the rights of children and families involved in adoption and foster care provided a range of online resources from March 2020 onwards. These included short videos on playing games with children, videos about children's rights at school, interviews with experts in adoption and foster care, and online meetings to support adoptive families or those awaiting adoption.

In Croatia, the NGO RODA – Parents in Action offered a series of e-courses for pregnant women and families, specifically targeting vulnerable groups who lacked support during the pandemic due to service restrictions and reductions.

There are several cases in which these organisations, sometimes in collaboration with for-profit entities, also distributed technological devices to both young and elderly individuals who lacked access and were therefore isolated during home schooling and lockdown periods. These initiatives were often followed by study support activities and digital literacy programs. In Belgium, for instance, a philanthropic foundation (the Roi Baudouin Foundation), together with a cooperative insurance company (P&V), allocated one million euros to purchase laptops for vulnerable youth and to provide training on how to use them.

4.1.3 Helplines: Listening and Responding

The third theme concerns practices aimed at listening to people's needs and providing appropriate responses through the creation or strengthening of remote consultation and support services. These cases illustrate how ICTs enabled contact between users (those seeking support) and service providers (organisations offering assistance). Communication was thus two-way but primarily structured around a demand-response dynamic. The main target groups for these services were women who were victims or potential victims of violence, as well as individuals in need of psychological support. In many instances, the telephone remained the most commonly used channel for this type of communication.

In Germany, the association *Frauennotruf Main e.V.* launched an awareness campaign during the first wave of the pandemic to encourage women experiencing sexualised violence to reach out via their helpline. Lockdown policies had intensified the isolation of victims, and the helpline became a crucial channel for supporting them in reporting perpetrators and accessing professional assistance, such as legal and psychological services.

Helplines were not limited to supporting victims of violence. In Denmark, for example, the organization Mother's Aid Denmark opened a dedicated phone line to offer free counselling and support to families with children and pregnant women. These groups faced significant financial, emotional, and physical stress due to the pandemic, and the initiative aimed to provide relief and guidance during a particularly challenging time.

In addition to traditional telephone lines, and often targeting individuals unable to speak on the phone, some CSAs offered similar services through alternative channels such as free SMS, mobile apps, or popular digital communication tools (e.g., Skype, Messenger). For example, in the Czech Republic, the initiative *#IdowhatIcan* was launched by a group of psychologists, psychiatrists, social workers, therapists, and priests, in cooperation with the Czech Psychotherapy Association, to offer online consultations during the pandemic. During the first wave, over 760 psychotherapists joined the initiative, offering free online consultations through a dedicated website. The platform also became a valuable database for locating professionals based on location, spoken languages, and areas of specialisation.

In Hungary, the NANE Association provided a secure and anonymous web chat to assist victims of domestic and sexual violence, as well as their supporters. This tool was considered more suitable than telephone lines for helping individuals confined at home with their abusers.

Some helplines were also created with a specific focus on other vulnerable groups, such as elderly people, LGBTQI+ individuals, mothers and pregnant women, migrant women, perpetrators of violence, young people, and children. In France, for example, *Flag!*, a CSA established to combat all forms of discrimination against gay, lesbian, and transgender individuals within the Ministry of the Interior and Justice, launched a web and smartphone application that allows users to anonymously report cases of LGBT-phobia and domestic violence. The app not only supports users in the reporting process but also enables the creation of a situational map to inform decision-makers.

In Poland, the Polish Association of the Deaf (*Polski Związek Głuchych*) developed a video chat service in response to the lack of accessible pandemic-related information for the deaf community. In addition to informing citizens, the chat was also designed as a tool to assist healthcare workers in communicating with deaf individuals.

4.2 Telecare Practices to Create Relationships

4.2.1 Lobbying

The various restrictions on personal freedom and the closure of certain services, particularly during the initial phase of the pandemic, gave rise to a series of campaigns and lobbying activities by CSAs, often supported by the use of ICTs. These initiatives frequently emphasised how the pandemic was being used as a pretext to curtail established rights. These campaigns included increased public support for combating gender-based violence, the protection of fundamental sexual and reproductive health rights, greater attention to gender differences in pandemic-related policies, and enhanced financial support to address poverty. CSAs primarily disseminated these demands through websites and major social media platforms.

In Lithuania, the *Lietuvos žmogaus teisių centras* (Lithuanian Human Rights Centre), together with other human rights NGOs, promoted an online petition urging public authorities to avoid creating obstacles to access to abortion during quarantine. This petition became necessary for two main reasons: first, some CSAs observed that pandemic-related restrictions had, in some cases, created barriers for women seeking this service; second, the Minister of Health had made a statement suggesting that the pandemic provided an opportunity to reopen the debate on abortion.

Similarly, in Belgium, the *Plateforme citoyenne pour une naissance respectée* launched an online campaign advocating for women's right to be accompanied by their partner during childbirth and for the right not to wear a mask during delivery.

Labour was also a central focus of digital campaigns. For example, union-affiliated workers at the Polish Academy of Sciences and the Academy of Fine Arts in Warsaw used the web and social media to launch an online petition and awareness campaign. Their goal was to shed light on the challenges faced during the pandemic by women and others in academia who also had caregiving responsibilities. The pandemic further disadvantaged these individuals in producing research output, which in turn affected internal evaluations, funding applications, and opportunities for new positions.

4.2.2 Matching Supply and Demand

The final theme includes initiatives in which ICTs were used as intermediaries to create networks that matched the supply and demand for information, goods, services, volunteer work, and more. The most prominent examples of this approach are so-called mutual aid platforms, websites that facilitate the connection between individuals requesting help and those offering support. In the cases observed, these platforms were often developed by informal groups of civic hackers (Schrock 2016), sometimes in collaboration with innovation companies and social support organisations.

Some platforms were simple Facebook groups created by individuals aiming to support those in need during the pandemic, such as people who were sick, elderly, at-risk populations, care workers, and other vulnerable groups. In Iceland, for example, the Facebook group *Hjálpum fólki í áhættubópi (Kóróna / Covid 19)* ("Let's help people in risk groups (Corona/Covid-19)") provided a space where volunteers could offer assistance, such as grocery shopping, to people in high-risk categories. By the summer of 2021, the group had grown to around 3,000 members.

In Poland, the Facebook group *Widzialna ręka* ("Visible Hand") offered similar services, sharing helpful information both online and in public spaces. The initiative reached approximately 105,000 followers, demonstrating the significant role that grassroots digital communities played in pandemic support efforts.

Other platforms were more structured web-based services, often complemented by the use of social media (for instance, Facebook) and telephone support to enable individuals affected by the digital divide to request assistance. One such example is *Stiprūs Kartu* ("Strong Together") in Lithuania.

The platform Mutual Aid UK enabled individuals to find and support existing community groups, or to create new ones where none existed, with the goal of organising aid during the pandemic.

In Latvia, the *#stayhome* movement was launched to coordinate volunteers, initially through an informal Facebook group, which later evolved into an NGO with its own dedicated website.

In the Czech Republic, a former nurse created an initiative to connect qualified but currently unemployed nurses with nearby medical facilities in need of staff, using a web-based platform. A similar initiative emerged in Slovakia, targeting medical students, healthcare professionals, and other volunteers.

In some initiatives, support for elderly people was provided through more familiar technologies, such as the telephone. In Spain, for example, a cooperative specializing in community development organised a phone-call chain initiative: one woman would call another, who would then call the next, and so on, until the last person called the first. In this way, everyone in the group remained connected. In Slovenia, an NGO set up a telephone line that anonymously connected elderly individuals. People could register in a database and were then matched with others for conversation and mutual support.

5. Discussion

In this research, we observed how CSAs used ICTs to mitigate the problems faced by people belonging to vulnerable groups, which were related to the information crisis that occurred during the pandemic. We considered the actions of these sociotechnical assemblages as telecare practices, proposing to extend the discussion around this concept beyond its current focus on health professionals, users with chronic illnesses, and specific technologies, to also include bottom-up practices of CSAs, not necessarily limited to healthcare, that address vulnerabilities and involve the use of everyday ICTs.

Expanding the analytical focus in telecare research enables greater attention to the often-overlooked dimensions of care – what might be termed “neglected things” (Puig de la Bellacasa 2017) that the dominant technoscientific narratives tend to exclude. This shift necessitates a reconfiguration of knowledge production that is both inclusive and attuned to vulnerability. A critical starting point is the application of an intersectional lens when focusing on telecare practices or crisis informatics. Despite its relevance, the concept of intersectionality seems to remain largely underutilised in these research areas. We argue, however, that a sustained, reflexive engagement with the intersecting axes of inequality – examining how they co-constitute experiences of care – is essential for uncovering the power dynamics that shape care practices during information crises, and shape how ICTs can be used to intervene. Such an approach supports this line of research in aligning more closely with Tronto’s recommendation (Parra Jounou and Tronto 2024) to integrate reflections on the ethics of care with considerations of privilege related to gender, ethnicity, class, and other axes of inequality. Furthermore, it allows the analysis to build on Pols’ insight (2010; 2012) that telecare practices vary depending on the users involved, while extending this perspective by emphasising that such differences are also shaped by structural inequalities and power relations.

5.1 Vulnerable Populations and Telecare Practices: Navigating Multilevel Challenges

The literature review suggests that the challenges posed by the pandemic and the associated information crisis for vulnerable populations have been multifaceted. These range from the suspension of family caregiving support services and sexual and reproductive healthcare to increased discrimination and violence against minorities, rising poverty and social exclusion, and widening educational disparities. The telecare practices observed highlight how the uncertainty surrounding these issues is complex in nature and requires care interventions that operate across multiple levels, from the individual to the structural, and from emotional and affective support to the facilitation of collective action. It is evident that these levels are not mutually exclusive; rather, in many cases, they appear to operate simultaneously.

Similar to what Ahlin and colleagues (2024) describe in the healthcare domain, ICTs have also been employed in our contexts to empower individuals by providing access to information, as well as emotional and affective support through helplines and related services. At the same time, it is evident that individual action alone is often insufficient to address these challenges, and that structural, collective responses are necessary. Many of the cases identified align with the “care and commoning” framework proposed by Sciannamblo and colleagues (2021), wherein the goal of ICT-mediated communication is not only to share information or support but also to foster community-building.

The cases analysed here clearly demonstrate that there is no one-size-fits-all solution to these challenges, echoing the findings of Parolin and Pellegrinelli (2022), who observed that the role of ICTs shifts depending on the changing constellation of actors within a network. It is essential to consider the specific dynamics at play, including the potential impact of proposed solutions on particular issues and existing inequalities. The same technology can interact differently with various social groups, just as different technologies can present distinct challenges for individuals facing the same issue but situated at different intersections of vulnerability and power. For example, a victim of gender-based violence may risk leaving traceable records that are accessible to perpetrators when using SMS messages or text-based webchats. Conversely, telephone helplines may mitigate this risk but could exclude individuals with hearing impairments. The key principles of safety, trust, peer support, collaboration, enablement, and intersectionality, as proposed by Chen and colleagues (2022) for implementing a trauma-informed approach in computing research and practice, represent an important step towards addressing these issues.

5.2 User Involvement in Telecare Practices: Varying Degrees of Participation

To better understand the different kinds of involvement that vulnerable people were invited to engage in through various telecare practices, the mapped initiatives were organised along two axes (see Figure 3). The first concerns the two main dimensions of the initiatives identified in the analysis, ranging from the provision of information to activities aimed at the creation of relationships among the users (see Figure 2). The second relates to the three levels of user involvement in the use of ICTs described by Carpentier (2015): access,

interaction, and participation. The intersection of these axes yields four stylised levels of contribution expected from vulnerable individuals in their interactions with telecare practices: discovering, following, reacting, and commoning.

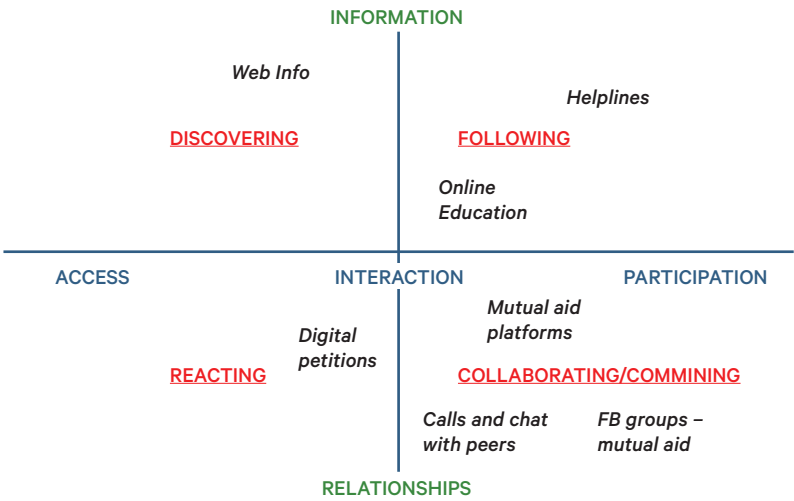


Figure 3.
The role of ICTs in telecare practices.

In the *discovering* mode, there is a marked distinction between those offering the service and those using it, which can take the form of a lay/expert relationship, with communication technology acting as a means of contact between the two groups. ICTs were used not only as a “back-channel” (Palen and Hughes 2018) to clarify and expand mainstream information, as already highlighted in crisis informatics research, but also to provide information to groups that often remain invisible to institutional bodies. This represents the foundational level of telecare provision and remains essential. However, the absence of specific elements such as emotional engagement and frequent communication, as emphasised by Ahlin and colleagues (2024), increases the risk that certain information may be misunderstood or overlooked by those who need it most.

In the *following* mode of care, there is an interaction between care providers and receivers, although the latter primarily act as an audience. In this category, computers and software for online meetings are employed to support the right to education for groups at risk of exclusion. These tools facilitate interaction and dialogue, often attempting to replicate, in online settings, care practices that had previously been established in face-to-face settings, thereby striving to balance innovation with maintainability, as suggested by Krüger and colleagues (2021). In many cases, beyond offering intellectual services, the organisations also provided the necessary hardware, thereby helping to bridge the digital divide. However, it is important to stress that mitigating digital exclusion requires more than access

to technology and connectivity alone, as previously emphasised by Cibin (2023). This materiality dimension must also be supported by social assistance and appropriate physical spaces (*ibid.*), as well as by ongoing technical maintenance (Ahlin et al. 2024).

In the *reacting* mode, ICTs support users only in accessing, or interacting with, the media through activities like lobbying or advocacy. This is the area in which the political dimension of care, highlighted by Puig de la Bellacasa (2017), becomes visible through practices that not only aim to raise awareness and disseminate knowledge, but also seek to intervene in the realm of opportunities by promoting structural change.

In the last category, telecare practices work towards *collaboration and commoning* (Teli et al. 2020). By commoning, we mean the collective effort towards the creation of a community objective, a commons, “to resist and create alternatives to the inequalities, contradictions, and threats of contemporary neo-liberal western societies” (Poderi 2020, 31). This process of empowerment through the creation of community is not possible in the self-care activities seen in the *discovering* mode. Technologies and platforms, when collaborating and commoning, are used primarily as a means of connecting people and co-creating together, blurring the direction of the interactions. In most of these cases, the ICTs employed are mainstream technologies. The use of these everyday digital tools – thanks to their widespread popularity and the fact that many users have already domesticated them – has been fundamental in rapidly bringing together large groups of people (Carlsen et al. 2021; Parolin and Pellegrinelli 2022), thereby enabling the formation of care collectives (Ahlin et al. 2024). However, several concerns have been raised regarding the use of major proprietary platforms and social media, including issues of transparency, fairness, and privacy risks (Cibin et al. 2023; van Dijck et al. 2018; Eubanks 2019). Further research is needed to understand how the internal dynamics of these platforms (for instance, how a platform’s algorithm determines the visibility of help requests within specific groups) may influence the development of interpersonal relationships in these contexts.

Policymakers and designers of technologies should keep in mind these dynamics when responding to similar future information crises.

6. Conclusions

This study has shown how CSA initiatives leveraged ICTs to address the challenges faced by vulnerable groups during the pandemic’s information crisis. By framing these interventions as telecare practices, we proposed broadening the scope of telecare research to include bottom-up, everyday uses of technology that respond to diverse forms of vulnerability. This expanded lens draws attention to often-overlooked aspects of care – what Puig de la Bellacasa calls the “neglected things” – and calls for a more inclusive, intersectional approach to understanding how care is practiced and experienced. Such a perspective not only includes attention to structural inequalities in debates about digital care but also aligns with ethical imperatives to consider privilege and power in the design and analysis of sociotechnical systems. The strength of this study lies in its exploratory approach, grounded in empirical data, which contributes valuable evidence to an emerging discussion on telecare and social inequalities – a field that remains underdeveloped and in need of further scholarly attention.

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Ontology Otherwise: Enclosure, Performativity and the Un-common-ing of AI, Data and Land

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Abstract

How do we promote human capacity for caring and evolving carefully together as we face ecological shifts in habitat and social relations? Using de la Cadena and Blaser's idea of *uncommon(ing)* and Judith Butler's challenge to the *common*, this paper considers conceptual forms of enclosure and foreclosure that stifle responses to uncertainty. It argues that ideas and identities are being foreclosed by the semantic connections and grammars of digital interaction and AI, much as commons enclose land. Regarding the physical and virtual as parallel spaces of appropriation under capitalist-colonialist cultures, the paper suggests that, if we are to care well, the data processing that feeds computation and artificial intelligence needs reconsideration at its core, much as land use does. If machine "learning" were based on a performative model, rather than something fundamentally categorical, it might avoid the obvious foreclosures of applying static models to changing contexts. Using this analysis, the paper explores data, land, access and inclusion to consider climate care and a transition from infrastructures to world-changing. In the process, the paper examines the linguistic infrastructures that inhibit change.

Keywords

enclosure; foreclosure; data; grammar; commons; reflexivity; AI.

1. Introduction

This is a highly reflexive moment – one when transformation is discernibly all around us, asking us to respond creatively and with care to multiple converging challenges, such as climate crisis and political polarisation. To recognize that things will be otherwise is to consider how they were otherwise and might be otherwise again (Star 1990) – the “designed, therefore designable” state of the world (Light 2011a). There is a growing literature that speaks with this reflexivity in mind: reflecting on periods when the structure of societies changed according to the resources of the season (Graeber and Wengrow 2021); when debts were annulled regularly to free debtors from the long-term consequences of resource failure (Hudson 2018) and when most of the world's population had access to land for “self-provisioning” (Angus 2023, 9). All make the point that

resources were organised differently and could be again. A sense of the transformations that have taken place raises the possibility for further change and supports the democratization of futures (e.g., Light 2021a). It also helps reveal what forecloses them. This paper uses a consideration of two resources in transformation – data and land – to explore how grammars act as infrastructure to configure our societies. It then asks how to make the world-changing that we need as a planet.

The premise here is that lessons may be learnt from comparing the functioning of historical enclosure (which took land-based resources from the commoner) with current trends in computing. The paper offers a discussion of contemporary enclosures and foreclosures based on how language structures futures. The performativity of language has been demonstrated by speech act theorists from Austin (1955) to Butler (1990; 1997). Here it is used to consider the encoding of everyday life in networked computing, where the turn to producing “intelligence” through machine “learning” (at least metaphorically, e.g., Murray-Rust et al. 2022), involves language structures that foreclose meaning-making and adaptability.

Core to the argument presented is the spatial idea of *enclosure*, which is to fence off or barricade and thus deny access, and its temporally-related cousin, *foreclosure*. To foreclose is to deny opportunities before they arise. To explore this as a current dynamic, the paper first argues for regarding the enclosure of the physical and virtual as parallel. The point is then made that the structure of language impacts the futures available to us at a time of rapid change, playing through both the arenas of data and land. Developments in computing are analyzed against performativity theory, drawing on philosopher Judith Butler (e.g., 1990; 2001) and ideas of (un)commoning that resist modern forms of enclosure (de la Cadena and Blaser 2018). This enables the final sections to look afresh at how we construct and care for our worlds and how we plan for resilience in the face of converging crises.

1.1 Alternatives and Why We Need Them

The power to transform ourselves culturally is critical at this juncture. Human-made crises have destabilised the planet, requiring both ecological and social action to unite in managing disasters and precluding worse. Part of this interrelated predicament is political; the world’s politics are largely hands-off and laissez-faire in what has become known as neo-liberalism. Technology companies have exploited this unregulated, financialized culture to expand annual revenues to bigger than most countries (Babic et al. 2018), making themselves too large to regulate. At this scale, they are configuring planetary behaviours across networks through code (e.g., Lessig 1999). They exist entangled in extractive systems of production/consumption: required to exploit resources for profit (Bakan 2005), even to replace managers who attempt to adopt different values (e.g., van Gansbeke 2021) in aggression that is hardwired into the legal status of *public limited company*.

Klein points out that, before the neoliberal era, emissions growth linked to fossil fuels had been slowing from 4.5% in the 1960s to 1% in the 1990s, but that changed (2014, 80). Neo-liberalism, as a pinnacle of late capitalist thinking where the market determines what happens and politics is used to protect markets, has affected material and cultural norms for the worse. It promotes “possessive individualism”, removing “the restraining powers of society” (McDonald et al. 2017, 4) and resulting in “more individualistic and self-centred self-identity where

previously societal discourses were based on social cohesion and solidarity” (*ibid.*, 11). In other words, the very way that societies understand themselves has been altered to the detriment of the collective sensibility needed to attend to climate care and a flourishing global habitat.

This system is not easily resisted; remedies must lie outside the current norms. De Sousa Santos argues that political resistance needs to be premised upon epistemological resistance, meaning “the critical task ahead cannot be limited to generating alternatives, indeed, it requires an alternative thinking about alternatives” (2007, 63) and Strathern suggests that understandings of “relation” shape what relations are possible and possibly understood (2018).

These authors suggest that making lasting change means rethinking structures of thought as well as (and as a precursor to) action on material culture. This is what informs this paper, which examines the underlying language that shapes how resourcing decisions are made. Taking this into a discussion of how resources are controlled is fundamental; new worlds will need changed access to basic needs. To this end, the paper links the need for transformation in access to resources with an analysis of language and performativity to see what work is being done by linguistic structures.

1.2 Enclosure

The word *enclosure* is evoked in laws as early as the 13th century Commons Act¹ in England and Wales to remove access to land from serfs² who depended on it for food and barter, as part of a trend seeing resources flow towards an elite (e.g., Angus 2023). Underpinned by Roman property law, with its stress on ownership of land and chattels (including women and slaves), the pattern over the centuries has been widespread expropriation of ordinary people and the creation of hungry workforces obliged to labour for others to survive. In this system, people are resources themselves, ready for exploitation.

Where England led with enclosures, other regions followed. Enclosures took livelihoods from local people by denying access to formerly-shared spaces. Across the world, the process continues.

Far from being a one-off event during early capitalism, enclosure remains fundamental to capitalist globalization and growth, and is broadly cemented by a logic of exclusion, domination, and control over places and people. (Zoob Carter 2023, *n.p.*)

This exclusion is notably occurring in areas populated by Indigenous communities (Ghosh 2021).

For many industrialised nations, recent land appropriation involves transferring common urban areas managed by municipalities (for the benefit of citizens) into the control of commercial interests, benefitting only shareholders. Governments use the rhetoric of *the common* to appropriate and enclose resources, becoming “global public goods” that governments see as their job to control (Blaser and de la Cadena, 2018). By contrast, “commons” nowadays are largely reclaimed land such that local people can again access ground/soil/land/place without overlord ownership. (“Commoning” is a political act and/or means of better husbandry to redress the passage towards private and enclosed space.)

In a move that takes appropriation into digital space, the technology industry is now creating new virtual and synthetic contexts for exploitation. The next section concerns how this manifests and forecloses meaning.

2. Virtual Resources for Exploitation

The arrival of digital infrastructure has introduced further potential for exploitation, allowing appropriation beyond land and materials and raising issues of possession and care in digital contexts. The digital is a fusion of resources that can be claimed, both material (servers, keyboards, carbon footprint) and immaterial (the work performed on a Google Doc creating a shared space of productivity, the “spaces” of virtual reality, artificial intelligence [AI] with its cognitive architectures for learning). There are ambiguous aspects to the digital, such as how real its virtual spaces are; digital infrastructure is rich in metaphor (see Murray-Rust et al. 2022; Nerlich 2024). Nonetheless, it is through claims of ownership that virtual resources truly become manifest.

The politics of software, digital infrastructure and data management extend ownership to entities in this ambiguous zone, with the output of ones and zeroes becoming resources to possess alongside the material forms which hold them. Sharing, limitless reproduction and ensuing patterns of rights control have been discussed with reference to the boundlessness of software and media (e.g., Benkler 2006; Aigreen 2011), which, for a while, eluded management but is now emphatically tied down. The latest dynamic – with similar opportunities for control and appropriation, but different impacts – is within the field of data and its manipulation (Mejias 2023).

Couldry and Mejias (2019) liken the outcome of the current blossoming of data manipulation to colonialism: mining data involves (a) appropriation of resources; (b) formation of new social orders; (c) extreme concentration of wealth; and (d) creation of ideologies to justify appropriative practices. Mbembe also sees colonisation coming from recent digital developments and a kinship between contemporary forms of extraction in the “age of the algorithm” and older forms of domination. These turn us “all into artefacts” (Mbembe 2020, *n.p.*), though simultaneously displacing us, our “muscle” no longer needed (*ibid.*).

This latest appropriation relies on what Parisi calls “algorithms of cognitive and affective capital” (2015). As Cheney-Lippold (2017) shows, these algorithms amass a digital shadow for everyone: our actions articulating our identity, our choices made within the frame of systems determining what is allowed to us, both in terms of accessing resources and of performing as a resource. Automated decision-making might seem like a levelling of opportunity, offering fairness free of human intervention, yet it removes judgment and discretion in the moment, leaving pattern-matching as a basis for decisions and, with it, a failure to handle exceptions. Further, it is well recognised these patterns are derived from data affected by human prejudice and that the patterns of prejudice intensify as classifications play out in societies. Networked data use has evolved fast and created a situation where little local control is available over smart houses, cities or systems of management. In the hands of global business, data, infrastructure, code and design processes unite to deliver discrimination and polarization (Chun 2024), inequality and segmentation (Eubanks 2018; Noble 2018) and the massive use of natural resources for trivial or detrimental design (from Papanek 1971 to de Vries 2023; Smith 2023). This dependence on machines for management alters human-world relations and how we treat each other in ways that are significant, yet hard to detect as we become habituated: “becoming normalized, like the [relations] before it. [...] The bigger and slicker it gets, the more it erases alternatives” (Light 2022, 36).

Suchman (2023) asks how AI came to be figured uncontroversially as a thing. She suggests that AI is “a sign invested with social, political and economic capital and with performative effects that serve the interests of those with stakes in the field” (*ibid.*, 3). Much current concern with AI comes not with the prospect of an out-of-control maverick machine running amok but because power over us exists in monopoly companies’ data centralisation with unprecedented control (Whittaker 2021). Abandoning ethical concerns in competing for market advantage, AI is expected to maximise profit for its makers using centuries of creative material and terabytes of user-generated content from social media scraped to represent the nature of the world. This has, in itself, been described as theft (e.g., McDermott 2023). A legal challenge to stop the use of copyrighted work in training AI programmes (Samuelson 2023) reveals the extent of the USA’s significant copyright measures, themselves a form of enclosure, now in competition with the next wave of digital exploitation practices. Just as land before it, digital resources are subject to the logics of enclosure, appropriation and extraction. A key difference is that control has moved from rulers and landowners to corporations: recent advances are not so much due to fundamental scientific breakthrough techniques, but “the product of significantly concentrated data and computer resources that reside in the hands of a few large tech corporations” (Whittaker 2021, 51).

In the next sections, the paper explores the language used in data processing, focusing on the point where machine learning handles data. Loosely modelled on the human brain, neural nets underpin advanced machine learning. An individual node in the neural net might be connected to several nodes in the layer beneath it, from which it receives data, and several nodes in the layer above it, to which it sends data. These architectures process training examples (usually hand-labelled in advance) to learn.

An object recognition system, for instance, might be fed thousands of labeled images of cars, houses, coffee cups, and so on, and it would find visual patterns in the images that consistently correlate with particular labels. (Hardesty 2017, *n.p.*)

To understand the impact of this design, let us consider what language is capable of.

3. The Nature of Performativity

The nature of language is to be performative (e.g., Butler 1990; 1997). Language can enact change through utterance, as “speech acts” and in social constructions that come from repeated speech acts, such as gender (and other aspects of identity that are created through repetition in society).

Concerned with gender as a social construct, Butler suggests that the body becomes its gender only “through a series of acts which are renewed, revised, and consolidated through time” (1990, 274) so that gender “is real only to the extent that it is performed” (*ibid.*, 278). This is the basis of a theory of performativity³ that dismisses essentialist readings of identity (i.e., definitional accounts) to propose that it is through social rehearsal that entities gain their characteristics (i.e., performative emerging). This is a reading of society that has the potential

for greater fluidity, such that social reproduction might become social transformation (Butler 2001). To embrace performativity as a theoretical position is to move from defining what *is* to what *we do* and the practices we adopt. It changes how we speak but also, they argue, it changes what is possible and what can become (Butler 2001).

Such an account of social formations is not at odds with the political analysis, above, of how identity is inscribed by automatic decision-making systems and the like. In fact, the very existence of so much literature on the impact of using data and algorithms in society supports a view of identity as emergent and emerging. However, the argument can also be considered at the machine-level to explore how the systems of AI and their like handle data, or, indeed, what we consider data to be. Although much is *not* known about how individual IT systems learn and then learn about their learning (and it is in the interests of the producers to keep even staff in relative ignorance of these matters to ensure they cannot share trade secrets), the basis of relations in machine learning is ontologies of terms. Although these relations can be adapted through learning, the syntax remains constant. And it is not a performative syntax. It is based on classification.

This point about performative vs definitional systems is perhaps best illustrated through examples. One comes from Indigenous scholars' explanation about how First Nation languages work; the other is taken from an earlier paper exploring a performative view of human-computer relations. They are given here as a prelude to exploring the foreclosing nature of digital realms.

3.1 Verbs vs Nouns

Not all worlds use nouns the way that European languages do and one person may speak in different ways depending on the language they are speaking (Athanasopoulos 2017). Law and Mol note languages have different emphases and academic conversations that restrict themselves to using tools available in English may "become limited and parochial" (2020, 264). Indigenous linguist Dan Moonhawk Alford explains the differences between First Nation languages (across the "Americas" before conquest), which are verb-dominated, and Indo-European languages, such as Spanish, Portuguese and English, which hang on nouns. Alford comments that, through these distinctions, he can both articulate and reveal a more fluid encounter with the world (1994, *n.p.*), one that precedes, but suggests, process philosophy⁴. Talking of another's reaction to the verb-led nature of First Nation languages, Alford relates:

[This man] was astounded that such a verby worldview is actually possible, much less alive and well in America 500 years after the invasion of Europeans, after 500 years of cognitive terrorism aimed at breaking up that worldview and substituting another, more nouny one. But just as indigenous Americans could never have dreamed how people could live in primary noun-orientation while surrounded by the everchanging flux, it is still a continuing puzzle to Europeans and their descendants after 500 years that "God" [...] here is a verb instead of a noun. [And] one of the toughest [intellectual] tasks indigenous people ever had to face was explaining to Europeans who their non-noun God was[...] they, and nature, and reality were all verbs. (Alford 2009, 294)

This tension appears again in botanist Kimmerer's account of learning the language of her ancestors after being trained as a Western scientist. Of the latter, she says: "it is a language of objects. The language scientists speak, however precise, is based on a profound error in grammar" (Kimmerer 2013, 48). She explains that:

[a] bay is a noun only if water is *dead*. When *bay* is a noun, it is defined by humans, trapped between its shores and contained by the word. But the verb *wiikwegamaa* – to *be* a bay – releases the water from its bondage and lets it live. (*ibid.*, 55)

This highlights the distinction between categorical and performative in language. She offers a grammar of animacy as a regenerative force, asking if grammar might be a tool of global transformation.

Indigenous scholar Zoe Todd points to the appropriation of Indigenous worldviews (2016), talking of European and North American academics having their "ontological moments", while taking credit for ancestral ways of thinking they have done nothing to protect or care for (*ibid.*). Both theories of the performative and readings from Indigenous and Global South scholars have informed the unease about computational structures described here and Alford is cited to demonstrate that the dominant complacency about noun-led worldviews overlooks hundreds of years of contrary practice. Even the notion of ontology to describe the different systems is inadequate, since ontology pertains to how things *are*, not a fluid state like "doing". What this example shows is that a noun-based structure is not inevitable.

3.2 Performativity and Language

To take this on, it is possible to explore how nouns condition and create data, which is not to look at implementation of systems but the *design of the underpinning technology*. In 2011, I used Butler's performative understanding of relations to look at the ontologies of (what was then) the computational "Semantic Web", i.e., linkages providing the basis on which machine learning was making its connections. I described how ontologies linked concepts in limiting ways – making realities by taking aspects of existing relations and reproducing them in systems so that their characteristics impact possibilities and foreclose alternatives. An ontology "reveals the potential for codification in semantic systems", I wrote, and "a single linked-up ontology for/of everything [...] begs the question as to the desirability of fixing meaning through defining relations so comprehensively" (Light 2011b, 435). I quoted a team making ontologies who commented that much computational ontology work risked "congealing knowledge" (Buckner et al. 2010). This resonated with Butler's "discursive norms which have congealed into givens" (Salih and Butler 2004, 303).

I gave the example of defining "woman":

If "woman" appears linked by relations such as "mother to", "daughter to", "sister to", "wife to", we will understand "woman" to be a family-orientated, possibly passive entity. If, in addition, we see "woman" linked as "employed by", "owns", "runs" and "manages", we see a more agentic profile. [...] this could mean the difference between "employed by" and "owner of" in some future woman's working life. (Light 2011b, 435-436)

Returning to this analysis, it is apparent that even the modified language proposed relates to a series of static states, despite additions to address agency. The passage concerns nouns: not *doing* words, but concepts caught in *being* words. The agency stays in a linear classificatory paradigm.

The role of the ontology in computer science, as distinct from within philosophy and metaphysics, is to eliminate ambiguity and indicate relations⁵ – it generates relations between states. Logics have to be made “fuzzy” (Cintula et al. 2023), they do not emerge from fuzziness in the way that negotiated meanings across human groups and cultures do. Deep learning allows relations to slide and transform, but it cannot rewire its syntax to move beyond ontologies. The data that is processed produces a noun-y world – a culture of states, not movements – because the design of neural nets and semantic webs is to define and pursue categories and these underlie the large language models and so on of generative AI – another angle on the “thingness” of which Suchman speaks (2023).

In a contemporary analysis, Crawford and Paglen (*n.d.*) offer this loaded commentary:

You open up a database of pictures used to train artificial intelligence systems. [...] A photograph of a woman smiling in a bikini is labeled a “slattern, slut, slovenly woman, trollop”. A young man drinking beer is categorized as an “alcoholic, alky, dipsomaniac, boozier, lush, soaker, souse”. A child wearing sunglasses is classified as a “failure, loser, non-starter, unsuccessful person”. You’re looking at the “person” category in a dataset called ImageNet, one of the most widely used training sets for machine learning. (Crawford and Paglen *n.d.*, *n.p.*)

Note that all the tags they describe are nouns. In their own description, we see a “young man drinking beer”: a more performative reading (though “being, growing, presenting as masculine and drinking beer” would be more so). What the machine takes from this image is a list of types: “alcoholic, alky, dipsomaniac, boozier, lush, soaker, souse”, like the car, house and cup in Hardesty’s list above. Classifying this way involves identifying an action as a *characteristic* of a person. The work is definitional beyond its sociological consequences; it is predicated on turning a fluid being into a static type that can be coded.

Crawford and Paglen ask a series of critical questions of how data processing systems are trained, including “What sorts of politics are at work when pictures are paired with labels, and what are the implications when they are used to train technical systems?” (*ibid.*). We might expand their remit to questions of process. Do training systems need to hinge on categorisation? Might there be a system that it is not only dynamic in linking (i.e., that “learns”), but allows people to emerge as more than the sum of their actions? Might we be attended by living archives that open possibilities to us, rather than be subjected to pattern-matching that compares us to norms and determines our worth accordingly? The answer may be antithetical to the functioning of ontologies but it is interesting to think with. Nouns may be the ultimate enclosure device.

4. The Language of Alternatives

The non-performative grammar performed by machines forecloses our possibilities; nouns enclose even before the scraping of data and selling it back to us parallels land-based enclosure

of old. Taken together, the possibilities for digital transformation are great, but also disempowering for individuals and communities. Just as commoners became labourers, so labourers are becoming shadows of their own data, described with greater classification and fewer exceptions, to be managed by new overlords: centralised and networked digital models of human behaviour owned by a few corporations. Where might we see a parallel play of enclosure and resistance by way of inspiration for alternatives?

4.1 Land Commons and Their Boundaries

Exploring alternatives to private and state-owned land, economist Elinor Ostrom worked to prove that *commons* can function as a form of resource held in common. This becomes possible if the right structures are established, such as membership and adherence to rules, countering the pessimism (e.g., Hardin 1968) that saw only the potential for the ruin of the resources involved (see Mildenerberger 2019). Ostrom's eight principles of commoning (Ostrom 1991) suggest that, in a limitless community, it is challenging to set modes of engagement; part of what resists overuse are clear group boundaries and recognized member sanctions (*ibid.*). Commons may therefore be a frame for any resources that are finite. (Looking at the planet, we might see a series of commons – sky, oceans, land – being badly managed through poor regulation.)

But looking up from individual instances of land-as-commons reveals challenges, since Ostrom's successful commons structure is also an enclosure, managing boundaries of care and legislating which people are sufficiently careful to be good commoners. While sharing may be a social, environmental and economic good (Light and Miskelly 2015; 2019), something as “ostensibly egalitarian as sharing” (Coote et al. 2010, 4) can exclude groups: because of how much discretionary time they have, where they come from, where they live, their health, observing that some neighbourhoods seem “awash with activities that enrich and strengthen social connections” (*ibid.*) and others not.

Sharing land in areas with little history of desolation (i.e., land is fertile, weather clement and water clean) may be individually successful, but the distribution of different soils suggests some limits to this template. Poorer areas are notably full of former industrial brown-field sites. These areas are not unused, despite the dangers, for instance Latva-Somppi et al. (2021) describe toxins in shared land in Sweden. If commons are reproduced across the world, land will include heavily damaged, vulnerable or polluted places, such as the South Sea Island Tuvalu, which is shrinking and increasingly salty (Redmayne 2021). Commons structures can reproduce patterns of existing hardship and intensify it, privileging those sharing resources in places that are not damaged by colonialist pasts and presents.

Butler suggests that when we seek a common bond, something similar happens – where an appeal to “socially instituted relations”, formed over time and giving us a sense of the “common” works “only by excluding those lives that do not fit the norm” (Butler 2001, 3). The norm binds us together, but also creates unity “through a strategy of exclusion”. Both the *common* and the *commons* can be too fixed for a rapidly evolving century and its inhabitants.

4.2 Commoning

If even attempts to resist enclosure can also enclose, it is interesting to consider how movements towards commons have responded. “To speak of the commons as if it were a natural resource is misleading at best and dangerous at worst – the commons is an activity... It might be better to keep the word as a verb, an activity, rather than as a noun” said Linebaugh, who adopted the gerund (2008, 279). Fournier (2013) suggests a specific politics:

Commoning is [...] about the production of ourselves as common subjects, in a material sense (having access to land and resources), in a knowledge sense (having the means and capacity to reproduce ourselves from natural resources), and in a relational sense. (Fournier 2013)

Relatedly, Huybrechts and colleagues’ place-based *reworlding* (2022) expresses fluid relations, as well as looking to establish them. The *uncommons* (de la Cadena and Blaser 2018) stresses diversity in a world where many worlds flourish. Thus, de la Cadena discusses “uncommoning” (2015):

[A] commons constantly emerging from the uncommons as grounds for political negotiation of what the interest in common – and thus the commons – would be. (de la Cadena 2015, *n.p.*)

Here Butler’s concerns for diversity and Linebaugh’s concerns for activity meet in a framing of care that resists stasis or exclusion. In other words, it has mattered to a generation of scholars that commoning, and, now, uncommoning actively join descriptive vocabularies. Commons are too tidy and too constraining as nouns.

5. Beyond Solutions

Might the technology industry likewise find fluid and partial accommodations that shift away from inhibiting structures (and the inhibition of structure)? It is difficult to imagine this happening. The technology industry prides itself on promoting technology to solve problems, which is an absolutist position. It anticipates solving climate change and the ecological injustices that see the Global South contributing least and suffering most, to be achieved with tools that are not yet invented (Gates 2021). Living with crises is a predicament that one can manage, endure or deny, but not solve (Martenson 2012). So, this technocratic position is hubristic on two dimensions: not only does it presume that a suitable technology will be invented, but it assumes solving is possible. Further, these narratives of future technologies have a commercial rationale, creating research and funding agendas alongside other functions: “Technological futurity can be theorized as a discourse of technological anticipation” (Kinsley 2011) where the “politics of anticipation of technical futures is the codification of the possible” (*ibid.*, 231). There is power in well-promoted visions.

Yet, between pursuit of giant schemes and focus on individual psyches and protectionist structures is a collective tier that could act on our predicament. Performativity applied to interdependence gives an alternative to neoliberalism, caught in age-old practices, such as *buen vivir* (e.g., Gudynas 2011) or *sentipensar*, after Orlando Fals-Borda and described by Escobar (2016). A million small experiments could support the ongoing deconstruction of (technocratic) norms.

5.1 Thinking and Doing Alternatives

A fluid world is one in which we can move readily from current understandings of ourselves to ones where we evolve and are able to see our potential to evolve. This takes a degree of self-awareness and reflection. In other words, the reflexivity of our times needs to become incorporated in personal and collective reflection on change, opening us to changing together, even if we are not sure what we will become or where we need to go. (This is distinct from being flexible workers or consumers, reinforcing the uncertainty and precariousness that capitalism and colonialism have created.) To leave exclusionary enclosures behind takes mindfulness, collaboration, subversion and critical mass. Action must create buffer zones in which change can root, as well as create the change needed (Light 2022) amid “an ethics of exclusion, which pays attention to the entities, practices, and ways of being that are foreclosed when other entangled realities are materialized” (Giraud 2019, 2).

In this context, automation is useless because we need to change the parameters of behaviour radically and keep changing them and automated systems do not break into unprecedented cultural modes, even if they are liable to unexpected behaviour. In response, we can ask what happens if we tune ourselves with active speech to recognize when categorization is merely a necessary communicative device and when it is liable to turn tools, data, systems and ways of being into something overly definitive, and thus reductive.

A key term in this rethinking and remaking might be *infrastructuring*, the verb developed from the word *infrastructure*. *Infrastructure* is an example of a noun representing *deadness*, as Kimmerer might say, since it is the aggregation of systems that are already installed: “Infrastructure does not grow *de novo*; it wrestles with the inertia of the installed base and inherits strengths and limitations from that base” (Star and Ruhleder 1996, 113). Infrastructure is influential in its rigidity, even as new systems are added, such as the layers of AI now appearing. *Infrastructuring* (e.g., Le Dantec and DiSalvo 2013), by contrast, could stay agile, rather than build new edifices. Infrastructuring holds a relationship with reversibility that infrastructure loses. In this way, infrastructuring highlights socio-technical process, even as it moves towards fixture.

Within digital computing, a process view already informs the programming of digital systems and how they are designed to achieve tasks sequentially. However, a process view rarely reaches to emerging socio-technical practices and never extends to changes in culture, even when these changes are precipitated by changes in technology. Changes in culture are regarded an externality. A performative view does away with that luxury.

5.2 Beyond Ontology

Playfulness is never singly faceted; it extends where it will: a means of understanding ourselves in/of plural shifting worlds. I proposed that technology could be made less divisive with “design which is spaceful, oblique and occasionally mischievous” (Light 2011b, 431). However, the growth of globally coordinated networks has given the lie to this. Openness, obliqueness and mischief are needed, but not enough. If we are interested in cultural change, we need to resist global financial and technological infrastructures that are self-correcting and swallow initiatives to change them. This takes the self-awareness of the tactician, not just in playing, but responding to the play of others.

Ontological pluralism offers the spectre of fragmented responses in a way that plays directly into the neoliberal worldview, splintering people in a “hall of ontological mirrors” (Light 2021b). It is a basis for the collective individualism that undermines solidarity. Yet, something in the idea of differential is right: unevenly created crises are also unevenly experienced. Repair is due. Difference should be acknowledged, yet without fracturing. Where categorising, as the basis of ontology, offers fragments, performing is at once both more modest and more fluid. Butler (2001) suggests that we can resignify the basic categories of ontology only to the extent that we submit ourselves to “cultural translation”. Speaking of “yielding our most fundamental categories” to a rupture encountering what is unknown, or not yet known, they say that cultural translation:

is not between two languages that stay self-enclosed, distinct, unified. But rather, translation will compel each language to change in order to apprehend the other, and this apprehension, at the limit of what is familiar and parochial, will be the occasion of both an ethical and a social transformation. (Butler 2001, 224)

Is it possible to weave into this another abstraction, such that two languages with different syntax might reach an accommodation without categories or ontologies? We may not know where our journey is going with this, but that returns us to de Sousa Santos’ point that we need alternative thinking about alternatives (2007), requiring us to abandon all certainty. Here, I have argued that we need alternative grammars to find this alternative and that perhaps these grammars have always been with us, if we had looked. A synthesis is what we are always performing, yet without the legibility or the tools.

6. Conclusion: From World-Making to World-Changing

Uncommoning is both performative and resists enclosure. It is important that enclosures of any kind are only a temporary state (and a state understood as provisional) if collective care to avoid foreclosure and loss of futures is to join collective care for the immediate and local and for redistributive justice. There is an anticipatory weight to nouns used in data processing that joins other enclosures, such as barricades, fences and more visible structures that close things off and down. Without an appeal to collective doing, making and becoming, all

participatory practice and potentially restorative plural engagements can be co-opted by fatal neo-liberal processes. Without flow, all collectivity may be a source of exclusion. We need to be enacting worlds, not choosing ontologies. It reminds how we lost solidarity (Koos 2019; McDonald et al. 2017; Smith and Sorrell 2014), for solidarity must be built. It asks for something fluid and evolving in the place of fixities that not only stop us in a moment but also erase other worlds and other possibilities for worlds to develop.

Inextricably linked, the practices of language are informed by modes of knowledge-making. Data is currency and, as discussed, linked to a redefinition of what it means to be in human society, yet, as shown, there are processes within the design of software (as well as its uses) that act already up-stream to define characteristics. In a paradox, the rapidly-evolving phenomenon of digital technologization can fossilize and stunt opportunities for change and contribute to cultural orientations that reduce capacity for facing and managing current predicaments. This can extend to the nature of the ontologies at work, both in the computational sense of the relations being built within machine learning, and in the sense of what they mean for societal understandings. This tendency demands an overhaul of language and knowledge-making as well as other practice. We can learn from how those building land commons understand themselves as actively communing and how this shift in description helped an emancipatory process re-open after a critical encounter with boundaries.

To end with a question, Butler asks whether the “common” may not be instituted through the production “of what is un-common, what is outside the common, what disrupts it from within, what poses a challenge to its integrity”. Do we need to know “that the ‘common’ is no longer there for us, if it ever was” and that “difference is not only the task of cultural translation in this day of multiculturalism, but the most important way to nonviolence?” (Butler 2001, 21). This sounds as workable an approach to caring as we are likely to find in our fractured and rapidly transforming worlds. It allows space for the transformative work of thinking performatively and, perhaps most importantly, a place of meeting for those interested in integrating the partial and provisional results, without foreclosing them. Language may be a thin tool against the powers that have sucked resources through the centuries, but it is one that almost every human being has access to and can use in the service of others, including beings without translation. In asking whether a regenerative use of language can help curb the flow of resources away from those vulnerable to the destruction of habitat and even challenge how resourcing is understood at a time of recognizing the planet’s limits, we may be confounded by the power of the software industry’s work of definition, but we have the grammar to challenge it.

Notes

¹ Many open green areas in England are still known as the “common”, being the remnants of land where commoners grazed their flocks.

² Serfdom was a form of slavery which kept people working for the local lord with little freedom of movement.

³ Not to be confused with performance or the way that things perform, rather this is an analysis of the power of language to enact, thereby offering a theory of how things come to manifest as they do.

⁴ Whitehead's process philosophy, itself based on Ancient Greek thinking about flow, offers a notion of life as process rather than lives as numbers and states, picked up by biologist Donna Haraway and feminist physicist Karen Barad.

⁵ It is akin to Johnson's dictionary, which, in establishing meanings also pinned down spelling: to write a definitive version of meanings (while doomed to failure) also provides a reference point for how language should be used. It is normative across different dimensions.

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Maintain-ability: On Life Alongside Computer Software

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Abstract

This paper examines what lessons can we learn about living with technology from software maintainers who struggle to keep digital infrastructures – at least most of the time – in good running order. The empirical material of the research was collected at three events as programmers convened to give testimony of disruptions of code and life. Inspired by hyphenation of *response-ability* by feminist technoscience theorists Karen Barad (2007) and Donna Haraway (2016), and in response to invitation for *broken world thinking* by Steven Jackson (2014), I theorise the concept of *maintain-ability* and demonstrate its application to foreground the capacity to not only give but also receive care which holds together more-than-human worlds at the dawn of the third millennium. The findings nuance and specify the notions of maintenance documented in science and technology studies literature, and weave it into life. Software maintainers exercise considerable agency over the material in their immediate care: code. However, in doing so they also find themselves having to articulate dynamic, interdependent and hybrid networks of relations which they are intimately entangled with, and whose durability depends on the success of their ongoing, indeterminate reconfiguration. Both the programmers and the software they maintain must continuously navigate risks of breakage, burnout, bugs or falling into obsolescence.

Keywords

software studies; software; infrastructure; maintenance; care; life.

1. Life Alongside Computer Software

I enjoy spending time playing and sculpting sound with music synthesizers. I do it almost every day, and consider it my “quality time with algorithms.” Moments of creation, self-expression and attentive listening to these specialised computers offer a welcome counterbalance to research work done in study of science and technology, which, in the interest of making room for socio-cultural critique, tends to background such validating and self-actualising, constructive relations of positive subjectification with computer technology. While programming sound, the famous concluding words of Donna Haraway’s early programmatic and arguably old-school *Cyborg Manifesto* sometimes echo in my mind: “I would rather be a cyborg than a goddess” (Haraway 1985).

In addition to enjoying making computer music itself, my artistic practice involves an ongoing intuition and interest-based exploration into acoustics, mathematics and pragmatics of various areas of synthesis, sound design, and exploration of software and hardware built or appropriated for purposes of generating, manipulating and organising sound. YouTube offers a vast repository of knowledge contributed by artists, engineers, corporations, boutique synth designers, influencers (“synthluenzers”), professors, and others. Anecdotaly, the YouTube recommender algorithm seems to do a relatively good job of suggesting interesting content for me to watch, especially in relevant areas of mathematics regarding synthesis, sound mechanics, music theory and unorthodox ideas from the history of sound synthesis and experimental music, as well as tutorials and reviews of the synthesizers I own. Much of what I am learning from this user-generated content – mediated via YouTube’s behemoth data infrastructure, as well as the search and recommender algorithms – feeds back into my artistic practice and my ongoing relationship with the software running on my computer and synthesizers.

Besides the private, of course the work parts of our biographies are bound up in personal relationships with software. While artificial separation of life into work and non-work is as necessary as it is treacherous, I encourage you to recall the moments and experiences you have shared with your word processor, web browser, PDF viewer, analysis program, and other familiar work-software which have been interwoven, sometimes more and sometimes less, with your professional commitments and projects. This is relatable and indeed the condition of all white-collar workers, including us academics.

Or consider the familiar operating systems such as GNU/Linux, macOS, Windows, Android and iOS which we teach our children to use; how to manage files, install software applications and keep them updated, customise settings, manage resources and mind cybersecurity.

As sound artists, as researchers, and as children and parents, we exist alongside computer software as users not only in a practical sense, but also existentially as we are interpellated (Althusser 1971) to take on “the user” as our identity and our assumed subject-position. Not one bundle of relationships, let’s call it *a life*, is the same as another one; each has a unique story, expanding and compressing, doings and undos of relations. Disrepair, decay and obsolescence affect not only the practical going-on of life, but goes to the core of our identities; what is it to be an artist with broken instruments, a researcher with buggy infrastructure, or a parent in a world of cyberthreats? Why does our companion software – most of the time anyway – generally seem to work? Where do software updates come from? Who is working behind the screen?

This article is on the folding and unfolding of certain biographies alternative to “the user,” and identities forming in very close and formative intimacy with software over long periods. Namely, the programmer life. More precisely, the focus is on a specific kind of programming life which is less occupied with developing new or soon-to-come software, and more or entirely with keeping existing software in good shape.

This is an article about the lives of software maintainers.

The aim of this article is to give nuance to such kind of programmer life. I do so by presenting the modal concept of *maintain-ability*: the ability to not only give but also to receive care. It is not in my interest to develop maintain-ability in quantifiable terms, that would be beside the point. Instead, my research aims to describe the texture of life intimately entangled with, and in existential sense maintained by computer software, and in particular as that life is lived

alongside and in co-dependent entanglements with existing software. At the centre of this analysis is a vignette titled “Maybe one more day per week...” which collects, illuminates and intensifies participant observation and unstructured interviews from my fieldwork at three meetups, where practicioning programmers gathered to thematise and discuss taking care of software. The vignette is an analytic construct which synthesises my fieldwork, and gives condensed character to the experience of living with software. I call this character “Stefan.” Following the vignette, the analysis will identify and interpret a selection of relations “Stefan” has with a computer program in his care. I will illuminate a fragile web of relations in the intersection of which “Stefan” is maintained as an *actor*. The article contributes to science and technology studies with an understanding of software not as a stable object but as a web of relatings, and a more holistic and fuller understanding of human experience of software life.

2. Caring about Maintenance and Repair

Questions of repair, maintenance and care have received considerable attention in science and technology studies over recent years. Journal issues dedicated to the topic include for example *Tecnoscienza* volume 6 issue 2 (Denis et al. 2015), *Nordic Journal of Science and Technology Studies* volume 9 issue 1 (Lindén and Lydahl 2021), and *Engaging Science, Technology and Science* volume 9 issue 3 (Denis et al. 2023). The late Bruno Latour recognised very sharply the importance of thinking both human and non-human life together through time (e.g., Latour 1987). Shannon Mattern has collected art and other projects into an argument which foregrounds and celebrates maintenance, usually done in the background (Mattern 2018). Beside their empirical work from the metro and streets of Paris (Denis et al. 2015; Denis and Pontille 2021), Jérôme Denis and David Pontille give a succinct answer to the question *Why do maintenance and repair matter?* (2019). Their answer is not surprising to an STS audience well versed in thinking about infrastructures of the everyday, and politics thereof.

Maria Puig de la Bellacasa built an influential posthumanist theory of care on works of Joan Tronto, Bruno Latour and Donna Haraway in her 2017 book *Matters of Care: Speculative Ethics in More Than Human Worlds*. These ideas and their call-for-action have resonated far and wide. No literature review on these themes, no matter how brief, can be considered sufficient without mention of Robert Pirsig’s 1974 hugely popular, autobiographical travelogue *Zen and the Art of Motorcycle Maintenance. An Inquiry into Values*. What this book so insightfully foregrounds is deep formative and reparative human relation with artifacts – a philosophical aspect of material culture without which any analysis seems to me lacking and unconvincing. Steven Jackson’s already canonical chapter *Rethinking Repair* (2014) collects writings on existential meanings of living with artifacts, including Martin Heidegger and Richard Sennett on craft traditions, and the familiar names of Sherry Turkle, Lucy Suchman, Katherine Hayles, Donna Haraway and Bruno Latour inviting information technologies too into the moral sphere of more-than-human becoming (*ibid.*, 232). In philosophical literature we find progress to systematise theory of people’s identity-formation from intimate, affective relations with objects (Piredda 2020; Viola 2021). There is no doubt that software are affective artifacts for my informants, as we will see below.

Other notable monographs which contribute empirically, conceptually as well as programmatically to social study of repair and maintenance include Christopher Henke's and Benjamin Sims' *Repairing Infrastructures: The Maintenance of Materiality and Power* from 2020, and Lee Vinsel's and Andrew Russell's compelling case for maintenance in their 2020 book *The Innovation Delusion: How Our Obsession with the New Has Disrupted the Work That Matters Most*. Vinsel and Russell draw from their persistent work in The Maintainers movement. The name of their book names the typical antonym of maintenance, namely innovation; and nothing invites what Vinsel and Russell call "innovation-speak" like the digital. The exciting, novel, and soon-to-come software consistently dominates the technological imagination (Balsamo 2011), masking historical and material facticity of software, and that most of software is actually old rather than new; we are already deep into the digital. My informants, software maintainers, always need to navigate their efforts against what innovation-speak, and the drive to invent and build new systems and features, rather than cleaning up and paying the "technical debt" taken during their design and development.

For programmers, maintenance has been a background concern since the beginning of modern computing in the middle of the 20th century (Ensmenger 2014). Seth Erickson and Christopher Kely theorise temporality as a vital aspect of software terms of life and evolution (2015). Indeed, thinking in terms of life, evolution and "lifecycle" are normal conceptualisations in software engineering (Ruparelia 2010; Kneuper 2017). However, it is Marisa Cohn's work based on ethnography at Cassini mission at NASA which so evocatively weaves together the lives of software and lives of people (Cohn 2016; 2017; 2019).

3. Caring for Code

Before presenting and analysing the fieldwork results in the form of a vignette, a clarification regarding the scope of this research is necessary. By "software maintenance" I focus not on all imaginable activities and practices of tending to computing systems and keeping them running. Instead, I focus narrowly on maintenance of source code. Source code is the functional specification of computer software. Code is typically composed in artificial programming languages expressed in text. In popular depictions code is often marked by dark backgrounds, monospace fonts and proliferation of parentheses (for fruitful critiques of "sourceness" of source code as well as textuality of computer programs, see for example Chun 2008 and Couture 2019).

Generally, repair and maintenance tend to be conflicting topics burdened by disinterest and stigma (Puig de la Bellacasa 2017; Mattern 2018; Denis and Pontille 2019; Vinsel and Russell 2020). So it is with software maintenance too (Ensmenger 2014). Working with old, existing systems is considered dirty toil. This sentiment is appropriated and intensified in Jaakko Koskenkorva's contribution to *Classic Programmer Paintings*, a sarcastic Tumblr upcycling known masterworks from the graphic arts by renaming them with bitter-sweet titles relevant and relatable to programmers.

The original 1893 oil painting "Raatajat rahanalaiset / Kaski" by Eero Järnefelt depicts in national-romantic style the impoverished and malnourished lower classes toiling in slash-and-burn settler agriculture in Eastern Finland at the end of 19th century (Salo *n.d.*).



Figure 1.

Eero Järnefelt, “Programmers at work maintaining a Ruby on Rails application” (1893), oil on canvas. Collaboration from Jaakko Koskenkorva.

An uncultivated wilderness behind the six figures extends as far as the eye can see. The updated title for the 21st century is “Programmers at work maintaining a Ruby on Rails application” (Koskenkorva and Järnefelt 2016). Rails is a popular programming framework for creating (and leaving behind) web applications in the programming language Ruby.

A codebase is a lifeworld from which to extract sustenance as well as identity. The larger ones have proportions of a landscape. While the measure is controversial, the size of a codebase is often measured in lines of code (LOC), and a program can span from thousands to millions of lines. Legacy codebases are chaotic, brutal, inhospitable places. Fixes must only be done locally, and expectation is that what is laboriously established here, must soon be abandoned. Getting an overview is impossible, and there is no grand plan – scraping a living is uncertain in a landscape like this. Hence the humour of *Programmers at work maintaining a Ruby on Rails application*. What matters is that any non-trivial codebase is too large for an actor to meaningfully hold all at hand and manipulate at once. Its materiality and (arte)facticity resist idealisation and Philosophies of being, inviting Philosophies

of *becoming* instead. “Maintainers are Bergsonian,” as Jérôme Denis’ and David Pontille’s inspirational cliffhanger PowerPoint at the European Association for Study of Science and Technology (EASST) 2022 panel on repair and maintenance proclaimed (Denis and Pontille 2022). Successful maintenance therefore always implies success in both knowing and unknowing over time, and articulating the string-figure, or a network of care on which the software object depends (Ojala and Cohn 2023).

Limiting my research scope of software maintenance to maintenance programming will bracket out the work of system administration, content moderation, hardware operations and repair, corporate management and many more admittedly necessary practices to keep the digital lifeworld running. These cuts are analytic rather than empirical or necessary, but as *agential cuts* (Barad 2007) they are rather enabling than disabling conditions of this research. In the tradeoff, I achieve a focus on manipulating and managing source code, in other words the single (arguably) quintessential aspect of computer life: programming. The element of maintenance focuses on materiality and diachrony of software as aspects of the actual lifeworld.

4. The Fieldwork

I attended three international tech meetups in 2018 and 2019 in Berlin, Paris and Washington D.C. At the meetings people who program convened to discuss the specific issues of maintaining existing software. All the events had the word “maintain” in their name, an exceptional move in the world of tech which tends to disregard themes of care and long-term thinking (Vinsel and Russel 2020). The events piggybacked on larger industry events as full-day, unconference style side-events. The programme was organised as a mixture of formats. Talks and presentations were given from the front of the room, while most time was spent in so-called “BarCamp” format, where participants first decide together on a topic to discuss, and then split to round-table sessions. All three took place in large, rather generic event conference centres. Between 20 and 70 participants attended each. Unsurprisingly, most participants were men, casual and informal in habitus and interactions. The gender bias is widely documented in critical literature (e.g., Ensmenger 2010), while communication styles and demeanour are often outside the focus, something I hope to partially remedy with this modest contribution. Inferring from what they said, everyone was a competent and experienced software developer. I collect and use these biases and propensities in the character we meet in the next section. All programmed for work or for pastime – or both, as that boundary tends to be rather blurry, as the section below will likewise show. Besides programmers experienced enough to get entangled with longer-term lifecycle issues first hand, there were a number of volunteer community managers from open-source projects, engineering team leads, some participants in more corporate roles in companies whose products are aimed at issues pertaining to aging software, and representatives from organizational initiatives to compensate crowdsourced labor such as open source programming (themselves venture capital backed startups, it must be added). The events were open to ticket-holding public, although targeting maintenance-oriented subsegment

of the audience of the industry events they were adjacent to. The events were conducted entirely in international English language. Indeed, many of the participants had travelled internationally to meet, myself included.

These events presented a valuable opportunity to listen to maintenance programmers give testimony of their lives alongside computer software to their peers, seek and receive empathy from one another, and share advice based on their private experiences and various socio-technical, economic, psychological and critical reflections, theorisations and world-views.

Prior to venturing out to conduct fieldwork, a colleague and I built a thematic research lexicon from desk analysis of online discussions about legacy code on blogs, Reddit, StackExchange, GitHub and HackerNews. This lexicon gave me a set of *companion concepts* to enter the field with (Winthereik 2020). To name some examples, “technical debt,” “dependency hell,” “modernisation,” and “desire to rewrite from scratch” were in the lexicon. At the events I then took notes of what literally was said, as well as my observations of various ongoingings. With the research lexicon as my companion and aide, I paid attention especially to expressions of affects, descriptions of dependence, and biographical struggles. To complement participant observation, I conducted a dozen unstructured interviews with the same companion concepts and the same research focus. After returning from the field back to the desk, I coded my notes for dynamics and ambiguities of the programmer life, as expressed by those who live it. From this and with critique from ethnographer colleagues in our STS research group,¹ I built a small handful of vignettes to substantiate the generic, synthesise the recurring, and intensify what was specific to programming and important for my informants, as well as to invalidate what I had expected but did not in fact encounter.

To present this fieldwork, the following vignette collects, intensifies and communicates what was discussed pertaining to *maintain-ability*, the ability to give as well as receive care in existentially necessary (although not sufficient) relations of becoming. As an item of ethnographic writing (Clifford 1983) the following does not represent a specific moment of fieldwork. Rather, its nocturnal setting, open mood, and informal literary and photographic style express the atmosphere and patterns of interaction among programmers at these quasi-professional events as experienced by the author, myself. The demographic biases, identities, appearances and habitus of the participants are condensed in a single archetypical character, a persona. I synthesised my observations about the affects, dependencies and biographical struggles the event participants voted to discuss in the BarCamp sessions into the social positionality and subjective life-concerns of this persona. The problem formulation and narrative the persona recounts in the vignette summarise the relational dynamics my observations and interviews revealed. After introducing my concept from the title of this article, I will uncompress the singular persona back to my material throughout the two sections “Stefan’s seven entanglements” and “Software dependencies” which follow the vignette. The specific software discussed is one of the real software applications whose solo maintainer I interviewed, anonymised, and which I present in further detail below as it exemplifies the conflicting entanglements of programmer life.

That said, let’s step in.



Figure 2.

A street milieu during warm, dark urban late Spring night. Photograph by the author.

5. “Maybe one more day per week...”

It is close to midnight, and I’m leaving the party. The warm, dark urban late Spring night engulfs me. I am satiated with culinarily quite interesting artisanal cocktail snacks sponsored by the hosting megacorp whose annual event for software developers was held earlier during the day. For this I am grateful, as I saved 3€ on dinner döner. I am leaving together with Stefan, a sympathetic ponytailed and bearded man in his mid-thirties.

As we step out, we pause on the street to finish our conversation before getting a decent sleep for tomorrow’s maintainer meeting. He shares with me something he has hesitated to tell his boss: that he would like to reduce his work from four days to three, and attend more to his pet project, a game world creation tool.

It had all started as something just for himself in his computer game creation hobby. The existing tools for world-building were too expensive. And like many programmers, he had shared the code online. During the past decade many other game creators had started using it. Growth of the indie game culture was the reason for the uptake, he tells me. While now there might be enough crowdfunding from small game development studios and hobbyists that he could afford a second day a week on it, the boss at the “real job” had already been a bit unhappy to lose his expertise one day a week.

Expressing the wish for moving to a three-day workweek might cost him his enjoyable programming day job. But the wish to better maintain and develop this world-building tool on which many computer games and their creators made themselves dependent is strong and felt like the right thing to do.

That hesitation wouldn’t be resolved tonight he concluded, as we wished good-nights and bis-danns, and walked our own ways.

(Ojala 2021)

Considering all the entanglements, we are left to ponder what will happen in this network of entanglements if Stefan proposes to his boss to go down to 3 days per week? What if he does not?

6. Maintain-ability

I theorise and work with the concept of *maintain-ability* to foreground the situated, fragile and often underappreciated capacity not only to give, but also to receive care (Ojala 2021). The concept is inspired by Karen Barad’s hyphenation of “responsibility” into “*response-ability*” (Barad 2010) and Donna Haraway’s lush use of it in her influential book *Staying with the Trouble* (Haraway 2016). What the hyphenation achieves for my analysis is to separate the activity my research focuses on, namely maintenance and especially maintenance of software, from the conditions of its possibility. It is a modal term: the ability to participate in relations of maintenance, a possibility but not more than that. Consider another *-ability* word familiar from popular discourse, “sustainability:” *sustain-ability* does not guarantee sustenance of human life on this damaged planet, it only enables it. In Bergsonian terms maintenance is virtual, and finds its actualisation (Deleuze 1988) along the lines of what makes maintenance possible, along the lines of *maintain-ability*. In other words, the concept of *maintain-ability* foregrounds what is necessary, but not yet sufficient for one thing or another to actually get maintained.

7. Stefan’s Seven Entanglements

Let’s now attend to the vignette with the concept of *maintain-ability* in mind. Here we hear the voice of a character who is navigating multiple entanglements, of which I name seven.

1. First and foremost we have the relation between Stefan and the world building tool, ie., a software as a body of code he has been primary author of for over ten years. The relation hinges on Stefan's ability to attend to the aging codebase, fix bugs, keep it hosted and available. Similarly, the source code must remain accessible, relevant and interesting to aging Stefan. Both pass through time and change in an indeterminate and open-ended process of becoming. As surely as the world building tool is same-but-different from what it was ten years ago and at each step of its biography, Stefan too is same-but-different.
2. Turning to the "what" Stefan speaks about, the proper topic of what is being said, namely to the status quo employment relation Stefan has in the company. The job pays the bills, maintaining Stefan practically at the level of subsistence via a sufficient and predicable salary payment. He does enjoy the job, therefore being maintained more deeply too. This relation depends on Stefan's employability, which is the hesitation explicit in the vignette; is a three-day employee, no matter how competent and liked, a good idea for the employer? This question concerns Stefan, and the vignette intensifies the hesitations based on feedback from going from full-time to part-time earlier.
3. Third relation, related to the previous one but more personal, relates Stefan and his current boss. Having employees and exercising decision power over them maintains the employer as an employer – a classic Hegelian dialectic of the master and the slave (Hegel 1910). This power is in no way absolute, as is evident in Stefan's apparent possibility to try to re-negotiate the employment relation (which might or might not work). However, as long as alienation is not complete, human relations are not absent from such relations. Stefan's hesitations are oriented at the psychology of the boss ("what will the boss think?"), and their higher-order intersubjective relation (e.g., "what do I think the boss thinks?," "what will the boss think I think of him," or more prosaically "is it awkward for me if he is unhappy with what I say", *etc.*).
4. Implicit are the ways in which the code artifacts at Stefan's current day job depend on his programming work with the company's products. In turn, their ability to be workable by him allows the company to exist, and by the employee relation to continue. Stefan's ability to enjoy his work suggests that the codebase is in a workable condition, and is interesting, challenging, or easy to work with, or whichever properties of the codebase enable Stefan to enjoy it. Two separate codebases are in his care, one of them in his only. Stefan is trying to re-balance his relation to both.
5. The vignette leaves unmentioned a fifth relation, namely whether Stefan has more colleagues at the company besides the boss. That is left for us to speculate, although programming is most often teamwork and team dynamics, communication and coordination, and onboarding and letting go of contributors were consistent topics at the meetups (Ojala 2021). Perhaps a three-day Stefan would be seen as a diva, a unicorn, a loser, or would be missed. He is not considering quitting, enabling us to ponder how he fits in the community, and enables his colleagues to enjoy their day job in turn. To take care of code is to also care of one's peers, whose identities too depend on it.
6. A sixth relation, one which Stefan talks about second order, is how other game developers have adopted Stefan's pet project, the world making tool. In principle, each of

the games and their developers sit in a no less entangled web of being giving and receiving care as Stefan. Consider for instance that a serious bug or security vulnerability was found in Stefan's codebase. As a popular dependency built into perhaps thousands of digital games, its implications would ricochet far and beyond the relation between the codebases of Stefan's tool published online, and other game creators' codebases.

7. Finally, let's name a seventh relation as Stefan is navigating his relation with himself. Let's call it his *identity*. Stefan is asking: "who am I?," "what do I desire?," "what is possible for me?," and "what sustains me?" More specifically "am I part of the indie gaming community?," "what kind of programmer am I?," "what does my program make me?"

From a certain perspective it is reasonable to consider the first one of the given as primary, others secondary; the vignette seems to be about Stefan's private need to maintain his long-standing pet project, and the need of that project to be cared for.

It is not my task to insist on organising relations of care in a hierarchy of primacy, but rather to analyse how software maintenance is relational, in-between, and contingent on *maintain-ability*, ability to give as well as receive care. For instance in the above, the ability of the other game developers to make themselves beneficiaries of Stefan's pet project depend (among other things) on his economic and existential dependency of the various conditions of his life, including his employment relation as expressed in the vignette, and on the world building tool being able to be incorporated into other bodies of code through its open source code, licensing, availability, tutorials, help forums, hosting the code and website online, *etc.* Likewise Stefan's bosses ability to be maintained as his boss (and perhaps more?) depends on Stefan's ability to be maintained as someone who has the ability to be depended on by other game developers.

8. Software Dependencies

A unique property of computer software is the gap between programming and execution. Computer programs are not crafted for an individual computer, but rather for a theoretical model of computation, then compiled and built as installation packages, and delivered to laptops, desktop computers, smartphones, servers, music synthesizers and other computing devices to run. Earlier distribution media of commodity software included tapes, floppy disks, CDs and online BBS systems. Nowadays installation is of course done over the Internet. Commodification alienates users from programmers: nobody can name the designers, contributors or maintainers of the digital furniture of the everyday, such as Microsoft Word (Manovich 2013) or the PDF viewer you might be reading this on. The isolation of software from hardware is a theoretical, engineering, and social achievement, as modern programming gradually throughout the 20th century gained independence from electrical engineering and professionalized, while unfortunately was made male in the process (Ensmenger 2010; Hicks 2018).

An implication of this contemporary arrangement for software maintenance is that changes can later be made to a single source code, packaged, and passed via the same online media to the sites of execution. Software updates include bug fixes, performance improvements, redesigns and rebranding, and product reorganisations in response to changes such as arrival of the EU

General Data Protection Regulation (Douglas-Jones and Cohn 2018). This is familiar from our everyday life with computers. A less salient corollary of this directed relation of software delivery is that changes can *only* be done by changing the source code: except in some exceptional cases, software issues are not solved on individual computers like the one I am writing this on, or the one you are reading on, but elsewhere in companies and open-source projects where the code receives maintenance, and results are then propagated as software updates.

Contrast this with maintenance of, for example, bridges: a crack in a bridge jeopardises that bridge and those depending on it, such as humans using it to get from place to place, a train route crossing that bridge, birds nesting on it, *etc.* Software instead resonates and scales outward from the source code onto times and places of execution. Analogically, code in need of repair is less like a bridge, and more like an *architectural plan* for a number of individual bridges built in different places and used for different purposes, and some built maybe still in the future. Under the framing of software maintenance strictly as maintenance of source code – versus, for example repair of smartphones (Nova and Bloch 2020) or as server administration – maintenance is firstly infrastructural, and secondly always dislocated, so that the causes and effects of both decay and mending are separated by the gap between programming and execution. Scaling effects of commodity software infrastructure mediated over the Internet are huge; a bug in a single software suite can impact a very large number of computers, and symmetrically an update can successfully trickle down to millions of devices.

Maintain-ability points to capacity of these rhizomes to receive care. Illustrative is the world-building tool “Stefan” maintains. At the time of writing the original draft of this article, it had 650 issues reported, and 40 incoming so-called pull requests pending for review.² The ability of this fifteen years old, now 380,000 line codebase to receive care would be improved if Stefan was able to dedicate more time to it – at least that is the hope expressed in the vignette. Reflexively this would enable Stefan to identify himself as a maintainer. Because this tool has been embedded into so many other games, indie game culture now has come to partially depend on its persistence through time. A core idea of programming is that not everyone needs to build their own world creation tools, but can build on modules made available by others. It is a standard division of labour across the digital landscape, and no code is developed up from first principles. Fixes and updates are distributed to projects which are arrangements of other projects, articulating the new with the old (Cohn 2019). The implications of this entanglement are crystal clear: the emic term for imported submodules are “dependencies.”

A few recent stories circulated widely throughout my fieldwork. One story concerned the Heartbleed bug in the OpenSSL security library. While the long-dormant bug itself was already fixed at the latest version of OpenSSL source code, severe doubts were expressed whether updates would ever reach all the devices running OpenSSL. Another story was about a Javascript package on which multiple large projects depend on too. Its sole maintainer no longer had the ability to maintain it, and passed it on to a volunteer, who unfortunately had bad intentions, and “poisoned the well” with wide consequences. The story raised controversy among my informants about moral obligations in change of open-source project ownership. Some sympathised with his decision to hand over a pet project insisting on the moral legitimacy of doing so, while other lamented the lack of trusted peers to share the workload with. Returning to Stefan, how would discovery of a deeply buried and serious

security vulnerability, or potential change of project ownership affect the seven relations listed above? Which actors would be implicated? What demands could justifiably be raised, and which ones concretely met? At what cost to whom?

The situation is more dire for software which is being run, but whose source code is unavailable. This is partially the case for all closed-source software which is, by definition, only maintain-able by those within the organisation which owns the software plus by consultants, an arrangement very familiar to the informants.³ Products fall out of support, whether by planned obsolescence (Mattern 2018; Vinsel and Russell 2020), when a company goes bust, or for whichever reason. Likewise, currently running software can have its code inaccessible because it has been lost, a concern for older legacy systems in particular, making it necessary to navigate knowing and unknowing code, constraining what repair work could even theoretically be done by the means of re-programming, and by which actors (Ojala and Cohn 2023). What these distances between code and execution mean is that code changes might or might not arrive at the site of execution. Or perhaps a codebase fails to attract care, gradually falls out sight, or is hard to work with due to design choices, accumulated grime, or use of programming languages or paradigms now out of fashion. Again using Stefan to illustrate, what would be the implications for all those other game developers, their games and their players, if Stefan ceased to maintain the world building tool? We know by necessity he eventually will.⁴ A recurring trope during my fieldwork was this: “What if the last maintainer gets hit by a bus?” The above vignette remains – as a literary technique of ethnographic writing (Clifford 1983) – mute on what his family, friends or doctor might have to say. Less dramatically, his negotiation with his boss might simply fall flat, or his colleagues could persuade him to stay on the team four days per week? These complications nuance the archetypical, differently precarious, differently anxious, underprivileged and sometimes feminized archetypes from maintenance, repair and care studies, who do not have the chance to hesitate.

It was concerning to observe that of the sessions suggested, the ones about burnout were full. We can say that while a stressed programmer is still within what is *maintain-able* by intervention by friends, colleagues, labour unions and others who care – perhaps the boss too, a burned out no longer is. Staying with the trouble (Haraway 2016) is a risky business. While the software maintainers like “Stefan” spoke of their profession often as a “sellers market,” reducing a life lived alongside software to a mere employment relation is a very narrow view, masking any deeper cultural and personal commitments, meanings, identities and *becomings*. While walking away from a project can be possible in an impoverished reduction of programming as a mere job, doing so always means more. Hence: Stefan’s project is a *pet* project – an entity one does not simply neglect or abandon without psychological and moral damage.

9. Conclusion: Fragile Relatings in a Broken World

Voice of fictional character Stefan in the vignette “Maybe one more day per week...” echoes (and by construction imitates) the discourses of the software maintainers I encountered. Like all of us, they find themselves having to articulate interdependent, hybrid and dynamic networks of relations from within. They spoke of pride, commitment, emotional and intellectual

fulfilment, and joys of working with aged software now in their care. They also voiced frustration with poorly designed or programmed code, insufficient documentation, struggles with managers and product owners to appreciate their efforts, scarcity of maintenance time, unsurmountable numbers of bug reports, communal and personal conflicts, tragedy... all aspects of a full human life. Exactly these entanglements invite what Steven Jackson called *broken world thinking* (2014); not only bodies of people and bodies of code navigate breakage, but relations do too. Further, the durability of those entanglements depends on whether they are *maintain-able*, i.e., whether they help or hinder giving and receiving care. “Stefan” is an analysis of that property in the testimonies the programmers gave during my fieldwork.

Maintain-ability is a recursive property of networks of relations which sustain lives lived alongside software. When it is thinned out, their flourishing is hindered, and duration over time is endangered; code fails to be source of running programs, and programmers fail to be maintained as maintainers. Examples: burned out maintainers have low maintain-ability, but a team of well-cared for maintainers a higher one. Closed source software has low maintain-ability as its workings are hidden behind corporate obscurity, open source has a better chance. Complicated or unusually structured codebase has low maintain-ability due to cognitive load of intervening in and improving on it, conventionally engineered and familiar style and structure a higher one. Isolated programmers have weak maintain-ability, as do those overworked (anyone remember the toxic “10x engineer” hype?) or precariously without healthy support. Installed software which can receive updates made to its source code elsewhere across the gap between code and execution is more maintainable than software which is isolated from its source (however, it is also less vulnerable to code injection attacks). When the networks of relations are robust and strong, this potentiality enables the flourishing of biographies of users, maintainers and software.

Why this matters is that life is made durable by the technologies it is entrenched in and scaffolded by (Latour 1987). A third millennium fact is that the parenthood and childhood, work, musicking with digital synthesizers, and indeed programming is lived more alongside existing and aging commodity software (Word, PDF and Excel), than soon-to-come or anticipated software (AI, care robots and VR). Building on Karl Marx’s work, Steven Jackson calls us to see beyond the alienation put in place by the logic of commodification under capitalist mode of production, and to recognise the forces at work elsewhere which global capitalism renders invisible (2014). Programmers as well as the software they maintain continuously navigate risks of breakage, burnout, bugs and falling into obsolescence, and software and digital infrastructures are therefore a matter of care (Puig de la Bellacasa 2017). And it does not need to be a matter of desperate toiling at smouldering swiddens in the periphery of a profession (see Figure 1). What I hope to have contributed in this paper to the conversation about maintenance, repair and care (Mattern 2018; Denis and Pontille 2019) is that although a possibility alone never guarantees anything, at minimum an *ability* to give, as well as receive care is necessary. I illustrated this modality with the vignette titled “Maybe one more day per week...”, which is an analysis of my fieldwork listening to people who program sharing testimony of their lives caring for code over time. We all, users and maintainers alike, live in intimate and formative relations with software, and are therefore essentially entangled with ongoing repair of this broken world. The critical question to prompt is this: “what is

necessary for these bodies of software to be able to receive care?” Singular and universalising answers like Open Source are clearly insufficient in webs of hybrid actors. As we look around the various softwares which constitute our lifeworld and reflect on our situated abilities to be cared for *by* them and to care *for* them, we see that some of the software of our lives have this ability, others less so.

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Notes

¹ I've since changed project, employer and country of residence, a familiar and disruptive biographical pattern under global socio-economic conditions of academic and tech industries alike.

² 698 and 51, respectively, at the time of third review of this article.

³ As one of the reviewers of this article pointed out, some readers might very well remember the so-called CrowdStrike incident crashing Windows computers on 2024-07-19, the closing day of the EASST/4S conference in Amsterdam.

⁴ *Memento mori*.

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Foraging Response-ability: Between Individual Profit and Multispecies Commons

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Abstract

In reaction to the economic and energy precarity that started in 2021, a portion of the Czech public turned to the forest as a source of wild crops and other free resources. In public debates, citizens have been encouraged to supplement their household income by collecting forest resources to partially make up for the deficiencies in social policies. Building upon ethnographic research on foraging practices in the Czech Republic and the concept of response-ability (Haraway 2016; Puig de la Bellacasa 2017; Hofman 2023), this paper analyses how everyday foraging can transform forests from mere natural resources for fulfilling individual responsibility into sites of more-than-human response-ability. The analysis examines what is required to exercise a response-able approach towards forests as a commoning practice. The way in which foragers establish their relation to the forest is traced on three levels: 1) the *non-linear* attunement of foragers to forest collectives, 2) a *non-innocent* form of care for common-pool resources that lies outside the extractivist-activist binary, and 3) the passing on of *non-instrumental* place-based knowledge to others. The article discusses how foraging response-ability can prevent the privatisation and enclosure of the commons by means of practices that operate beyond the state-market duopoly, yet without an explicit activist agenda.

Keywords

commons; response-ability; care; foraging; forests; multispecies relations.

1. Introduction

The commons have been the source of much hope and negotiation on a global scale in recent years. The commons are conceptualised and experimented with as a promising framework for the distribution of resources as they offer the possibility to execute distributive justice beyond the duopoly of state-market resource management (Mattei 2012). Some scholars point out that the state-market dichotomy is false because even government-managed public goods are transferred to the private sphere and privatised (Quilligan 2012). Contemporary theories and practices in the Global North seek to overcome privatisation by doing the commons through community action, where resources are collectively cared for and the produce is

shared (Bollier and Helfrich 2021). The commons are thus conceived of as a necessary alternative to the state-market tandem as the commons are the “resources that belong to the people as a matter of life necessity” (Mattei 2012). Drawing upon an analysis of the mundane politics of the commons and care, I aim to contribute to the commons debate by analysing foraging as an activity that co-constitutes forest resources through everyday human-nonhuman encounters.

This study is based on research conducted in the Czech Republic, where forests cover 34% of the country’s area. Altogether, 54% of Czech forests are owned by the state, 29% are privately owned, and municipalities and forest cooperatives own 18% of Czech forests (eagri.cz *n.d.*). Between 2010 and 2022, Czech foragers collected an average of almost 25,000 tonnes of mushrooms annually, with an estimated value of 161 million EUR (Ministry of Agriculture 2021; Bílý 2023). Czech legislation allows them to do so because the forests are considered public goods and forest crops are treated as common-pool resources. Unlike commons, where people negotiate (often informally) over norms and rules of use (Quilligan 2012), common-pool resources are open access and there is no system of communal rights and rules for their management.

Yet, while most Czech forests are not managed as commons in the narrow definition of the term, certain activities that foragers engage in could be described as commoning. As Bollier (2020) noted, it is important to recognise “the reality of a commons as a dynamic, evolving social activity: commoning. In practice, a commons consists not just of a resource, but of a community that manages a resource by devising its own rules, traditions, and values”. The concept of commoning makes it possible to emphasise the processual and relational nature of commons enactment. In the case of foragers, they have their own informal rules, traditions, and ethics, even though they are not a standard and formally established community.

In this paper, I seek answers to the following questions: How can foraging for forest crops be conceptualised beyond the commodity/commons dualism? How do foragers take care of the forests and how do the forests take care of foragers? How can foraging-related human-nonhuman encounters contribute to the theories and practices of the commons? The paper shows how foragers relate to the forest as more than just a source of crops and that they also engage in multispecies care. I argue that the everyday response-ability practices of foragers include both the use of the forests (but not extractivism) and care for the forests (but not activism). This article is organised as follows. In the second section, immediately below, I describe the ethnographic terrain to which the research relates. In the third section I introduce the conceptual debates that I seek to engage with, and in the fourth section I present my methodological approaches. In the fifth section I offer an analysis of how foragers practice “foraging response-ability” toward forests. In the final section I identify where forest foraging figures in the theories of commons management and why “foraging response-ability” matters in the debate on maintaining the openness of the commons and preventing their enclosure.

2. Whose Responsibility? Between Enterprising Consumers and Irresponsible Plunderers

“When the mushrooms stop growing, we feel it because we are just getting by on the money we have,” Julius, one of my interviewees, told me. He and his wife have a huge family and

the money they make from picking and selling mushrooms is an important addition to the family budget. Their children join them in mushroom foraging and Julius began teaching them how to forage in their early childhood. The family gives away and sells mushrooms, uses them as gifts and commodities, and keeps and processes some of the mushrooms they find for themselves. This practice is not uncommon in Czechia, where mushrooms form a considerable part of the non-market and informal food economy.

According to official estimates from 2020, 70.5% of the Czech population visited the forest at least once a month and approximately 83.5% of households collected mushrooms (Ministry of Agriculture 2021). Most of the mushrooms that people collect are kept by the pickers or are given away to their extended family and friends. Czech legislation does not limit the number of crops that foragers can take from the forest (as long as the crops are being collected for one's own use and people are not picking protected species or foraging in highly protected areas of the landscape). It is possible to enter and collect mushrooms in both private and state-owned forests, and the right to the "general use of forests" is established in the Forest Act (No. 289/1995) (zakonyprolidi.cz *n.d.*). To sell mushrooms, a person must possess a trade license and a certificate proving they possess the required knowledge, and they must have permission from the owner of the forest in which the mushrooms are being collected for sale.

The economic and energy insecurity that began to emerge in 2021 made the forests more engaged as a co-creator of the Czech economy and sociality. In 2022 the average inflation rate in the country was 15.1% (czso.cz *n.d.*). Moreover, in the first quarter of 2023 the purchasing power of real wages fell to almost what it was in 2017 (Miler 2023). In autumn 2022, the Czech press reported that Czechs were "stocking up for the winter" (Špačková 2022) by collecting forest crops and growing more food in their gardens. A newspaper reported that people were stealing wood from the forests to use it as firewood (Očenášková 2022). One of the most visited news website published an article titled "Inexpensive Recipes for Times of Crisis," featuring mushroom recipes (iDNES.cz 2022). The food magazine *Apetit* published an article titled "The Modest Diet of [Our] Great-Grandmothers" in 2023, which mentions forest crops as a significant source of sustenance that people supplied their households with in the past (Vávrová 2023).

In one of the thematic research interviews I conducted in 2022, a ministry official said to me that "precarious times are ahead" and stressed the importance of the availability of forest crops because "salaries are low in rural areas" and "according to official estimates 20 percent of people are not eating properly." He illustrated the situation with this example: "Take an old lady in a cottage – she's happy to grab a wheelbarrow and fetch wood she doesn't have to pay for, and to pick more mushrooms, raspberries, blueberries...". In this light, the availability of forest crops is considered a way of dealing with the economic crisis, especially in more impoverished parts of the country. Foragers' responsibility for the use of forest produce has thus begun to be discussed more intensively in the public sphere.

Professional foraging has been highlighted as an innovative business model (Němý 2022) but has also been criticised as forest plundering. For example, the Ministry of Agriculture issued the following warning: "Commercial mushroom pickers tend to plunder the forests. This is a dangerous trend and can endanger local ecosystems" (Ministry of Agriculture 2023). Mushroom foragers are then caught between two contradictory responsibilities: on the one hand, they are supposed to perform "self-care" (Rose 1996); on the other hand, they are confronted with the

specter of plundered ecosystems and burdened with the responsibility for preserving natural resources. In the fifth section I analyse how foragers respond to these contradictory obligations by performing their response-ability for forests. To begin, however, it is first necessary to introduce the conceptual grounding of my analysis of foraging practices in the theories of the commons.

3. Conceptual Grounding

Although the commons has been theorised in multiple ways, there are two characteristics that most scholars are likely to agree on. First, the commons is managed through self-organised collaboration, and second, the commons as a theoretical model and a material practice offers an alternative to how the state and market players approach issues of education, health, food production, and environmental sustainability (Velicu and García-López 2018). One of the leading commons scholars, Elinor Ostrom, challenges the reduction of human behaviour to the purely rational choices of an egoistic individual (Ostrom 1990). In contrast to state-market solutions based on individuals attempting to maximise their profits, commons approaches highlight cooperation, reciprocity, and the collective production of conditions and outcomes. Emphasising collective activities as constitutive of the commons, Linebaugh (2008) uses the verb “commoning” for its ability to express the collaborative processuality that is involved in maintaining the commons.

While some commons scholars draw a strict line between the privatisation of the commons and the commoning of self-organised communities (Linebaugh 2008; Quilligan 2012; Bollier and Helfrich 2021), the dichotomy between the neoliberal and anti-capitalist approaches to the commons is questioned by Zapata Campos and colleagues (2020). In their analysis of the commoning routine in the repair movement in Göteborg they argue that commoning is not necessarily driven by a political agenda. Individuals might be “ideologically heterogeneous” (Zapata Campos et al. 2020), but they become commoners by commoning. As well as expanding the potential of the commons, a number of scholars have begun to explore more extensively the positioning of the commoners against an individualistic and/or anthropocentric ontology. Singh (2017) explores the communicative and affective aspects of commoning practices between humans and nonhumans in forest ecosystems. Federici (2012) focuses on cooperation and responsibility, which apply not only to human collectives but also to ecosystems and animals. Velicu and García-López (2018) link the theoretical work of Ostrom and Butler to emphasise humans’ mutual vulnerability as a “constitutive part of the common(s)” (2018, 66). Velicu and García-López propose seeing mutual vulnerability as a condition for response-ability, i.e., the capacity to respond collectively to violence, to invisibility, and to the transformation of some individuals into disposables.

The way responsibility is conceptualised is an important analytical step for my research. Citizens who are each supposed to turn into an “enterprising self” (Rose 1992) are subjected to a process of “responsibilisation” (Pyysiäinen et al. 2017). They are assigned the responsibility of providing for basic needs but are not given the power and decision-making authority to negotiate their situation at the political level (Dobrynin et al. 2020). Responsibilisation assigns responsibility to the individual, who must make decisions based on “consumer choice” (Allen and Guthman 2006). Mustalahti and colleagues (2020) point out that responsibilisation stems from a conception of agency as a rational, economically motivated, and individual action.

A more appropriate conception of agency, however, is as an “accounting for actions” (*ibid.*, 8), since this understanding of agency may include relational dynamics between subjects and render it possible to respond in a non-individualistic mode.

Following STS and feminist scholars’ analysis of relational agency, I want to underscore how the liberal focus on individual actors obscures not only human relational dynamics but also nonhuman beings as active members of forest collectives. The concept of response-ability as developed by STS and new materialist scholars allows nonhuman collectives to be included in my analysis (cf. Haraway 2016; Puig de la Bellacasa 2017; Hofman 2023). Response-ability acknowledges the interdependence of the shared world and the resulting accountability. Response-ability, as Haraway (2016) describes it, is generated as a response to the entanglement of the world’s human and nonhuman inhabitants and through the care we exercise towards those with whom we share the conditions of life. Response-ability is never complete, it is precarious and non-innocent, but it can strive for “multispecies recuperation” (*ibid.*, 114).

Thinking about the commons engages with the concept of response-ability along several lines. The approaches that are important for this text are the ones that link response-ability and the commons through an emphasis on mutual vulnerability. Velicu and García-López (2018) draw on Butler’s notion of vulnerability, according to which the assumption of actor autonomy and norms must be systematically challenged “with the ‘response-ability’ of all as equal political agents” (*ibid.*, 66). Consequently, they proclaim that changes in the management of ecosystems cannot occur without a radical change in social and ecological inequalities. Ng and Walsh (2019) use the concept of response-ability to examine the possibility of creating a more-than-human refuge for the vulnerable within the commons, drawing attention to “the need to variously inhabit passion and action, detachment and attachment to cultivate ‘response-ability’” (*ibid.*, 7). Of importance for using response-ability as an analytical tool to explore the ecological commons is Barad’s (2007) and Puig de la Bellacasa’s (2017) conceptualisation of the unintentional ethos.

María Puig de la Bellacasa draws upon Barad’s critique of the reduction of “ethicality to intentional agency” (Puig de la Bellacasa 2017, 219). Consequently, Puig de la Bellacasa ascribes ethical agency beyond humans since she conceptualises care as activities that participate in the continuation of the world. Care practices help to maintain life. They don’t require subjective intentionality. Drawing upon Puig de la Bellacasa’s conception of more-than-human and worldmaking care, Hofman (2023) develops the concept of everyday response-ability and proposes response-ability as a non-professional and everyday practice that is produced by care. I draw primarily upon the multispecies character of response-ability and recognise that it is enacted with nonhuman collectives in foragers’ practices of commoning.

4. Methods and Fieldwork

This article builds on my four years of PhD research on coexistence between humans and fungi in the Czech Republic. A significant part of the research was undertaken with a research team working on a project called “Microbiological citizenship between antibiotic and probiotic regimes,” conducted between 2020 and 2022 at the Institute of Sociology of the Czech Academy

of Sciences.¹ My own position was initially influenced by my romanticisation of mushroom picking practices. We foraged for mushrooms with my parents when I was a child, and these were my first encounters with forest animals and plants. Therefore, during the research, I purposefully focused also on ambivalent aspects of foraging as a practice that combines environmental ethics with personal economic benefits. Analysing the ambiguous behaviours of foragers who strive to utilise and yet care for the forests helped me to not idealise foraging and to conceptualise more accurately situations that can inspire multispecies flourishing.

The research participants were selected using the snowball sampling method (Parker et al. 2019). The project was presented to the respondents as research focusing on the coexistence of humans and fungi and the related social and interspecies aspects of this relationship. Twenty-six thematic interviews were carried out mainly with mushroom foragers, growers, and mycological researchers. This set of data includes seven follow-up interviews with participants whose experiences were found to significantly contribute to the analysis of human-fungal relationships and multispecies ethics. The interview questions covered environmental ethics, the cultivation and sharing of knowledge on mushrooms and their habitats, the sale of mushrooms, and the gift economy. A semi-structured questionnaire was fielded to members of the Czech Mycological Society and 41 completed surveys were collected. The questionnaire was relevant to the research, especially as it revealed that foragers give away many of the mushrooms they collect, which was an important impetus for analysing non-market economic activities in more detail.

I conducted 10 participant observations: I joined the foragers when they were foraging for mushrooms and I visited cultivation facilities, mushroom exhibitions, and research facilities either on my own or together with members of the research team. Participant observations were a crucial source of data for this paper, as I included the presence (and absence) of smell particles, human and nonhuman sounds, and choreographies of touch as relevant participants in my research. During the participant observations, I decided to walk with foragers across the landscape as a method that could be used to assemble additional data on their relationship with nonhuman collectives (Springgay and Truman 2018). The dialogue between myself, the participant, and the location (Anderson et al. 2010) was an important strategy for observing the interactions between humans and the landscape and documenting the sensory relationality of human-nonhuman encounters.

The following sections represent the experiences of foragers whose practices and thinking about and with mushrooms embody important modes of foraging. I selected them because their approaches to forest collectives have a “prototypical value” (Flyvbjerg 2006). I consider them representative since they represent situated place-based knowledge (Pontius 2020), which emerges in the multispecies collectives of a particular location and is shaped by human-nonhuman collaborations and temporalities. Data were generated between 2020 and 2023, and interviews were recorded and transcribed or processed into summaries. The research was carried out according to the Code of Research Ethics of the Czech Association for Social Anthropology and informed consent protocols were followed. The research materials are in Czech, and the quotes included in the paper are translated into English from the original Czech. An additional four thematic interviews were held with experts on microfungi, and this set of interviews was part of an artistic project I participated in with a Czech documentary filmmaker. The total number of participants was twenty-three. All data are anonymised.

The production and analysis of the ethnographic data were influenced by the “thinking with theory” approach (Jackson and Mazzei 2018). I did not consider concepts and theories as models that needed to be “applied.” The generation, analysis, and interaction of the data with conceptual frameworks were circular: I sought relevant theorisations for the data, which I incorporated back into the design of further interviews and participant observations. The fieldwork led me to concepts and the concepts directed me to other fieldwork, the exploration of which allowed me to think more precisely about my chosen theories (Stöckelová and Abu Ghosh 2014). Examining concepts with the data and gradually selecting key topics with the help of appropriate theories generated the topic of the ability of foragers to perform response-ability without top-down norms. I identified the concept of response-ability as the one most effective for exploring three qualities that characterise the human-nonhuman relations that emerge in foraging practices.

Some pickers have a sense of accountability to forest collectives. “When I’m in the woods, I should act like it,” said Julius of the foragers who scream, handle mushrooms inappropriately, and listen to the radio in the forest, and he concluded by saying “I’d kick them in the ass with a pointy boot.” Following foragers’ practices, I conceptualise foraging as a response to the obligations that are co-created by nonhuman collectives and are enacted without adopting a stance of “paternalistic stewardship” towards ecosystems or committing destructive extractivism (Puig de la Bellacasa 2017, 144). I call this approach “foraging response-ability.” I purposely use the word “foraging,” and not a “forager’s,” response-ability in order to highlight the process of human-nonhuman interactions itself, instead of the individual subject of a human forager.

5. Foraging Response-ability: Three Responses

In this section, I explore “foraging response-ability” as an activity that involves cultivating foragers’ attunement to nonhuman collectives. Firstly, I show the activity of foragers as intensively linked to the sensory communication of ecosystems. Second, I analyse “foraging response-ability” as a type of care that is neither extractivist nor innocent and conceptualise it beyond the dualism of capitalist and anti-capitalist practices. Third, I examine the transfer of knowledge on ecosystems that is focused on the reciprocal care performed between foragers and nonhumans and has a significant non-instrumental quality. These three analytical foci lead me to conceptualise “foraging response-ability” as *non-linear*, *non-innocent*, and *non-instrumental*. I present these characteristics of “foraging response-ability” as activities that have the potential to contribute to a more general debate about thinking and doing commons.

5.1 Searching: A Non-linear Response

Zac, a professional forager, was explaining to me the importance of smell for foraging. I had to remind him of my questions because the different scents of the forest were attracting his attention and distracting him from the interview (or: drawing him to the forest’s sensuality):

All the senses are used. You can smell the aspen, for example, because the leaves give off this specific smell when they're rotting, so you can smell the leaves and you think: there should be *Leccinum* mushrooms here.

Foragers do not follow a linear path in the forest. Foraging is not harvesting. Foragers must be able to attune themselves to the heterogeneous forest semiosis (Kohn 2013), which is what can lead them to edible mushrooms. As seen in the example of aspen, trees can be helpful index signs indicating the presence of a specific mushroom. Roa, Julius's daughter, told me that the rare, culinary, and financially valued cauliflower fungus (*Sparassis crispa*) grows almost exclusively near pine trees. It is useful to combine knowledge of mycorrhizal alliances with olfactory skills. Recognising scents helps orient foragers' movement through the forest and helps them to identify whether the mushrooms they find are edible. Zac instructed me:

The sweetbread mushroom is edible and smells like semen – it signals the presence of wild mushroom mycelia. So you know there's a good chance of finding mushrooms within two metres.

Sometimes the smell of the mushroom cap helps to identify the mushroom species. "Sheathed woodtuft has a beautiful smell – like a flower," Zac explained to me in a passionate voice. Having knowledge of the geological subsoil beneath the forest floor is similarly helpful. Zac got used to using online sources to find out what type of soil and rocks make up the subsoil of the forest he is going to forage in. "It's too sour here, there aren't any microelements, and you won't find morels here," he remarked about one specific location during our foraging trip. Mushroom pickers sometimes experiment with practices that depend on nonhuman dynamics, without any expert knowledge having validated these practices. Julius decides whether to go foraging based on the phases of the moon. If the moon is full, the mushrooms are healthier, and not as bent or mouldy. He is not sure why the growth of mushrooms is related to the phase of the moon, but he has "verified this through observation."

However, successful mapping of the terrain involves more than just the sum of a person's ecological knowledge. Zac describes the forests as "dynamic systems," meaning that the complexity of the systems exceeds the rational capacities of individual human foragers. "No forager dies clever," Zac noted. Further, he mentioned that the forager is guided by intuition at some point: it's "a kind of sixth sense." A conception of forests as dynamic, complex systems that transcend human rational capacities escapes the reduction of forests to resource-producing object. It comes closer to an approach that Shiho Satsuka (2018) conceptualises as "koto." The term koto ("events") conceptualises events happening simultaneously and beyond human cognition. For example, simultaneous processes in the human body can take place in multiple locations without our awareness while they nevertheless still impact our mood and activities. Only by cognitively capturing the results of these events can humans transform them into a "mono" form, which means that they become a separate object localised in singular space-time coordinates. According to Satsuka, koto "evades the modernist desire of being captured in a spatial representational scheme" (*ibid.*, 82). Satsuka met nature science students in Japan who were able to sense that mushrooms

were growing in the forest around them before they saw them. The students could operate with a cultivated ability to feel fungi-related events.

At a specific spot, the forager sometimes has to rely on a sixth sense – on calibrated capacities beyond instrumental knowledge and rational decision-making. Cultivating “koto” perception means transcending the dichotomies of “animist” and “scientific” or “traditional” and “modern” systems of knowledge (*ibid.*, 95) and making room for a foraging intuition connected to multispecies events. The sixth sense of a mushroom forager can be described as a cultivated skill, wherein one is attuned to events occurring simultaneously in the forest – it is an intuition that can lead the forager to the place where these elusive events are perpetuated in the form of a “mono,” that is, in the form of the particular macromycete of the given fungus. Response-able foragers do not experience the forest as a homogenous object of natural resources. They are attuned to the “koto” of local collectives, which enables them to be guided by multispecies and multidirectional events, instead of reducing the forest to a field for linear crop harvesting. Engaging forest collectives in foraging strategies not only increases the amount of mushrooms collected but also enhances foragers’ response-ability towards the forest’s more-than-human inhabitants as I will explain in the following section.

5.2 Care: A Non-innocent Response

For the participants in my research, foraging is not apolitical and detached from capitalist economic connections. Financial crises can intensify the need to use forest resources. Some foragers commodify the mushrooms they collect on the market or exchange them in the informal economy. In contrast to commoning communities in the Global North, which position themselves as forms of anti-capitalist subversion and an alternative to the power of the state, the participants in my research do not forage in order to engage in “edible activism” (Chang and Bai 2020). Foragers coordinate their approaches outside the extractivism-activism binary. They care for the forest and they benefit from it. The response-ability they perform as everyday care is not innocent (Hofman 2023) or destructive and it is based on presence-absence dynamics (Haraway 2016). I will follow this dynamic from top to bottom: from the sounds emerging and disappearing among the trees to the mycelial networks in the forest soil.

The forager’s approach is guided by the rules defined by law (289/1995 Coll.): visitors to the forest should not disturb the peace, destroy plants, drive in the forest, or start fires. In the foraging routine, everyday adherence to the rules is combined with some subtler habits. Julius taught his children that they should not shout in the forest unless someone in the group is in danger of getting lost. However, remaining a silent presence in the forest is more than just an obligation, because when there is silence one’s senses can grow sharper and the ability to listen better develops. Silence in this case means the absence of sounds produced by humans. This silence allows a person to become more attuned to nonhuman voices. Janice, Julius’s daughter, pointed out that the silence is the reason she likes foraging in the forest and Julius remarked that when he is in the forest with his children they ask him with fascination: “Dad, can you hear the birds singing?”. Being in a forest landscape requires the tuning down of human-produced sounds, which has a shared benefit: the animals are not disturbed and the humans can listen to nonhuman

voices. Foragers “rebuild quiet places” (Haraway 2016, 1) by being quiet and by making room for nonhuman soundscapes.

Presence-absence dynamics affect not only the forest soundscape but also microscopic mycelial networks in the forest soil. The presence-absence calibration determines the health of the mycelium. In a research interview, a representative of the Czech Mycological Society was reluctant to encourage people to do too much mushroom collecting because crowds of foragers could squash the forest soil and damage the mycelium. This is why he is also hesitant to invite professional mushroom pickers to give public talks at events hosted by the Czech Mycological Society. He doesn’t want everyone to go out collecting mass amounts of forest crops. However, regulating the presence of humans is not enough to protect the mycelium. Forests are made up of multispecies collectives and humans are not the only non-innocent users of the forests who are negotiating their presence in the forest. “Hectares of forest land ploughed up by wild boars will do more damage inhibiting the further growth of mushrooms than a thousand mushroom pickers,” one mycologist claimed in a newspaper article (novinky.cz 2009). Mycologists want the forest soil preserved as much as possible, wild boars need to plough it, and foragers require an abundance of mushrooms growing from mycelium. The forager’s response to the conundrum of conflicting interests is their response-ability.

The health of the mycelium is essential for mushroom foragers who collect extensively to supplement their household supplies or budget. According to some foragers, the survival of mycelial life can be affected by the way in which a mushroom is removed from the forest undergrowth and disconnected from mycelial networks. I was given instructions on how to pick a mushroom correctly. The whole mushroom needs to be removed from the soil, the end of the stipe must be cut off, and the pit created after the mushroom is removed needs to be covered with soil. If the stipe were cut while the mushroom was still in the soil, the end of the stipe would rot. “The mycelium would be damaged,” Roa remarked, highlighting the importance of the removal process. If foragers collect mushrooms without caring for the mycelia, they will damage the site, and the next time there will be a limited number to collect. Such response-ability fosters the biological growth of the mycelium and the economic growth of the forager’s business.

Taking careful account of the materiality of the mushrooms is an ethical obligation towards the mycelium, but also towards the people who receive or buy the mushrooms. Julius prides himself on his supplier ethic:

All (our) mushrooms are fresh and we take pride in the fact that I have taught the girls to do this – that the mushrooms are usable, nice, and, most importantly, thoroughly cleaned. Those we bring mushrooms to know that I won’t bring them any crap that they then have to clean.

In general, to uphold the ethical and economic commitment to the people who are to receive the mushrooms it is necessary to forage for mushrooms that have not yet been consumed by slugs and insects. Some mushroom pickers compete with other organisms for intact mushrooms: they want to avoid having their mushrooms taken by another forager or a slug or wild pigs tearing up the site.

Caring properly for the mycelium helps macromycetes flourish again. It creates the potential for more foraging and more flourishing, but also for conflict and competition between humans and nonhumans. This care is not altruistic, innocent, or selfless. Instead, it is working for the “everyday continuation of life” (Puig de la Bellacasa 2017, 135) – the economic life of the foragers and the biological life of the forest’s inhabitants. Care of the foragers is a mundane routine whose purpose is to sustain the forest collectives, with all their conflicting obligations and competing world-making practices. It is an everyday tinkering and enacting of the world “so that *all* (rather than ‘we’) can live in it as well as possible” (*ibid.*, 161). Foraging is not utopian activism or cynical exploitation, it is doing commoning activities “as well as possible.”

5.3 Transmission: A Non-instrumental Response

One of the research participants, Viola, grew up in South Bohemia, where she regularly went foraging with her grandmother. After returning from the forest, Viola, her grandmother, and her mother would prepare the collected mushrooms for dinner. The whole extended family would gather at the family house during the mushroom picking season and would forage and eat there. Mushrooms became a “family affair.” She owes her “passion” for mushrooms and her knowledge of them to her grandmother, who used to pick mushrooms when meat was scarce when she was young. Viola currently lives abroad, where she has adapted her knowledge of mushroom foraging to local conditions and publishes mushroom recipes on her blog. Some of the recipes have been passed down to her from her grandmother. Similarly, Julius was introduced to mushroom picking by his grandfather, to whom he is so grateful that he asked me to be sure to mention his grandfather’s role.

His daughter Janice said to me, “Since I was a kid, we’ve gone mushroom picking, and gradually it [the knowledge about mushroom species] was uploaded into my brain.” Not only do Julius’s children learn to identify mushroom species and their relationships with other forest entities, but Julius also teaches them work habits so they know that “money isn’t printed by ATMs.” Julius’s children already know that making money by foraging requires mycological knowledge but is also physically exhausting. Julius said, “Sometimes they whine in the woods that the baskets are heavy, that their feet hurt, but they just have to keep trying.” Knowledge is shared and useful work habits imparted while foragers are present in a particular location and with the nonhumans who are present in that location. “When the kids are tired, they build little houses out of moss and branches, they observe anthills, they look at birds, they learn about nature,” Julius remarked.

However, it is not only the transmission of knowledge and skills that is essential for forming relationships with forest collectives. Foragers transfer affective bonds. The forest is not merely a source of crops, it is a place that offers emotional relief – a place for the situational absence of the obligations of life outside the forest. One of the research participants has begun visiting the forests more often precisely for the respite they offer from the demands of caring for an ill relative whom he has to look after all night. In the mornings, he is able to escape into the woods for a few hours, where he can “heal his wounds and his soul.” In that moment, the forest, for him, is “another world.”

One goes into the forest, sits on a stump, cries for a while, and then one can move on. There is peace in the forest, it is a balm for the soul. You're alone there, you enter another world.

Janice does not think visiting the forest is a waste of time, even if they do not find many mushrooms, because the forest is so tranquil: "I usually clear my head in the forest because it's quiet." Another research participant, a priest, who is also a passionate mushroom picker, directly emphasised that his relationship with nature had been shaped since childhood by his frequent visits to the woods. He "always escaped to the forest" and considered it a place of "relaxation," where he gradually became familiar with "every stone." The participants' relationship to the forest is shaped and transmitted as a relationship to a place that is "responsive to vulnerability" and provides not only crops but also the potential to create a refuge (Ng and Walsh 2019, 4). For my participants, forests are a place that they care for and that responds to their own vulnerability. The mutuality of vulnerability, which Velicu and García-López (2018) define as a constitutive aspect of the commons, is extended beyond the strictly human relationality in foraging practices. Mundane foraging can transform forests from mere natural resources for instrumental use into places of "trust and safety" (Ng and Walsh 2019, 11).

The psychological relief provided by forests, as appreciated by some of the research participants, transcends the conventional ecosystem service category of "recreation." These landscapes are not generic forests that provide a "service" as a uniform instrument but familiar places – "other worlds" – connected to foragers through long-term relationships. Consequently, foraging knowledge is not passed on as a form of universal knowledge about generic ecosystems but instead consists of knowledge about specific places, specific species of forest crops, and local ecologies. Similarly, Tsing (2015, 91) has described how Hmong mushroom pickers make the landscape familiar "by hiking and foraging" and Singh (2017, 765) has shown how villagers in Odisha cultivate attunement and embody affective relationships with local forests through everyday practices such as caring for the forest and gathering berries. A physical presence in the forest that is attentive to nonhuman inhabitants makes the forest landscape familiar and intimate. This is a precondition for the creation of a refuge. The transfer of this kind of knowledge and skills is enacted through "place-based learning" (Pontius 2020), which recognises that the learning process involves nonhumans who participate in shaping knowledge at both the informational and affective levels. Foragers learn how to collect mushrooms without destroying the mycelium, they know how to care for the forest and how to accept care from the forest. This kind of commoning practice opens up forests as caring collectives beyond instrumental utilisation.

6. Conclusion: Foraging Response-ability as a Process of Maintaining the Openness of the Multispecies Commons

Collecting mushrooms, which are given as a gift or processed within the household, can be considered an example of a "diverse economy" that attempts to include those economic practices that are mostly overlooked within the capitalist hegemony (Gibson-Graham 2006).

Nevertheless, I hesitate to label the foraging activities described above as “alternative” practices of food self-sufficiency since the term “alternative” reifies “a capitalocentric anchoring, which uses capitalism as a central point of reference” (White and Williams 2016). What’s more, some of the economic practices of foragers could be labeled nonmarket and even noncapitalist, while other types of economic activities operate within capitalist and market relations and cannot be characterised as “noncapitalist politics of place” (Gibson-Graham 2006). Rather, the practices examined in this paper constitute a hybrid foraging economy: they partly offset the negative effects of capitalist production and they involve market exchanges, but at the same time, some of these activities are performed outside the market and avoid any monetisation.

Foraging response-ability thus should not be conceptualised in the dualist terms of capitalism versus its subversive alternative but rather as a commoning practice that engages with the nonhuman inhabitants of the forest ecosystems. In this final section, I summarise how foraging response-ability, performed as *non-linear*, *non-innocent*, and *non-instrumental*, can enrich the theories and practices of everyday commoning in the multispecies realm of food-producing ecosystems. Building on the previous sections, I offer a threefold way in which foraging response-ability enables modes of openness within the practice of commoning. These include the openness of forest collectives to human members, the openness of ecosystems, which is maintained by preventing their political enclosure, and the openness of foragers to the potential care provided by forests.

Firstly, the non-linear responsiveness of foragers opens up the forest collectives to them. For my participants, belonging to a forest collective is not primarily about stewardship over the forests but about regularly sharing space and time with the forest dwellers and attuning themselves to their lives. The foragers’ knowledge and affective connections are small-scale and place-based (Pontius 2020), and they pass on their relationality with these collectives to the next generation of foragers. Their encounters, cooperation, and negotiations with nonhumans are not just another aspect of commoning management but a constitutive condition for foraging as a response-able approach to forests.

Secondly, non-innocent motivations can prevent the enclosure of the commons because the effort to benefit from forest crops keeps the forests open. State and mycological organisations are concerned about the extensive amount of foragers in the forests because the ecosystems could be damaged by the presence of so many people in the forest. Nevertheless, it is probably also because there are so many foragers and visitors that the forests remain accessible: politicians would not dare to place limits on foraging or on access to the forests because they would alienate a significant portion of Czech society. Foragers shape the politics of commoning not through direct political action (Zapata Campos et al. 2020) but through the act of foraging itself. Foragers don’t act on political grounds, but their actions of commoning have political consequences.

Thirdly, non-instrumental modes of human-nonhuman interactions enable foragers to become open to reciprocal care. Foragers use the forest crops they collect, replenish their stocks with them, exchange them, and sell them. They benefit from the forest’s resources, but foragers also take care of the forest. Such activities are not a form of one-way management of an ecosystem. The forests care for the foragers, too. They provide humans with crops and an emotional refuge. Barad’s (2007) asubjective “ethicity of matter” (Puig de la

Bellacasa 2017, 142) allows us to recognise forests as collectives that care for foragers since subjective intentionality is not a necessary precondition to perform care. By not obscuring forest processes with the notion of intentionality, it is possible to acknowledge the food and the emotional refuge that forests offer. Human-nonhuman interactions in forest collectives are reciprocal and mutually cooperative in sustaining the economic and emotional life of foragers and the biological life of forests.

Foraging as an everyday commoning practice can be constitutively multispecies, politically non-intentional, and reciprocal beyond the scope of human communities. Foraging response-ability thus co-constitutes the openness of ecological resources and negotiates the ways in which they are used. The small-scale maintenance of life in the forests is done by tinkering, interacting, and experimenting with nonhuman collectives. Foragers' activities in and with forest collectives are not reduced to economic calculations or environmental agendas. Foragers are neither entirely individualistic nor solely altruistic. If the forest commons are formed only by the dichotomy of state-market versus activist management, everyday foraging response-ability is overlooked.

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World(s)-Making through Data Work, Activism, and More-than-Human Encounters

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Abstract

This *Crossing Boundaries* section hosts thought-provoking contributions in which scholars reflect on their situated engagements with commoning and caring. The authors examine how they try navigating the tensions, synergies, overlaps, and ruptures between their research agendas and the knowledge politics of the commons and care across digital infrastructures, grassroots activism, and more-than-human relations. Yana Boeva explores how caring and commoning are not only theoretical frameworks for understanding digital technologies, but also deeply entangled practices, often entailing voluntary or precarious labor, that are essential to technology. This framework highlights the tensions shaping these practices, from exploitative care work to exclusions tied to expertise and power in digital commons. Jonas Fritsch offers an autoethnographic account of affective and more-than-human encounters at the margins of research, reflecting on how long-term engagement with urban ecologies generates careful world-making that blurs the boundaries between research, everyday life, and ethical commitment. Finally, Cindy Kohtala reflects on scholar-activism within grassroots technology milieus, arguing that both design and STS scholarship inhabit the so-called ivory tower and the world beyond academia, and therefore engage in forms of “edgework”.

Keywords

caring; commoning; more-than-human relations; digital infrastructures; scholar-activism.

Care and Commoning by Convergence: Foregrounding Essential Practices and Values for an AI Era

Yana Boeva

Looking back on the past two decades in the development of digital media and computer technologies reveals a stunning array of umbrella terms and descriptors of their influence across societal domains. Not too long ago, we still were (and are) in an information age, encountered big data and the “society of algorithms” (Burrell and Fourcade 2021), had brief stints in the Industry 4.0 and longer ones in the platform economy, are continuously

participating in the digital transformation of many things, and recently have hastily transitioned into an automation and artificial intelligence (AI) period. These developments do not progress linearly or overwrite each other. As scholarship in Science and Technology Studies (STS) and its adjacent fields of history of technology, information studies, digital sociology, and critical data studies has shown (Bowker 1993; Wajcman 2017; Suchman 2023), these phases recursively and sometimes counter-chronically shape each other. Take, for example, the recent series of global AI summits since 2023, which brought together government leaders, international organizations, the private sector, and civil society to discuss the economic potential and threats of AI, as well as the place of many countries in the AI arms race. At the same time, the dominance and dependence on Big Tech, combined with the implications of the last presidential election in the United States, sparked debates and launched initiatives in Europe to promote locally developed tech alternatives. Similarly, individual governments as part of their digitalization strategies, be that Denmark, France, or the German state of Schleswig-Holstein, have started ditching Microsoft and its growing AI platformization of services, opting for open-source solutions such as Linux, LibreOffice, and other locally developed and hosted alternatives. These cases reveal the intricate sociotechnical ecosystems and the difficult-to-untangle relationships between the public and private sectors, scientific research and its commercial applications, and local communities of practice and global supply chains, shaping contemporary societies (Andrejevic et al. 2023).

STS has demonstrated on many occasions and with many examples that contemporary technoscience is not a single-handed endeavor of technology developers and their economy, but is co-produced with governmental support and interests, the voluntary as well as unpaid labor of users and microworkers, and public-domain knowledge and infrastructures. Extensive critical scholarship on data, algorithms, and the digital transformation of work, knowledge production, and everyday personal use demonstrates that practices of caring and commoning actively (re)configure these technologies and our interactions with them (Edwards et al. 2011; Bucher 2018; Delfanti and Frey 2021; Jarke et al. 2024). Despite these apposite empirically grounded insights, acknowledging any contribution to the development of recent digital and automation technologies and data, but also co-ownership, beyond that of tech companies, remains a peripheral phenomenon in public debates and imaginations. In that sense, a more comprehensive discussion of contemporary automation technologies from the perspectives of care and the commons is needed, given their essential role in this technoscientific production.

From a digital perspective, both care and commons, and their manifestations in different practices, have been explored as mostly separate accounts. Prior research foregrounds actors, organizations, and practices (Pink et al. 2018; Burrell and Fourcade 2021), the sociotechnical and politico-economic characteristics and conditions of data work and technology production (Helmond 2015; Tubaro et al. 2020), and the cultural values that inform them (Söderberg 2010; Dourish 2016). Taken together, this work has demonstrated a complex interplay of alignments and overlaps between care and commoning. For instance, there is the careful collection of public data on pollution, noise, and traffic, but also the policing of marginalized communities within urban environments, along with the curation and maintenance of openly accessible databases in the public domain (Pritchard et al. 2018; D'Ignazio and Klein 2020). At the same time, there are disruptions and tensions, such as when open-source principles are

co-opted by major technology companies (Rieder 2022; Widder et al. 2023). This contribution to *Crossing Boundaries*, thus, seeks to explore and discuss some of the implicit, binocular interactions between care and commoning in the context of contemporary digital and automation technologies, considering their growth and global spread, as well as their implications for democratic knowledge production and civic engagement.

2. Pluralizing Care for/in/with Data

The growth of digital and computational technologies and processes has been demanding ever more diverse data to develop, train, and implement them broadly. Tech companies' hunger for data has not only created the wrong impression that data is out there and up for grabs, but also that it is often easily accessible and manageable. However, there is no such thing as "raw data," as Lisa Gitelman (2013) reminds us. Data – whether digital or analog – is sometimes defined, sometimes discovered, but also sampled, created, articulated, processed, structured, and interpreted by those who interact with it. Scholars in the interdisciplinary field of critical data studies have documented and called attention to these different modes and practices that are integral to data work and (everyday) digital infrastructures yet remain mostly invisible (Irani 2015; Miceli and Posada 2022). Given the prominence of scholarship on data practices and the datafication of public welfare services and administration, particularly in the Nordic countries as forerunners (Redden 2018; Hoeyer et al. 2019; Kaun and Liminga 2025), it comes as no surprise that a care perspective has enriched this discourse. Data work is frequently hidden from plain sight and broader narratives, yet it is also "careful," as Irina Zakharova and Juliane Jarke (2024) emphasize. By "care-ful," they mean that it is part of community practices and mundane activities. Considering data and data work from a care lens means highlighting that data is local and relational (Loukissas 2019; Poirier 2024).

Care, as feminist STS scholarship makes clear, exposes the situated perspective of invisible actors and practices and becomes a form of ethics in practice (Mol et al. 2010; Suchman 2007). In the case of digital and algorithmic systems, for example, this means that data workers, similarly to nurses and care-takers in healthcare, ensure that these systems function smoothly or produce relevant results, often in the absence of the promised "full automation." Thus, Zakharova and Jarke invite us to embrace care as both analytical and agentic perspective moving from care as critique in datafied societies to "buildings communities of care" (2024, 652). The care turn in digital scholarship, thus, highlights the multiplicities of practices, the embedded relationships, and affective dimensions that data and digital technologies consist of and thrive upon yet which tech developers and proponents tend to downplay.

This pluralization of care is enacted in three entangled and recursive modes. The first one, *care for data*, describes the "care-ful" collection, preparation, and maintenance of research, specimen, or citizen-related data by scientists, in museums, libraries, and citizen centers. As noted above, data is never raw, and to make it meaningful for its particular context, actors engage in digitizing specimens, enriching metadata, cleaning, (re)formatting, verifying data, and many other data-related activities (Plantin 2019; Davies and Holmer 2024). Knowledge infrastructures (Edwards 2010), as public institutions, but also the (digital) commons, rely

on these dedicated data practices. The second mode, *care in data*, recognizes the various relations between data and human actors connected to them that the universalizing narratives of computation (Lee and Ribes 2025) tend to flatten or obscure. As an umbrella term, “data work” is frequently described as tedious, boring, and easy to automate. At the same time, machine learning algorithms promise to uncover and predict new patterns in literally anything from the data, thus suggesting that context and experience become redundant. However, studies on the implications of algorithmic and data-driven systems in public administration or school education demonstrate that replacing human-centered interpretation of data with score-based data analytics or “displacing the human subjects themselves as objects of care and attention” (Seaver 2021, 525) can be detrimental for shaping people’s lives, since no machine learning system or algorithm provides any of the often-embodied understanding of an individual’s situation. Finally, this leads to *care with data*. This mode represents the potentials of data and data practices to support sustainable and socially desired developments. Recent years and technopolitical developments have brought forth a range of data-rescue and knowledge-creation initiatives, such as the Environmental Data and Governance Initiative to save US public environmental records from removal (Rojas et al. 2025), various digital platforms for landscape and biodiversity preservation (Urzedo et al. 2023), or generally improving knowledge on environment and climate change through data (Edwards 2010; Lin 2025).

Care in the digital realm, as these modes emphasize, and, following Lindén and Lydahl (2021), is both a practice and an ethical-moral orientation. This raises pressing questions about whose practice and whose ethical and moral values. For critical scholars on data, activists, and those caring, this lens lets us seek answers that recognize difference, experience, affect, and power. However, care, in its various forms, does not align well with technology design and technologists’ interests such as scalability, marketability, and heteronormativity, because care is enacted in situated and less privileged ways (Powell et al. 2022; Seaver 2021). Still, it is exactly care as approach and perspective – the situated assemblage of researcher and researched – that reveals the hidden labor and data work underlying automation, which enables digital technologies to scale. In a way, as I discuss in the next section, care does not *care* for the digital product but how it is maintained, drawing parallels to the commons and commoning.

3. Putting Commoning First

Within the commons model, digital commons represent only a subset of the broader commons-based ecosystem, with its distinct practices, sites, actors, and cases of peer production (Dulong de Rosnay and Stalder 2020; O’Neil et al. 2020). For the sake of simplicity, in this and the following sections, I drop the word “digital” in front of commons and commoning as its practice of maintenance and sustainment (Poderi 2020)¹. The concept and ethos of the commons have significantly shaped our contemporary digital technologies and our interactions with them, as evidenced by research on free and open-source software (Kelty 2008), peer production and decentralized internet (Bowker et al. 2009; O’Neil et al. 2020), and data sciences (Plantin et al. 2018; Plantin 2019).² Instead, I want to focus on a few important aspects that share contours with care in relation to the contemporary digital context.

Digital technologies and infrastructure, much like their more tangible, physical equivalents, require maintenance and care (Dulong de Rosnay and Stalder 2020; Poderi 2020). Failing operating system updates, rarely interoperable data and software, misspellings or different spellings in file names and datasets affecting data processing, bots spreading misinformation on Wikipedia, abandoned tech documentation, or the ingenious acts and workflows human users come up with to cope with imperfect systems have been documented widely in academic research and public media. Elsewhere, some of these peer-to-peer practices have even been called the “plumbing” of technology (Musiani 2012). Unlike commercially developed digital technologies embedded in organizational contexts, which, in theory, have the means to support this maintenance, most commons depend on voluntary contributions, collaborative authorship, and, thus, shared values and responsibility. This may seem as a clear-cut distinction but in practice, as scholarship on peer-to-peer production has pointed out (Berry and Moss 2006; Velkova 2016; Poderi 2020), commons strongly require defining “ownership of means of production, technical architecture/design, social organization/governance of work patterns, ownership of the peer-produced resource, and value of the output” (Dulong de Rosnay and Musiani 2016).

Turning these requirements into practices, such as open access academic publishing but in fee-model-based subscription journals or the use of public-domain data to train machine learning models, has been critiqued by scholars, voicing concern that the commons are influenced by and co-constructed with liberal legal and economic frameworks (Berry and Moss 2006; Dulong de Rosnay and Stalder 2020; Thylstrup et al. 2022). Simultaneously, the celebratory and idealized image of the commons and the debates about openness as its core principle enable what legal scholar Melanie Dulong de Rosnay has framed as “common-swashing:” “appropriation of the semantics and the message of the commons for commercial purposes without endorsing its values” (2020, 11). In her ethnographic study of the Blender community, media scholar Julia Velkova points out that a problem is that the idealization of the commons conceals “a critical debate about the ways in which this open gift economy functions; who benefits from it and how; and what remains out of sight, hidden deeply under the paradigm of openness” (2016, 1). Both the legal-economic conditions and the celebratory imaginary of commons and its related concepts – broadly emerging from a Western and male-centered technology development perspective – have overlooked and deliberately devalued as commensurate feminist, non-binary, differently abled, and non-Western cultures and practices, even seeking to impose upon them their understanding and traditions of openness (Boeva and Foster 2016; Toupin 2020). Instead, as the “infrastructuring” of the commons unfolds, be that as part of the stack of most commercial software technologies or in advanced computational practices, developed within academic research communities (Boeva and Kropp 2024), the possibility of achieving the opposite of openness increases.

These speak to a broader problem of technoscientific innovation: both imaginaries and narratives tend to foreground the output or results of that innovation and neglect the vast processes and involved actors behind it. If, in this case, commons as the umbrella term means that output, commoning would be the process of creating, maintaining, and further developing the commons. However, as Poderi (2020) rightfully points out, commoners as involved actors and commoning as practices are framed either as “collective subjectivities” or as a topic of niche study in peer-production research. In seeking the “stabilization” in a classical SCOT

manner (Pinch and Bijker 1984), what becomes hidden is the affective or care dimension “that characterizes the commoners-commoning relationship” (Poderi 2020) needed for its accomplishment. The efforts, emotions, the built-in relationships, the kind of skills exceeding purely technical ones, but also resentments and disappointments are all vital and valuable elements of digital and automation technology interactions and their production, as Poderi continues:

By focusing on affect, it becomes clearer that for commoners caring for the commons is anything but taken for granted. It is an ethical and political labour that needs to be continuously (re)affirmed and which both triggers and is triggered by affective states. (Poderi 2020, 40)

Returning to the examples from the beginning, this asks about how commons-inspired initiatives for digital sovereignty can account for that. Launching an initiative on “EU-made” open-source alternatives addresses only a small part of the problem. Transferability of skills and work routines into new digital environments is not “interoperable” with digital systems, as empirical research on the digital transformation of public sectors and organizations has demonstrated. Aspiring independence from commercial tech providers requires true and sustained commitment to commoning with care in mind, for instance, “[elevating] nontechnical contributions as essential to the project,” as signaled in a best practice guide by the Digital Commons Policy Council (Daly et al. 2024). Again, this raises questions: Who can commit to commoning, and who cannot? If not, what remedial measures are available? But also, what defines a nontechnical contribution, knowing that every technology is a sociotechnical assemblage without clear boundaries? In that sense, commitment entails thinking first with local communities rather than with dominant innovation paradigms, something that a care perspective on data practices, digital transformation, and automation has frequently stressed.

4. Increasing (the) Overlaps of Care and Commoning for Just Technological Futures

Care and commoning are not just frameworks for understanding digital and automation technologies. They are also deeply entangled practices that often remain invisible in technoscientific narratives. Acknowledging these interactions poses challenges, especially as the socio-technical ecosystem consolidates under a few dominant technology companies and their technologies. This consolidation sharply contrasts with earlier visions of digital participation and democratic collaboration – values that shaped internet development, open-source communities, and our current digital infrastructures. Thinking care and commoning together shows these practices – whether through voluntary contribution or precarious labor – are essential to technology, yet are often devalued or made invisible by dominant innovation narratives.

At the same time, a critical tension emerges when examining the distinctions between care and commoning in the digital realm. While commoning often arises from deliberate choices and shared values, much care work in data-driven systems persists within colonial, patriarchal, and capitalist structures, where participants engage out of necessity rather than conviction. Microworkers training artificial intelligence, content moderators flagging harmful material,

and those engaged in the mundane yet crucial work of data maintenance rarely participate as commoners but as workers, often inadequately compensated or recognized. Conversely, digital commons initiatives often require higher levels of technical literacy to participate, potentially limiting who can contribute and whose voices shape these spaces. These asymmetries demand greater attention as we envision future alternatives to technology provision.

The rise of generative AI intensifies these concerns. Contemporary generative models have been trained extensively on materials drawn from the digital commons – open-source repositories, digitized cultural heritage, open-access scholarship – yet their developers frequently fail to acknowledge or reciprocate value to these communities (Noroozian et al. 2025). This extraction resembles what scholars on peer-to-peer production have called the “tragedy of the commons,” in which limited actors maximize profit from shared resources, while the commoners who sustain these collections through their labor receive nothing in return, or even worse, suffer exhaustion and burnout (Poderi 2020). Simultaneously, the emergence of synthetic content and AI-generated material threatens to pollute the commons themselves, placing additional burden on those already engaged in invisible maintenance and curation work.

The initiatives toward digital sovereignty emerging globally – from European alternatives to Microsoft products to French development of independent videoconferencing infrastructure – represent potentially meaningful shifts in technology politics. However, true commitment to commoning with care requires sustained attention to whose practices and values inform technology development, sustained funding and institutional support beyond technical development, and meaningful engagement with local communities and their needs rather than imposition of technological innovations. This draws a few critical questions: How can large initiatives for digital sovereignty sustain the affective and relational dimensions of care and commoning without reproducing existing exclusions based on technical expertise, literacy, or access? What structural conditions and support systems are necessary to prevent the suffering and alienation that frequently accompany engagement in care work and commons contribution? And, as AI systems increasingly shape welfare provision, public administration, and everyday life, how might care and commoning perspectives inform more just and responsive technological futures? Recognizing care and commoning as co-constitutive of contemporary technoscience demands a fundamental reorientation in how we conceptualize digital innovation, governance, and participation. As STS scholars and engaged researchers, we bear responsibility for foregrounding these often-displaced perspectives and practices, challenging the “noisy” narratives of techno-progress with more “care-ful,” attentive accounts of how our digital worlds are actually maintained and by whom.

Notes

¹ I am well aware that a natural habitat, as an example of commons, is very different from, for instance, an online community platform. A natural habitat, such as a small forest, might be tended by tax-funded municipal care workers alongside conservationists and outdoor activists, and be freely accessible to everyone, whereas an online platform for neighborhood sharing of information and goods can be voluntarily maintained but remain a closed, communal infrastructure. Opposite constellations are similarly possible.

² A detailed overview of concepts, historical developments, and empirical studies on commons is beyond the scope of this reflection. For a comprehensive overview, see the *Handbook of Peer Production*, edited by Mathieu O’Neil, Christian Pentzold, and Sophie Toupin (2020) as well as the discontinued *Journal of Peer Production*.

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At the Margins of Research: Affective Encounters and Careful Worldmaking

Jonas Fritsch

How do we as researchers allow ourselves to be touched by the world in a way that propels us to touch back? What is the resonance between theory and practice in such affective encounters? And what worlds are made at this intersection between caring for and caring with? And how might we understand this blurring between research and not-yet-research as a form of becoming-research that propels new labs of living-with across human and more-than-human actors?

This article takes its point of departure on a bicycle moving through an urban garden – Byhaven at Sundholm – in Amager, Copenhagen, somewhere in the Fall 2015, not long after I had taken up a position in interaction design at the IT University of Copenhagen (ITU) after living most of my life in Aarhus. As will become clear when reading the article, what at the time seemed like a tranquil pedalling exploration of a new neighbourhood has ended up becoming increasingly entangled in the development of my professional practice. I know now that it led to an engagement with more-than-human dimensions across social, mental and environmental ecologies which profoundly influenced the creation of my research Lab, the Affective Interactions & Relations (AIR) Lab at ITU (<https://airlab.itu.dk/>). I know the encounters that I had in that urban garden over the years developed into multiple research and teaching collaborations exploring these ecological explorations through sonic design experiments, urban design concerns and affective data collection. However, I also know that I have not yet taken the time to tell the story about how these worlds came to be, and how this initial bike ride and encounter with the human and non-human actors populating Byhaven and the Sundholm area. And I believe that this might be a story that can contribute to the aim of this special issue, because it essentially is one about complicating, dissolving and crossing boundaries; disciplinary, professional/personal, human/non-human/more-than human, to name a few.

It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories. (Haraway 2016)

I am intentionally framing this article as “a story,” with all the power and limitations this brings. As Haraway points out, every story is in itself a form of worldmaking, and how we tell it, changes the worlds we create. This story is told based on more than 10 years of engagement with Byhaven, drawing on both written fragments (field notes, unsuccessful research applications, article drafts), images/sound recordings/videos, workshop findings, design experiments, interviews and more. It extends previous explorations of how to articulate that which we sometimes “leave out” when we tell more formalized stories about what constitutes “research” (Kofoed and Fritsch 2023). It might be seen as a form of “undisciplined writing” (Fritsch et al. 2022) that draws on autoethnographic and vignette-oriented ways of bringing forth knowledge that was not there before, because it was hiding in the not-yet-articulated dimensions. In this piece, I use the term “at the margins of research” to unfold this. In doing so, I draw on Star who argues that marginality is an experience of living simultaneously “inside” and “outside” many different networks and of continuously becoming a multiple actor-subject (1991). This resonates with a more contemporary “call for action” by Stengers who argues that scholars and researchers must allow themselves to be touched by current sensible events in the present to change things (2019). In this article, I will argue how existing at the margin requires inhabiting “critical zones” and in-between, relational spaces of thinking-feeling at the intersection between research and (other forms of) life. Further, I will argue that taking the time to “tell stories differently” might function as an invitation to interrogate the juxtapositions between “marginality” and “centrality” as ever-changing currents across STS and design – and quite possibly beyond.

But let’s get back on the bicycle in 2015. At the time, I was trying to find the most direct bicycle path from my home to the university, which, due to the street planning in the neighbourhood, was not a straightforward task. After some months of searching, I started returning to a path that would take me through an area – which I later discovered was named Sundholm – that I found intriguing, where I would pass through an urban garden, namely Byhaven; a place I could also overlook from my office on the 5th floor in the ITU building. On my daily commute, I would take the route with Byhaven and its chickens and rabbits, enjoying the atmosphere and feel of the space, but always on a bicycle in motion, just passing through.

In 2017, this changed. As part of an ongoing research project on *Affects, Interfaces & Events*, I decided to host a workshop in the garden with some colleagues to explore what we called “Urban Fabrics” (Fritsch and Thomsen 2014). Specifically, we wanted to map and explore the entanglement of digital infrastructures across social, environmental and mental ecologies (Guattari 1989; Fritsch 2019) as well as human and non-human actors using the BThere design method (Eriksson et al. 2006). The main element of the BThere method is to print a large map of an area and then go to that area and start populating the map with observations across different layers, while engaging in conversations with the people in the area. We have reported in more detail in the findings of that workshop (Fritsch and Samson 2020) but for present purposes, I would like to zoom in on two things that now, seen in retrospect, have been instrumental in shaping my research agenda in the last 8 years.



Figure 1.

A collage from the BThere workshop; in the top left corner you see a screenshot from the Sonic Contours, the yellow names to the right are wifi-names we discovered when moving from ITU to Byhaven, and in the middle you see the annotated Google Map and a non-human participant. Photo by Jonas Fritsch.

First, we encountered the daily responsible for the Urban Garden, Emil. Emil told us about the story of the place, how it was both a regular urban garden but was also used for social rehabilitation through gardening for people affiliated with the nearby Sundholm shelter. Emil referred to them as the users of the garden, and how they were often homeless and with some form of substance abuse. Further, Emil told us that even though the area was loved and appreciated by several people and users, it was still continuously subject to change – even threats – from the ongoing processes of gentrification sweeping over a number of areas of Copenhagen in the name of urban redevelopment. At the time, this meant that there were plans to convert a rather large area of the urban garden to build a parking house that would secure municipal revenue streams. During the data analysis after the workshop, this issue made us reflect on the question of value; what are the different forms of value that intersect across the different stakeholders in Byhaven? Value for Emil and the users was not economic or monetary value, which on the contrary seemed to be the driving force behind the parking house project and the municipal urban planning. Further, it also foregrounded the emergent and processual quality of the place; nothing was settled and the resources to keep the place running had to be renegotiated on a yearly basis. It also raised questions about ownership and the commons; whereas the urban garden was for everybody, a parking house would be for paying customers only.

Ever since that day, I was constantly anticipating the construction of the parking house to begin; an imaginary symbol of the capitalist capture and the conversion of city-near nature

into monetary revenue streams of surplus value. I was thinking: how can I as a person and researcher, and we as a university, engage in what's happening in our own neighbourhood – and potentially make a difference in this process?

On my way to work I would now normally say hi to Emil to hear about how things were going, and I got to meet some of the users of the garden and heard their stories. I started inviting colleagues over for lunch in the garden and created small student research projects that used the urban garden as a case for design work. And I started using design research and other methods to explore why it was so difficult to translate the value produced in the urban garden into a format that could be understood and recognized by the decision-makers and systems that were involved in the urban renewal projects. This led to a growing research engagement on how to partially capture and translate affective data on the lived quality of the place for human and non-human actors, where more researchers got involved, and where we met with more people from the site. We used experimental walking and listening methods with and without technology to attune to the place (e.g., Springgay and Truman 2018; Oliveros 2022) and developed an installation that would allow us to zoom in on the sounds of the place, hence the name *Sonic Zoom*. We did breathing and meditation sessions in the garden and regularly went there for lunch and coffee. We also hosted a visit in our university Lab (AIR Lab) for Emil and some of the users of the garden, since we found out that the large road between the garden and the university worked as a hard boundary both for us at ITU and the people from the urban garden at Sundholm, and wanted to break that barrier. We started drafting research applications and writings about our engagement and mobilized larger networks and stakeholders.



Figure 2.

Sonic Zoom in use at Byhaven. Photo by Jonas Fritsch.

At some point, we asked Emil about the status on the parking lot. He said it had been postponed due to increased pricing for construction work; apparently the building lot was tied to the development of another lot, and together they were too expensive to kick things off. In the meantime, construction of two major new residential buildings on the parking lot between ITU and Byhaven had begun, which was very palpable evidence that the gentrification process had not stopped entirely, but only been displaced to other areas in the vicinity. It also meant that the garden was no longer visible from my office.

The collaboration came to a hard stop during COVID due to the national lockdown (first from March 2020 lasting until Summer 2020, and then again from December 2020 to March 2021). Due to the national restrictions, it was against the law to gather in groups, especially when it comes to extra vulnerable people such as many users of the garden who had, e.g., pulmonary diseases such as COPD (Chronic Obstructive Pulmonary Disease). We kept in touch via phone with Emil and others from the garden, hearing about their experiences which were very mixed; there were challenges, especially regarding physical compassion and the increase of drug trading, but also an increasing number of people were using the garden as a place of relief during the lockdown. It was, however, also a challenging time to do site-specific research in general.

One day, in the Autumn 2020 while visiting the garden, we found a large crowd of people gathered there. We went into one of the greenhouses to check out the tomatoes. One of the people from the crowd also went into the greenhouse, and we asked him about the group. He said that it was a group of municipal workers, also from the urban development sections, that were visiting Byhaven as part of an inspiration tour. He then told us about some of the projects



Figure 3.

Collage of more-than-human entanglements in Byhaven (above) and the development site between the university and Byhaven over time (below). Photo by Jonas Fritsch.

he had been involved in planning, one of which was at the nearby school. We somehow ended up asking him about the plans for the area, and the parking house. He said that it was in fact no longer on the table for the time being – but that when it was being planned, he was just hoping that the case would not land on his desk. He was a local person and had known about the area for years and did not want to be part of deciding to build a parking house in Byhaven because he really liked the place and did not want to see it change. In the Summer of 2025, construction started in the area – but not for a parking house, but rather an expansion of the nearby youth prison’s courtyard area. In the meantime, Emil had moved on to other projects, and my engagement with the area was awakening again after a time where I had focused on other projects. We talked to the new daily leader, Erik, who said that after this construction, there would be no further plans involving the urban garden area – at least that he knew of. Our conversations with Erik were part of getting more involved in a new urban redevelopment project carried out at the entire Sundholm Area after a period of less direct engagement due to other spinoff projects.

The above vignette departs from a passing-through to a situated engagement with a site and its inhabitants due to an affective encounter that touched me in a way that propelled me to touch back, resulting in a growing engagement, which is still proliferating, albeit at a slower pace and less directed than some years ago. This oscillation between touching and being touched also echoes Spinoza’s definition of affect as “an ability to affect or be affected,” which are always two facets of the same event. This basic definition has been taken up by Brian Massumi who argues that this affectation happens in-between, blurring the traditional boundaries between what might be seen as an object or subject (2009, 1). Further, by proxy of Deleuze’s uptake of Spinoza, Massumi emphasizes that “a power to affect and be affected governs a transition, where a body passes from one state of capacitation to a diminished or augmented state of capacitation” (*ibid.*, 1f). This transition is felt, in the unrolling of an event, that leaves a trace and can be re-activated across other events. According to Massumi, this line of thinking emphasizes bodily capacitation, felt transition, quality of lived experience, memory, repetition, seriation, inclination – in dynamic *relation* to each other:

If there is one key term, that’s it: relation. When you start in-between, what you’re in the middle of is a region of relation. Occurrent relation, because it’s all about event. Putting the terms together, you realize straight away that the relational event will play out differently every time. In repeating, it takes up the past differently. In taking up the past differently, it creates new potentials for the future. The region of occurrent relation is a point of potentiation. It is where things begin anew. Where things begin anew is where they were already present in tendency. (Massumi 2009, 2)

Looking at the personal vignette above through this wholly relational understanding of affect and Stengers’ call for an active research engagements that blurs the boundaries between any easy separation between “research” and “life” – or sensible events – more generally allows us to explore what happens at the margins of research; in those areas where the distinction between research and not-quite/becoming-research. Byhaven is an example of how I, as a body moving through a space, allowed myself to become affected and start touching back – sometimes in projects that were more attuned to traditional research methods and practices, but also in ways

that were continuously questioning and moving my research towards a clearer ethico-political engagement with a site I had developed an affection for. This research interest has been in a constant processual flux of becoming shaped by both conceptual foundations, calls for funding, collaborators, user needs and technological explorations. From a research side of things, what has been striking is the continuous ability of the site to sustain a form of research interest.

Because “nothing comes without its world” we do not encounter single individuals, a meeting produces a world, changes the colour of things, it diffracts more than it reflects, distorts the “sacred image of the same”. (Haraway 1994, 70 in Puig de la Bellacasa 2012)

If we are to further conceptualize this engagement, it can indeed be understood as a continuous form of pluriversal worldmaking-with the site and the multiple collectives mobilized along the way (Schön 1987; Haraway 2016; Escobar 2018). My relation with Byhaven developed into a careful engagement exploring the material, ethical and affective entanglements through experimental interventions (Puig de la Bellacasa 2017). As articulated in the quote above, the encounter with Emil as described in the vignette was indeed a meeting that ended up “producing a world” – but only because it was allowed to unfold, and because I started “caring about” the site. Here, I draw on Schrader’s distinction between “caring for” and “caring about” where the former entails the often-gendered labor of caring for somebody in need, and the latter concerns an affective relation. As Kofoed argues:

Caring for somebody is usually goal-oriented, as it involves an “effort to improve the situation of a patient” (Mol, 2008, p. 23). [...] Beginning to care about something or someone implies an opposite move, namely the transformation of the limit that places someone outside our socially sanctioned scope of care (Schrader, 2015, p. 668). (Kofoed 2024, 11)

Looking at Byhaven, we can identify a number of entangled and sometimes conflicting caring practices dressed in different guises and on a number of levels; that of the users – both “regular” urban gardeners and the socio-rehabilitating gardeners – towards cultivating the garden, that of Emil towards preserving the garden for the users, that of the municipality towards developing the city – and that of us as researchers moving into the site. In reality, it might be argued that the line between caring for and caring about is also not easily upheld in (research) practice.

In the case of Byhaven, this careful and ethico-political engagement has also been one related to commons and commoning, and nature as a site of affective socio-nature encounters and co-becomings (Singh 2017). And whereas this was the initial site that catalyzed this conceptual orientation, the encounter with Byhaven has also travelled into other sites such as a contested nature reserve near Copenhagen, Amager Commons, and an emerging urban development in the Southern part of the city, Jernbanebyen/Spor 10. In the first case, we explored different ways of caring for the commons reported through “undisciplined writing” and problematizing the limits of caring through research (Fritsch et al. 2022). In the second case, we became part of the very first steps in the realization of a novel urban development and were allowed to follow the ways in which values emerged and were spread into the early stages, sites and communities developed in the project. Here, it was very interesting to

follow the developers' ambition to, in collaboration with the municipality, create a social community that would precede the actual development process. However, we also saw that the values about participation and ecological impact had a hard time when encountering the reality of development and investments. Both cases, however, emerged directly as a result of the engagement with Byhaven and the stakeholders we had teamed up with, e.g., Gehl Architects. Again, this is an example of how an initial commitment to world-making through socio-nature encounters might be sustained across sites and move into new collaborations and encounters. Whereas this in itself is hardly revolutionary, it adds to the potential field of exploration opened when allowing yourself to become touched and start re-worlding.

Conceptually, the research carried out in and around Byhaven has been filtered through pre-existing agendas around, e.g., affective and emotional approaches to interaction design (e.g., Fritsch 2018; Fritsch 2021; Fritsch 2025). In turn, this research agenda has been coloured and modified through experiences "in the wild." It is my experience so far that this will necessarily be a process of mutual resonance – and in this case it has provided enough vibrational affect to sustain the engagement. However, during the last almost decade there have been periods of deep engagement, and periods of detachment. COVID was a rupture, and the same might be said about the changing employees in Byhaven. But also very practical arrangements such as kids starting in school leading to a different bike path that did not go through the garden have had an impact on this. Research engagements as a form of care can be unstable at times. The parking house story is also interesting since it foregrounds how an engagement with urban space is always an engagement with the temporary and larger socio-economic flows of people and money. And how the power of that which might happen has an immediate effect on the things that are happening, also when it does not materialize.

One of the things we do as researchers to sustain initiatives is to try to secure funding, which in the case of Byhaven never materialized, even though we sent in six different applications to various funding bodies over the years. Naturally, the process of writing up applications and inviting collaborators into networks might be seen as a mobilization of interest in itself – but having no funds, and receiving funds for other projects, also diverted the attention. However, in the period where we have not received funding, Byhaven has been presented to more than 400 students in many different courses, having multiple colleagues visiting, presenting the work we have done there in multiple talks and panels, and much more. This naturally troubles the notion of centrality and marginality, since it can be argued that Byhaven has been a central pedagogical element – but that is a different, yet complementary, story to tell. At present, we are seeing a resurging interest and we are writing up new articles and sending in new funding applications. And then, of course, there is this piece, which might simultaneously be seen as a re-enactment and feeding-forward of the previous engagements into the present – and of re-centering the marginality of the research into novel directions.

The story about Byhaven can also be framed as a design research engagement where different methods and techniques were tried out in collaboration with human and non-human actors across ecologies in an attempt to map and identify design opportunities for strengthening communities, increasing psychological wellbeing and capturing affective data for urban planning processes. During the years, we have drawn heavily on Anna Tsing's ideas about developing different arts of noticing oriented towards the more-than-human through multispecies attunement

(2021). According to Tsing, new arts of noticing emerge when the body and senses attune to other values than the habitual. In our work, we have often explored how digital and interactive technologies might enable the body and the senses to explore, discover and qualify aspects of reality that are previously hidden or unrecognized. And returning to Stengers, Spinoza and adding Daniel Stern (1985), it is about allowing yourself to be touched by sensible events and use that affective capacitation to develop novel forms of attuning to the unfolding of life at the margins of research, as an engine for directing research to the things that we truly care about. This involves, following Moore and colleagues (2021), a form of “careful risk-taking” in the re-making of relations and, ultimately, of the world. Further, as should be clear when reading this text, the margin is never a fixed site, but in continuous movement, folding and in-the-making. Attending to this becoming can enrich research practices across STS and design towards new existential territories and engaged impact in a world in tension. It is my hope that this piece provides a certain entry point for this required collective experimentation across disciplines.

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World(s)-Making “Out Here” in Scholar-Activism, in the Milieu of the Between

Cindy Kohtala

For design and STS scholars engaged with situated communities offering alternatives to extractivist capitalism as “commoners,” how do these engagements cause us to reflect on our own positions as commoners ourselves? STS does clearly engage with analysis and critique of “Big Tech,” for example (Birch and Cochrane 2022), as well as related efforts of alternative digital commoning projects (Perperidis and Tsekeris 2026), with scholars emphasizing such endeavours as worthy of STS attention (Papadopoulos 2018; Sciannamblo et al. 2020). Commoning here denotes the *ongoing-ness* of stewardship of things, resources, livelihoods, by a

collective, in ways that enable people to experiment with new lifeways (Bollier and Helfrich 2012; Poderi 2020; Perperidis and Tsekeris 2026). Many scholars – myself, my colleagues, as a “we” – have been embedded in sustainability materialist and alternative technology communities for years or decades, researching *with* them more than *on* them, to explore increasingly urgent socio-ecological questions often unaddressed by universities, governments or markets (Hess 2016; Berglund and Kohtala 2020). Our identities blur from academics reading climate science and updates on further transgressions of the planetary boundaries to people working together with care in our own urban milieu on things that seem to matter (Temper et al. 2018; Berglund and Kohtala 2020; Schlosberg 2025; Houtbeckers 2025). World-making “out here” with social groupings, in the wild and in a way that necessarily blurs academia and activism, appears more and more to be the only option available. Yet the very between-ness, of becoming, of entering with others into an alternative space-time as commoners, is fraught and fragile; patriarchal trappings and rigid identities-practices in polarized worlds shunt us away from the messiness and confusion that accompany commoning (Velicu and García-López 2018; Kohtala et al. 2019; Prendeville and Kohtala 2023). Thinking through Judith Butler, Irina Velicu and Gustavo García-López (2018, 57) caution us against instrumentalizing thinking of the commons as for or against capital power, but rather as bounded human selves who are “mutually constitutive but also mutually vulnerable.” I ponder how to get myself and ourselves from here to there in the messiness and vulnerabilities of scholar-activism.

“Civic engagement” and “participation in society” are increasingly seen as vital elements of democratic societies in collective stewardship of webs of life on planet Earth (Marres 2015; Coles 2016; Kely 2017). As the crises we face are multi-scalar and volatile, uncertain, complex and ambiguous, “social innovation” or “grassroots innovation” – that is, grassroots movements’ attendant sociomaterial experimentation with new practices and infrastructures – are for many scholars not *sufficient* for the sustainability transformations needed, yet both *necessary* and thereby worthy of study (Seyfang and Smith 2007; Olsson et al. 2017; Schlosberg 2025; Kuu-Park et al. 2026). Yet how social innovation is often referred to in scholarship – at arm’s length as if viewing a surgical operating theatre from above – appears to me to distance us from the very real effects of a world on fire, the embodied experiences concomitant with change and building alternatives that are affective and often highly visceral (Berlant 2016; Poderi 2020). What does it take to make worlds together with our interlocutors in ways that actively practice care? Such worlds entail prefiguring sociotechnical infrastructures that seek to common knowledge production rather than enclose it (Perperidis and Tsekeris 2026). These world space-time fragments grow in a one-world world of academic managerialism, the death of expert knowledge, increasing academic precarity, and patriarchal scholarly practices on the one hand, and a milieu of activist in-fighting, increasing polarity and disinformation, and fragmented attention to community governance on the other (Prendeville and Kohtala 2023; Gül et al. 2025). We as scholars are transversing worlds on fire *in here* in academia as well as worlds *out here* in civil society with communities.

The world *in here*, of scholarship and conventional academia, continues to struggle with the effects of neoliberalism and audit culture, while encountering ever-new catastrophes concerning the crisis of expertise and university defunding in the face of encroaching authoritarianism. Natural scientists sit in committee rooms and wonder aloud if they need to

“become activists,” while others are arrested on picket lines, whether the protest pleads for peace, demands climate action, resists job loss, or protects diversity and inclusion initiatives. Researchers are siphoned into the quicksand of productivity tools – global corporate software packages oriented to capitalism-driven business instead of learning and research environments, not to mention AI tools – in order to meet obsolete and anti-knowledge-commons achievement metrics in an impossible global competition for fee-paying students and external research funding (Srigley 2018; Jowsey et al. 2025; Thrift 2025; Gül et al. 2025). In Europe, such technology use especially by universities and governments is increasingly seen as contravening General Data Protection Regulation (GDPR) principles on data collection and privacy, and calls for “technology sovereignty” have been rising in importance for some European Union nation-states at both regional authority and citizen levels (European Commission 2026; Pierucci 2025). In Finland, for instance, a bottom-up citizens’ initiative for legislation on “digital independence” is currently gathering signatures.

In universities, there have always been informal academic collectives using and building independent and free, open source infrastructures (softwares, databases, repositories) for collecting and sharing their work aimed at knowledge commons, sometimes in tandem with citizen science initiatives and sustainable materialist activism (Schlosberg 2025) having similar “free and open” ethos. There appear to be increasing numbers of researchers who want to gain or improve these skills, regarding them as a key part of the commoning they aspire to, yet meeting technical and technical-cultural hurdles. The Bits of Freedom association in the Netherlands has run “privacy cafés” for more than a decade, digital STS scholar Janet Vertesi launched the Opt Out Project several years ago, Tactical Tech is said to have reached two million people with its Data Detox Kit, and critical engineer Julian Oliver runs courses in digital hygiene and security, as well as in deploying and maintaining sovereign, self-hosted cloud services. These examples number among hundreds of small and large not-for-profit intermediaries aiming to foster digital literacies among activists, civil servants, academics and ordinary citizens, as well as the co-production of alternative social-digital infrastructures. We *in here* increasingly scrutinize how entangled our daily practices are with “Big Tech” ecosystems (Birch and Cochrane 2022), at the university, in the field and at home, inducing unease if not sheer anxiety. Little wonder that scholars and scholar-activists are writing articles titled with tired or leery questions (Winner 1980; Law 2015; McKibben 2022), embittered utterances (Thrift 2025), and cursewords (Eubanks and Schaeffer 2008; Springer 2016; Graeber 2018).

Through engaging with alternatives *out here*, we are enjoined to see tech itself rather as socio-technical relations and interdependence: as *commoning* and *care*. Transitioning to tech tools that accord more with our scholarly and personal values, entails learning to use and domesticate, for example, free, open office applications and cloud services; alternative communication platforms that use channels or sub-groups (Mattermost) and that include decision-making tools (Loomio); free, open video and audio meeting software (Jitsi, Big Blue Button) and social media (various Fediverse applications); and the principles of low carbon websites and low carbon computing. As these may be the tools our interlocutors in the field use and develop, they become “rhetorical technologies” (Baudry et al. 2021) that invoke and represent the digital sovereignty community we aspire to join. This means joining an alternative technology’s *design constituency* and using and co-producing *counterartifacts* (Pfaffenberger 1992). Scholarly engagement with grassroots

commoning groups in this way is a different sort of “academia without walls,” still aimed at strengthening the links between research work and social justice (Pereira 2016), yet with different conceptions of how change will occur and what constitutes knowledge (Houtbeekers 2025).

Cognizant of principles of environmental justice and thinking-acting practices in webs of life, we note technology rather as more-than-technology and even more-than-sociotechnical, understanding it as the set of “techniques, tools, and systems of knowledge applied by humans across cultures and throughout history” (Paulson 2024, 75): that is, world-making, involving material flows and very real material impacts on vulnerable communities (*ibid.*). The world-making we imagine is not exactly the pragmatism of eco-modernism, where the transformation needed will be wrought through design and technological innovation while the world stays the same, nor is it a naïve utopianism of entanglement *all the way down* that still maintains some sense of anthropocentrism and privilege. If, as underlined by Susan Paulson (2024), we perceive the societal structures underpinning technology that need to change – by continually asking how colonial, class, gender and race systems are enmeshed with technologies, that then in turn produce and reproduce marginalization and destruction, we might gain insight into *how* such regress may be otherwise. In this sense, commoning is deeply ecological (Vetter and Fersterer 2025).

Yet the freedom spoken of in the context of *convivial* technologies, where commoning is concerned with bottom-up, reflexive experimentation with alternatives; the entwining of individual and collective autonomy enacted through technology, as conviviality; and the freedom to care for each other (Vetter and Fersterer 2025; cf. Illich 1973), is not the same free-dom of free, open source software (F/OSS), nor is openness the same as accessibility or commons. F/OSS development by tech collectives is rife with controversy. Its “free and open” discourse has never been associated with liberatory freedom nor openness to marginalized communities (Dunbar-Hester 2019; rms-open-letter 2021), not to mention environmental justice, which renders any commoning discourse by so-called p2p commons communities open to be questioned (Kohtala et al. 2019; Prendeville and Kohtala 2023; Dannemann 2023). In particular, distributed, indieweb (“dweb”) initiatives and grassroots software development labelled as community technology, community informatics or civic tech (Tarr et al. 2019; Walker 2020; Murillo 2025; Gehl 2025; Troncoso and Utratel *n.d.*) are digital commons initiatives with very material implications and practices that play out in situated, embodied experiments on the ground. Many projects appear to fight informational-commons enclosure on the surface, yet continue to purge from their ranks valuable contributors (due to race, sex, gender and other factors) who are seen as raising political questions. All this is because code is still deemed apolitical and neutral, and the inordinate influence of the sociotechnical culture of Silicon Valley, the Californian ideology (Barbrook and Cameron 1996), provides the baseline of success. Moreover, several independent tech movements are inspired by or have already been subsumed into projects that actively incubate hate, while commercial F/OSS platforms explicitly collaborate with fascist actors. Some of this has already been noted as accelerationism, as articulated by scholars including Timnit Gebru and Émile P. Torres (2024) regarding generative AI corporate figures and sponsors espousing eugenicist ideologies. These tendencies, “rhetorical technologies” of a very different kind, stand in stark contrast to the cooperatives and collectives who explicitly orient to principles of degrowth, *autonomía*, community economies and feminist economics (Temper et al. 2018; Varvarousis 2019; Perperidis and Tsekeris 2026; Troncoso and Utratel *n.d.*).

The latter, who may also be scholar-activist collectives, build interstitial, prefigurative and situated practices oriented to pluriversal political ontologies. Moreover, many of these scholar-activists are themselves subject to a life of precarity in an academic environment of hiring freezes, yet possess valuable research and knowledge on how to live in new alternative webs-of-life.

Design and STS scholarship is both *in here* in the so-called ivory tower and *out here* in the world. Design has to be both, always. If design research is not rooted in practice, it dies; but, what practice? Whom or what does design and design research serve? Design academia is in the throes of questioning its knowledge practices, including research engagements with knowledge holders “out here” (Brereton et al. 2014; see also Costanza-Chock 2020). STS too has wondered about how it is “engaged” (Sismondo 2008), or how STS can better “make & do” with its interlocutors (Forlano et al. 2012; Downey and Zuiderent-Jerak 2021). Romand Coles calls such engagement “edgework” (Coles 2016). But what happens at the edges?

In a recent issue of *Science, Technology, & Human Values*, Martin Savransky (2025) wondered how scholars and collectives alike will survive our current onslaught of catastrophes:

[I]f it is now a matter of learning how to think and live in the rubble of capitalist devastation, the question becomes how to learn to pay attention to what lurks in the folds and snags of the present, what insists and persists inside and in spite of it. (Savransky 2025, 1128)

He turns to Isabelle Stengers and thinks through Philippe Pignarre and Stengers’ (2013) presentation of the *interstice* as a point of departure, a situation or an in-between. The interstice is not an innovation incubator or even a boundary object; it is a state of possibility between what can yet be imagined within the devastation of the present. Pignarre and Stengers speak of the image of the interstice as “a problem ‘that gathers together,’ not of a problem to be resolved” (*ibid.*, 112, *emphasis in original*).

Interstices bring to mind the anarchic notion of how interstitial practices aim to create the building blocks of the future society within the “shell of the old” (Carson 2021; Wright 2010); the interstice thus belongs to that “shell” or “bloc,” but is not defined against or in relation to it (Pignarre and Stengers 2013, 110). Savransky thus terms it the *milieu of the between* (2025, 1129). I have thought of makers’ and hackers’ skill at articulation work (Star and Strauss 1999) as interstitial, their ability at technical interoperability, building workarounds at the interstices between technical-cultural worlds (Kohtala 2018). Yet Stengers’ thinking “by the middle” of the interstice is immaterial, or perhaps a-material. The conceptual power of the interstice lies in how it holds possibilities for political openings, for drawing in and commoning based on the situation. In maker culture, sustainable materialist activism, and community technology collectives, the milieu of the middle holds space for postcapitalist organizing that breaks from its commodifying discourses (Sivek 2011; Lange and Bürkner 2018; Smith 2020). For Angelos Varvarousis (2019), it is during moments of crisis, in particular, when there is opportunity for

[O]pening up a field of experimentation with new practices and ideas that are simultaneously products and producers of the new social imaginary significations emerging due to the destabilization of the prevailing older ones. (Varvarousis 2019, 501)

The milieu of the middle is both pragmatic and utopian, practice and speculation.

Pignarre and Stengers were reflecting on the Seattle anti-globalization protests of 1999 in *Capitalist Sorcery* (2013), and the dynamics that come with activism, ideologies, group in-fighting, praxis and principles. For them, the interstice presents a possibility and a “process which asks its protagonists not to express themselves but to become capable of being obliged to think by the situation and for the situation” (*ibid.*, 131). Commoning requires, not principles so much as awareness of patterns, connectedness and interrelatedness (Vetter and Fersterer 2025). When working with communities *out here*, participatory design scholar Yoko Akama (2014) has become attuned to a sense of between-ness, a liminality that may remain outside of our conscious attention but is the rhythm of our relationality in communal work. As the interstice engenders plurality, it cannot be taken hostage by a pure position without closing down, even while the risks of authoritarianism and effects of current polarization and hate vectors still give us pause (Coles 2016; Varvarousis 2019; Dannemann 2023). For us, scholars and communities alike, caring about commoning, we wonder if we can get ourselves back into the *milieu of the between* where experiments at the grassroots matter, to think not of problems, but to think by the middle. Freedom is not the free of open source; it is the freedom to care for each other.

Arundhati Roy (2003) wrote,

The time has come, the walrus said. Perhaps things will get worse and then better. Perhaps there's a small God up in heaven readying herself for us. Another world is not only possible, she's on her way. Maybe many of us won't be here to greet her, but on a quiet day, if I listen very carefully, I can hear her breathing. (Roy 2003, p. 75)

I imagine the *interstice* not as a place or a practice, but a space-time that is needed before prefigurative and interstitial practices can begin to be collectively created; a thing that can be seen like a star, only by looking at it through one's peripheral vision. In academia *in here* and in activism and civil life *out here*, knowing how to see and be in the *interstice* matters in this current political moment, so that we may experience the many we's and I's relationally and sense how to co-govern. The world(s)-making this entails, our coming together and commoning together as commoners, is a subject worthy of STS attention. It is a practice that is worth you and me and they coming together as a *we* in a way that does not erase difference or mess, but rather makes life in common.

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Designing Concerns. Bruno Latour und das Transformation Design

by Peter Friedrich Stephan (2024) Bielefeld, transcript, 513 pp.

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The ambition of this book is to establish a channel of interdisciplinary communication between STS and design studies. Its author, Peter Friedrich Stephan, is a recognized design scholar and professor for transformation design at the Kunsthochschule für Medien Köln in Cologne, Germany. He finds foundations of such a channel between STS and design in the work of Bruno Latour, who himself, as Stephan repeatedly cites, conceived of design playing an important role in the transformation of the project of modernity: “[W]hy not,” Latour asks in *An Inquiry into Modes of Existence*, “transform this whole business of recalling modernity into a grand question of design?” (Latour 2013, 23, *emphasis in original*).

For Stephan (2024, 36), design negotiates the relations of use and changes of use (“Nutzung und Umnutzung”), habit and irritation, normality and particularity. In its most general form, design brings something into existence that modifies existing practices. This conception of design as a practice resonates with the work of Latour. In particular, Stephan elaborates on a set of Latourian terms and endeavours: the notion of Dingpolitik (Latour 2005), an understanding of concerns and the projects that involved visual techniques like drawing and mapping.

Despite his deep engagement with the Latourian œuvre, Stephan stays alert of the shortcomings of Latour’s work: its terminological and logical inconsistencies, and in particular its recurrent misleading examples.

Where Latour is right, he is often not breaking new ground, and where he is breaking new ground, he is often not right. [...] Latour’s approach is original, but it ignores the current state of discourse in design. (p. 27, *own translation*)

Thus, a mutual rapprochement of STS and design promises to benefit both sides. For design, Latour offers, indeed, a “system” of thought (cf. Latour 2010, 607) that is productive in reorienting the self-concept of design towards its new role widely called “transformation design.” Latour’s system can do this just because of its inconsistencies and voids. And for STS, the current state of debates in design can provide anchors for lifting Latourian theorizing to a new level of sophistication.

The book is structured into three parts. Part A discusses the state of the art of design and argues based on a brief review of the field's history why it might profit from a more thorough engagement with Latour's works, and in particular with Actor-Network-Theory (ANT). It finds a convergence in the projects of polity, design, and Latourian theorizing in that under the conditions of a pluriverse, their task is to work towards (or compose) a future coherent world. Part B then turns to the writings of Latour to excavate and re-construct the role that design plays in his thinking. Again, due to inconsistencies, this is not an easy task, but Stephan succeeds in writing an introduction to decisive parts of Latour's works that most likely is accessible to designers. And Part C merges Latour's ideas on concerns with a design-focused approach to concerns developed by the author. Based on examples from his own studies, Stephan explains that his approach to concern design might be understood as a development and update of earlier frameworks of design, in particular of Sozio-Design proposed by Bazon Brock and others (cf. p. 374).

But what are concerns? On various occasions, Latour juxtaposed matters of fact with matters of concern to emphasize, amongst others the role of (public) interests in the definition and (dis-)stabilization of facts. Matters withdrawn from reasonable debates (facts) might become matters of public dispute (concern).

From this, Latour derives a design task: visualizations should be created that illustrate the controversies surrounding matters of concern. Design should thus contribute to a *Parliament of Things* and enable a reset of modernity. (p. 27, *own translation*)

Stephan, however, is critical of Latour's treatment of the phrase matters of concern, arguing and partly showing that Latour could have spent more effort to increase the phrase's terminological clarity. For instance, given Latour's fascination with Gabriel Tarde, Stephan (e.g., pp. 263-264) wonders why he didn't take up the latter's term of "passionate interests" to suggest that matters of concern are the "fabric of vectors and tensors which defines the attachments of people and assets" (Latour and Lépinay 2009, 39). Also, Stephan explains that the "specifications" that Latour made in his second Spinoza Lectures in 2005 (cf. Latour 2008, pp. 47-48) – matters of concern have to matter, have to be liked, have to be populated, and have to be durable – did more to obscure his thoughts than to specify them. In addition, Stephan shows that the varying ways in which "matters of concern" have been translated into German minimized the term's potential impact (cf. pp. 182-183).

According to Stephan, it is best to conceive of concerns in design as "values in action," thereby following Latour and ANT in acknowledging the assemblage of various elements as place of agency and of their (necessarily incomplete) mutual definition. ANT and concern design share the characteristic that their vocabulary allows for describing aspects that have hitherto been only partly recognized. "Yet, while ANT upvalues the contribution of material elements in chains of action, concern design complements their psychological aspects" (p. 335). This helps answering a question that Latour had left open, the question of why and how chains of action are initiated. In line both with Latour's views on the Anthropocene and humanity's responsibilities in *Facing Gaia* (Latour 2017) and with the more general principles of transformation, Stephan claims that the task of design may be to "temporarily stabilize

the driving forces of concerns in *cultural formats*” (p. 336). Doing so with an emphasis on *matters of concern* might help avoid the trap of unjustified collectivities, like “the social” in social design, and allow for a stronger focus on Dingpolitik.

Stephan’s book is timely insofar as the reception of Bruno Latour is ongoing with unabated power even after his untimely death and includes more and more disciplines outside his own core areas of engagement. Its presentation of Latour’s work is informed and informative. While at times repetitive, the writing across the three parts nonetheless ensures that these parts may be read separately, which makes them more usable in teaching. However, as regards the main mission to encourage a mutual rapprochement of STS and design, it remains to be seen if Latour is a good strategic choice. STS appears to find itself in a momentum where the interest in practice-oriented research is declining in favour of a re-assessment of macro-sociological power relations and the political economies governing (and manifesting themselves) in recent developments in science and technology. Certainly, design scholars have well-developed sensibilities in tracing power inequalities in objects – yet, whether these sensibilities will be conveyed over a bridge leading through Latour and ANT can be doubted.

What is beyond doubt, however, is that Stephan’s book encourages others to forge further between STS and design – an encouragement, we should add, not only at design scholars but also at STS scholars.

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Technology, Users and Uses: Ethics and Human Interaction through *Technology and AI*

by Joan Casas-Roma, Jordi Conesa and Santi Caballé (eds.) (2023) Bradford, Ethics International Press, 376 pp.

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What happens when ethics escapes the philosophy seminar and takes root in circuits, protocols, classrooms, and kitchens? *Technology, Users and Uses: Ethics and Human Interaction Through Technology and AI* invites us to look closely at these encounters, where ethical ideas are not simply declared but built, coded, and lived. Edited by Dr Joan Casas-Roma, Dr Jordi Conesa, and Dr Santi Caballé – scholars whose work spans AI and technology ethics, computational modelling of moral systems, and the governance of learning technologies – the volume is framed as an “out-of-the-box” exploration of how ethics unfolds not only in how technologies *work* but in how they are *used*. This framing reflects the editors’ own interdisciplinary vantage points, which blend philosophical reflection, computing expertise, and a sensitivity to the ways technologies reshape relationships and social orders at multiple scales.

The editors frame the collection as a conversation about ethics in the age of AI, but it is less a single conversation than a polyphony. Across its chapters, ethics appears not as a fixed rulebook but as something made and remade in relationships between people, technologies, and institutions. In Section 1, *Ethics and Technology*, Joshua Alexander González-Martín (Chapter 1, p. 1) revisits the question of who bears ethical responsibility in technological design, arguing that responsibility is distributed among engineers, users, and other agents who shape socio-technical systems. Belliger and Krieger (Chapter 2, p. 33) challenge the long-standing thesis that technology is morally neutral and purely a means to an end. Drawing on the idea that technological development and design are socially constructed – shaped by exchanges among institutions, designers, and users – they argue that moral issues arise not only from misuse but also from the very functions for which artifacts are designed. Grimshaw’s (Chapter 3, p. 66) contribution takes aim at the dominant imaginaries of intelligence – Western, secular, male – and asks what it would mean to design AI systems around alternative cultural understandings. These early chapters signal a recurring argument: ethics is always situated, and to treat it otherwise is to import unexamined biases into code and infrastructure.

Ethics, as these early chapters show, is shaped by context and culture – a theme that deepens in the next section. Cultural plurality is one of the book’s strongest currents. In Section 2, *Technologies and Thought*, Oldfield’s chapter (Chapter 4, p. 99) situates anthropomorphism within a broader critique of how AI-based systems are deployed without sufficient understanding of their societal impacts. She surveys failures in healthcare diagnostics, educational assessment, criminal justice, recruitment, and consumer applications to show how human-like cues in technology can mislead users, obscure risks, and even encourage self-dehumanization. Hutcheon (Chapter 5, p. 135) examines domestic AI systems – smart home hardware combined with digital assistant software – through Ivan Illich’s concepts of radical monopoly and conviviality; she shows how black-boxed design in these systems undermines users’ sense of ownership and control by discouraging repair or modification, fostering learned helplessness, and narrowing the range of meaningful technological choices available in everyday life. Together, these chapters remind us that ethics is not only about avoiding harm but about cultivating forms of life worth living with technology. This emphasis aligns with participatory design traditions familiar to STS, as well as Lucy Suchman’s (2007) critique of “one-size-fits-all” human-machine interaction. The volume also stretches the moral circle to include non-human agents. Ricci (Chapter 6, p. 161) engages deeply with Luciano Floridi’s concept of the “infosphere” as a moral space where the virtual and the real merge, demanding an ontocentric ethics that encompasses both natural and human-made entities. Zandbergen (Chapter 7, p. 182) complicates this ethical expansion by juxtaposing antinatalism – the belief that bringing new human life into the world is morally questionable – with transhumanism, the movement seeking to transcend biological limits through technology. Through this contrast, he diagnoses a form of twenty-first-century neo-nihilism, a worldview in which humanity oscillates between refusing the continuation of human life (the antinatalist impulse) and seeking to engineer itself beyond the human condition (the transhumanist dream). Stelios (Chapter 8, p. 204) confronts the challenge of “artificial morality”: how, if at all, machines can be equipped to reason morally, and what risks arise when cultural partialities are embedded in their decision-making. Collectively, the chapters in Section 2 expose how technical design choices, cultural assumptions, and philosophical visions intersect to shape not only the operation of AI systems, but also the moral, social, and existential horizons within which humans and intelligent machines will coexist.

Where the theoretical chapters sketch conceptual landscapes, the case studies operate as “ethical experiments”. From Section 3, *Use Cases of Technology*, Jiménez-Alonso and Brescó de Luna (Chapter 9, p. 235) take us into the intimate world of griefbots – AI chat systems trained on the data of the deceased – where questions of authenticity, consent, and the commodification of mourning collide. Spaid (Chapter 10, p. 259) interrogates the promised “editorial turn” of AI text generators, showing how machine authorship redistributes labour from writing to curation and verification while risking epistemic opacity, stylistic homogenization, and diffused accountability – an incisive STS lens on authorship as infrastructure. DeFalco and colleagues (Chapter 11, p. 288) extend the book’s commitment to situated ethics into the domain of adaptive learning technologies. Rather than treating neurodiversity as a matter of accommodation, they reimagine it as a design principle that exposes the normative assumptions embedded in “average learner” models. Their argument that inclusion requires structural – not merely technical – change resonates with the volume’s

broadier insistence that ethics must be built into systems from the start. Arnold's (Chapter 12, p. 288) treatment of cryonics shifts the temporal horizon to decades or centuries, exploring legal ambiguities and social inequalities that would accompany the revival of preserved bodies. Camilleri (Chapter 13, p. 336) returns us to the near future of classrooms, arguing for the formalization of an ethical objective in teacher preparation for machine autonomy, where adoption, adaptation, and enactment cycles ensure that teachers integrate AI's benefits while guarding against bias and preserving equity, judgement, and care at the heart of learning. Paolillo's (Chapter 14, p. 364) account of social media in Sri Lanka's political crisis offers a sharp lesson in "digital colonialism", showing how platform moderation policies imported from the global North can fuel unrest in very different media ecologies.

One of the collection's most significant contributions is its refusal to remain within the narrow frame of mainstream AI ethics – often reduced to bias, transparency, and accountability (Jobin et al. 2019). By presenting ethics as an ongoing, situated practice rather than a static principle, the book offers a conceptual and methodological roadmap for tracing how values are enacted, contested, and reconfigured as technologies travel between design, governance, and everyday use. A key strength lies in the book's multi-scalar approach. The juxtaposition of philosophical frameworks with grounded empirical cases allows researchers to see how abstract normative commitments – such as virtue ethics in the infosphere (Floridi 2013), where moral reasoning is examined not as a top-down imposition but as an emergent property of sociotechnical assemblages. For researchers, the book's structure is instructive: pairing conceptual provocations with diverse case contexts can illuminate how similar ethical tensions – around autonomy, trust, or inclusion – are negotiated differently across sectors and cultures.

The collection also makes an important methodological intervention by foregrounding the role of "users" as active ethical agents. In many chapters, users are not passive recipients of technology but participants who repair devices, repurpose systems, and resist harmful applications. This offers fertile ground for new comparative projects. Scholars could, for example, follow how adaptive instructional systems are localized for neurodiverse learners in one context, while domestic AI is reconfigured for communal governance in another. Such comparative STS research would deepen understanding of how ethics is co-produced not only by designers and policymakers but also by the everyday negotiations of diverse user communities. For those working at the intersection of AI governance, design ethics, and cross-cultural technology adoption, *Technology, Users and Uses* provides both a shared vocabulary and a set of empirical prompts to pursue ethics as an evolving social achievement. It encourages methodological pluralism – combining ethnography, participatory design, speculative scenarios, and critical technical practice (Agre 1997) – to capture the full arc of ethical formation. By showing ethics in motion, the book models a research agenda that is both responsive to technological change and anchored in the lived realities of those who use, shape, and contest these systems.

In the end, *Technology, Users and Uses* is less an instruction manual for ethical technology than a set of invitations – to investigate, to intervene, to imagine otherwise. It asks STS to keep ethics in motion, to resist its reduction to compliance checklists, and to attend instead to the messy, contested work through which people and technologies come to matter to one another. That work, as this volume shows, happens everywhere: in the network, in the household, in the classroom, in the law, and in the street.

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Attachements et Fragilités: Écrire dans le Cours des Choses

by Collectif Attachements: Jérémy Damian, Amandine Guilbert, Rémi Eliçabe, Anne-Sophie Haeringer, Antoine Hennion, Sophie Houdart and Brice Laurent (2025) Paris, Presses des Mines, 212 pp.

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On the cover of *Attachements et Fragilités* are one bird and two bird shadows. On the same cover is the name of one collective, Collectif Attachements, and seven people as its shadow. *Attachements et Fragilités* is an edited book that does not reference any editor. Similarly, its introduction does not reference any author. One gathers from these voluntary omissions the authors' insistence on the book as the product of collective work.

Indeed, the Introduction itself presents the book as both a “collective” endeavour and “the result of a long journey” (p. 13). The Introduction serves multiple purposes. It presents the collective – its genealogy, evolution, and theoretical influences. It outlines the theoretical and epistemological impetus behind this collaborative book, less as a programmatic statement for the chapters to come and more as a reflection on this “long journey” (p. 13) that made the book what it is. Finally, the Introduction offers an overview of the following six chapters which are all fragments of empirical research on widely diverging topics – the organisation of solidarity breakfasts for migrants, walks in and around post-Fukushima territories, experiences of osteopathic practices, (mis)understandings of end-of-life care in a palliative care service, contested definitions of Europe's multifaceted “objects”, the plurality and ambiguities of what the authors call an urban “middle ground” (p. 173).

Considering the chapters' thematic eclecticism, the Introduction works as a knot that ties together this diverse gathering of research landscapes as it spells out the book's *raison d'être*. Thinking the social through our attachments – attachments to us as people *and* as researchers – does not mean applying a fixed method that this volume would offer a guideline for. It means getting attuned to a certain research sensibility: one that refuses both active/passive and subject/object dualisms, and remains attentive to the corporeal and affective dimensions of experience, including as researchers immersed in situations. Importantly, being attentive to people's attachments means caring about what they care about. Rather than predefining events, this means leaving open what is unfolding in and through them. This approach is empirical yet speculative, and embraces epistemic humility, uncertainty, and ignorance. Lastly, it encourages experimenting with a way of writing social sciences that leaves room for all of the above.

Understanding how the Collectif Attachements came about helps understanding the book's intentions and structure. In both the title and the collective's name, the term attachments is used in the plural form. It stands for a collective with no institutional or disciplinary affiliation, a group of people that evolved over the years, drawn together by a curiosity for open-ended approaches to research and an appeal to forms of social scientific "craftmanship" (p. 13) more attentive to situations than causalities. This gathering of like-minded but differently-focused researchers overcomes disciplinary and thematic boundaries. While there is one collective, there is also a multiplicity of attachments. Though it might run counter to the authors' collaborative intention to single out Antoine Hennion's work, the very insistence on attachments speaks to the centrality of the sociologist's "pragmatism of attachments" (2013) to the present project. In a footnote useful for situating the book vis-à-vis the STS corpus, the authors explain how the collective was originally formed during a seminar on music organised by Hennion in the 1990s at the Écoles des Mines in Paris, at a time when major STS figures – Michel Callon, John Law, Madeleine Akrich, Bruno Latour – were developing Actor-Network Theory. This genesis and early uses of the notion of attachments by those scholars (Hennion 2017) situate this book well within the STS tradition. However, both Hennion's explicit intention to relate to but stand in contrast with the sociology of translation school of STS, and three decades of a collective in movement have produced an object at the border of this borderless field which is STS. While the book displays its signature fine-grained (ethnographic) attention to the instability of worlds-in-the-making, it does not necessarily engage with typical technoscientific objects. The Introduction is also an illuminating piece for anyone interested in how the work of American pragmatists – with William James and John Dewey as key references – has been appropriated by European STSers.

In the first chapter, Hennion shares pieces of his experience as a volunteer at "Les P'tits Déj's Solidaires", a collective that organises breakfasts for migrants in Paris. The chapter takes us through the daily improvisations of a group dealing with situations as they *present* themselves, in the sense of making themselves present, temporally and spatially: they care about/for migrants "because they are there" (p. 64). And it confronts us with a difficulty shared by all – volunteers, beneficiaries, Hennion-as-volunteer, Hennion-as-writer, but also us-readers and us-citizens of nation-states where migration everywhere is being vilified: which word to use? "Migrants"? "Refugees"? "Guests"? "Homeless people"? What worlds are we bringing along with our words? Which wor(l)ds does a situation call for? Hennion's text sensitively touches upon the troubles of engaging with an ethically and politically charged presence, in situ and in writing.

In Chapter 2, anthropologist Sophie Houdart brings us along on wandering paths in post-Fukushima territories. We are immersed in the many attunings and fine-tunings that inhabiting and researching post-catastrophic worlds require: familiarising with instruments for measuring radioactivity, problematising the very act of measurement itself, sensing the limits of ethnography, attuning with one's own corporeality, but also with others, and with a living radioactive world. Houdart beautifully renders the complicated experience of our porosity to a toxic world and the difficulty of ethnographically observing and reporting on what is lively yet invisible.

Chapter 3 is written by dancer and anthropologist Jérémy Damian. From the situated position of an ethnographer training to become a practitioner, Damian chronicles several situations of osteopathic practices – with trainers, trainees and patients – thus turning away from

controversies over scientificity to instead explore the subtleties of what osteopathy does and how, as “a craftsmanship of the hand, the senses, and attention” (p. 95). Damian explores a number of paradoxes: learning to perceive what is unperceivable and doing so “without doing anything” (*ibid.*); touching from a distance, touching what cannot be touched; experiencing how the contours of who and what is being touched and cared for loosen in the osteopathic act. In an apt parallel between the work of the osteopath and the ethnographer, Damian calls our attention to the subtle work of developing the necessary attention for reading the world.

Chapter 4 narrates a distinctively demanding research situation, as sociologist Anne-Sophie Haeringer shares some of the tedious discussions taking place in a palliative care service. All present in the service are de facto implicated in the vicissitudes of end-of-life care. This includes doctors and medical staff, but also patients and their loved ones, as well as the ethnographer. By posing the ethnographer as “an ordinary moral agent” (p. 121), Haeringer avoids the double trap of the neutrality of a view from nowhere and the superiority of a judgment based on method. In chronicling differences of interpretations – for instance, over a patient’s desire, or lack thereof – Haeringer shows how interpretative work is done by all and how expertise – be it medical or sociological – cannot secure the validity of one moral judgement over others.

Chapter 5 pulls the thread of a critique of expertise, although in a different direction. In a somewhat colder writing style that contrasts with the rest of the volume but pertinently resonates with its object(s), sociologist Brice Laurent analyses European construction through its objects, “creatures at once material and reglementary” (p. 152): construction materials, Cypriot halloumi cheese, credit-default swaps, carbon nanotubes, GMOs. Thinking Europe through the objects people are *attached* to problematises ideals of European harmonisation founded on “an extraction of the political” (p. 152) and in the objectivity of either market or science, since attachments produce frictions, contestation, and resist classification within “objectively” (p. 164) defined borders. Laurent’s approach offers a way out of the impasse of populism versus expertise and captures what STS does best: displaying the ontological force yet contested manufacture of market or science classifications, and how our worlds resist them.

Similar to Chapter 2, Chapter 6 is a stroll through “les Murs à Pêches”, an urban brown-field site that Amandine Guilbert and Rémi Eliçabe invite us to think of through Richard White’s concept of “middle ground” (2010). Exploring the interstices of a space where urban planning has not yet sedimented, they chronicle plural and contested modes of inhabiting. On this site, which inherits from the decline of horticulture, a heterogeneity of temporalities, economies, and ecologies coexist, producing tensions and creativity born in precarious relationality. This wandering from garden to garden complicates stories of economic/urban development, environmental/patrimonial preservation, political activism or socioeconomic marginality by showing how they telescope in the frictions of locality.

The authors seldom refer explicitly to the concept of attachments in their respective chapters. What the reader is presented with are so many versions of what reading the world through our attachments can mean. The experiences written about are fraught with undissolvable ambiguities, voluntarily left unresolved. The shared embrace of openness and interpretation – in the literal sense of standing “inter”, in-between things, as they are made and unmade – means that contributors all develop their unique ways of getting attuned to the situations they navigate. This produces not just an eclecticism of topics but also an eclecticism of language and

focal points. For social scientific practitioners, the strength of such eclecticism is a demonstration by example that the very point is experimenting in and with research and writing (though given the space for exploration that this approach allows, contributors could have allowed themselves to experiment further with creative forms of writing). The weakness, common to such edited volumes, is a somewhat disparate gathering in which one can eventually lose track of what makes common ground, despite many echoes from one chapter to another.

As a feminist reader, one regret that persists throughout the book – especially in its introduction – is the limited engagement with feminist scholarship, including feminist STS work. Sure enough, any volume is bound to be lacking in this or that theory. And there are well-noted mentions to major authors associated with the feminist STS corpus (Vinciane Despret, Isabelle Stengers, Marilyn Strathern, Donna Haraway...). But the overlap between the most salient dimensions of attachment – materiality, tensions, instability, corporeality, affectivity, as both sources of joys and pains, constraints and resources – and much feminist work, particularly on the ethics and epistemology of care (Puig de La Bellacasa 2017) lent itself to a more explicit and thorough engagement with feminist literature. This is not a matter of citing feminist work qua feminist. As Noortje Marres (2023) explains in a critical homage to Latour, it is a matter of not closing off to the possibilities long explored by the situated knowledge of feminist scholars. These possibilities usefully illuminate any scholarship interested in thinking the fragility of our worlds and our attachments in/to it – particularly so in times of all-around environmental damage. They can also relevantly complement the work of the pragmatists so central to this book. Feminists have long thought about the ambiguities of attachment. The careful fragments of research collected in *Attachements et Fragilités* would have only benefited from fostering more attachments to the singularly careful corpus of feminist STS.

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Antoine Hennion. *Passioni: Vino e musica*

by Emiliano Battistini (ed.) (2024) Rome, Luca Sossella Editore, 247 pp.

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The volume edited by Emiliano Battistini offers the Italian translation of two essays by Antoine Hennion, preceded by an extensive introduction by the editor. The stated aim of the volume is to introduce the Italian public to an author who, despite being a pillar of the sociology of taste and of Science and Technology Studies (STS), remains little known in Italy. A closer reading of the volume, published in the series “La tradizione del nuovo” of the “Umberto Eco” International Centre for Semiotic Sciences, however, reveals an editorial operation that merits attention beyond this. The volume, in fact, presents and introduces Hennion’s work and puts his pragmatics of taste in dialogue with an Italian semiotic tradition concerned with the construction of meaning in sensory competence. The result is a fascinating journey across disciplinary boundaries among the social sciences, semiotics, and STS, exploring the interest in taste, the construction of subjects and objects, and the attachments that unite them.

The essays chosen by Emiliano Battistini to present Hennion’s work are selected to showcase his extensive body of research on the pragmatics of taste. Battistini presents the author as a scholar who has spent decades working on an innovative research programme on taste influencing the sociology of culture and consumption, as well as the development of STS in cultural and arts fields.

Hennion interprets taste as the result of practices that involve a relationship between the object and the subject, in which they define each other. As Battistini explains:

Hennion’s pragmatics of taste avoids both flattening the dynamics of taste to the internal causes of the object – its properties to be objectified – and making them vanish into the external causes behind the subject’s preferences – understood as variable signs in the game of social class distinctions. (p. 15, *our translation*)

Battistini states Hennion’s work exceeds Bourdieu’s view (1979), which considers taste a main social distinction among ruling classes. Bourdieu’s critical take on aesthetics, rooted in the social origins of taste, became influential in France and beyond in the early 1980s and shaped debates in cultural sociology. Hennion instead aligns with the work of colleagues at the CSI, *Centre de Sociologie de l’Innovation* (Centre of Sociology of Innovation), promoting

Actor-Network Theory (ANT), and recognising the agency of objects to account for the fabric of associations that artistic and cultural objects are part of and for their forms of resistance. For Hennion, objects and things, and therefore an art work, are not passive elements but do something, put themselves into action (*messa in opera*). The author, referring to the work of Étienne Souriau (2009 [1943]), employs the concept of “*œuvre à faire*”, work to be made, as an open deployment of possibilities.

Battistini considers Hennion’s perspective a cousin of the one used by Latour (2005) and other CSI researchers in the field of science and technology. It is similar in that it shares the interest in presenting artifacts as nodes of relations, but it differs because, with art and culture as its target, it focuses not so much on what persists in translations – secured by passages, links, work, and evidence – but rather on interruptions, obstacles, and stumbling over things. In this regard, we slightly disagree with Battistini, as we do not consider any difference in the theoretical approach used at CSI. Indeed, Battistini draws a clear distinction between translation and mediation, whereas we believe they should be approached differently. We deem that emphasising mediation is valuable in both science and the arts for highlighting the agency of nonhumans, and that translation is merely one way in which mediation occurs. In other words, mediation always involves changing one specific configuration into another, in which the second configuration can be more or less connected to the first. Moreover, in our opinion, Battistini’s distinction between the two concepts hides the shared root of the ANT project across fields.

Focusing on mediation within aesthetic practices, Hennion’s two essays in this volume examine how objects and subjects construct one another through repeated practices in a solfeggio class and during various types of wine tasting.

In the essay on the solfeggio class (published in English in Hennion 2017), the author shows the network of relationships and mediations that enable an undifferentiated group of children and notes to be transformed into mutually defining elements. It closely examines the role of objects such as desks, notebooks, musical instruments, spaces, pupils’ and teachers’ bodies, exercises, and other mediators in the process that progressively brings music into being. Ethnographic examples show how notes and young musicians develop, or become, through relational processes. For example, a child learns to recognize a sound as a note with a teacher’s help, isolating and identifying it. Through practice, children learn to listen, differentiate, and name sounds, transforming them into musical notes.

In this process of music and musicians creating each other, a mutual becoming-with, objects such as instruments, notebooks, and sheet music serve as essential mediators. Musical signs initially emerge through the keyboard and the embodied coordination between sound, gesture, and listening, while written notation may come later as a supplementary transcription. Children become music readers, gradually developing their ability to recognise and vocalise notes, and music players, by tuning in between the body, the ear, and the instrument.

The focus on mediation – as Battistini explains – “helps to open up to the process that brings music into being, with its mediators, with its trials, with its always uncertain outcomes” (pp. 31-32, *our translation*).

This essay contributes to Hennion’s research programme, which, through the concept of mediation, focuses on the capacity of things and objects to act. As Battistini highlights, things are not merely manufactured, but they also manufacture us in turn. Hennion demonstrates

how listening (and learning to do so) entails reconfiguring the musical object. Music is made to exist through a set of practices involving children, teachers, parents, desks, instruments, notebooks, music sheets, and much more. Music is not a stable object but something that emerges through mediations, gestures, social and material relations. By following the mediators (teacher, instruments, teaching materials, classroom configuration), we can account for the co-construction of the music in the becoming.

The second essay is an English translation of a French version of an article (Hennion 2015b) for the collection “Moments of Evaluation: Exploring Sites of Dissonance” (Hennion 2015a). As Battistini highlights, Hennion starts with a question: what is a good wine? However, he does not aim for an essentialist definition in terms of properties (such as chemical composition or production techniques), but to understand the co-construction between object and subject. Here again, the object (good wine) does not pre-exist but is the product of collective sociomaterial practices: different tasting practices, discourses, rituals, shared knowledge, body language, attachments.

From an evaluation studies perspective, the essay describes the relationships among bodies, groups, objects, discourses, and agreements needed to develop acceptable public discussions of divergent evaluations. Hennion analyses specific devices in action by examining different types of tasting practices carried out by professionals and amateurs, revealing how objects, bodies, and attachments influence wine evaluations.

Like the music case, the essay aims to show how object and subject are constructed through situated practices, or as Battistini states:

Here too, it is the relationship between subject and object, the contact between the two, the constant mutual practice in a specific place and time, that allows wine to be constructed as an object and, at the same time, to define those who taste it as subjects, allowing the characteristics of the former and the perceptive competence of the latter to emerge together. (p. 44, *our translation*)

Hennion puts music and wine tasting in conversation. By imagining the practice of blind tasting in the field of music, he introduces the differences between “the object wine” and “the object of wine”, highlighting the role of attachments in taste “construction”.

The wine object, which interests blind-tasting professionals, comprises its organoleptic components, including terroir, production technique, and label. The wine object, or wine as a work of art, is instead what it does and makes others do and is the object of interest of “hedonistic tasters”. In the tasting-meal practice, the hedonistic tasters act as amateurs, dedicating a specific time and space for wine to express itself as a work of art.

Music cannot be restricted to its material and analytical features. Music must necessarily pass through transport; one needs to be carried away by it, to enter into it and to perceive its qualities even before knowing whether s/t/he(y) loves it or not. For Hennion, wine works in a similar way. Through this analogy, Hennion highlights the links between the subject and the work, showing how taste requires practices of unfolding the work of wine, in which the subject is taken and carried away by the wine.

The central idea here is passion, or rather, the way in which the subject is taken by the object and develops attachment. Being passionate means being carried away, captivated, but

at the same time, as Battistini highlights, it means “that in order to reach this state, it is necessary to do something: one must in some way ‘actively abandon oneself,’ do everything to let oneself be acted upon” (p. 52, *our translation*). There is, therefore, a relationship of mutual construction between subject and object. In other words, the good wine, like the hedonistic amateur, is the result of the practice of tasting.

Each attachment introduces different elements, and Battistini outlines four of them: the community of practice of amateurs (a collective that develops a language and discusses taste), the devices and situations of appreciation (sociomaterial practices with their techniques, tests, comments, and discussions), the body that experiences (the tasting body that perceives and is in turn perceived) and the object experienced (an active wine).

According to Battistini, it is precisely a capacity to reveal the unfolding of the complex web of mutual becoming between subject and object within attachment processes that lies at the core of the dialogue between the pragmatics and semiotics of taste.

We are thus entering into an interesting interdisciplinary dialogue we briefly mentioned earlier, which occupies the last 40 pages of Battistini’s extensive introduction. Here, Battistini relates Hennion’s work to a semiotic tradition, particularly developed in the Italian national debate, known as the semiotics of taste (Marrone 2016). According to Battistini, the dialogue between these two traditions can be prolific as they share an object of interest.

This communality, Battistini informs us, is based on a recent “turn” in semiotics that broadens the discipline to include the investigation of enunciations, passions, and the aesthetic dimensions of the unfolding of enunciation processes within specific practices, such as taste practices. Referring to Marrone and the Palermo school, Battistini discusses how semiotics actively seeks to understand signification processes by distinguishing between two different languages, plastic and figurative. The two languages enable a more sophisticated interpretation of the signification processes, which are, in turn, based on the semantic cultural grids (figurative language) or a new articulation of the visual material (plastic language) that highlights contrast, shapes, colours, positions, and textures. Marrone’s semiotics of taste is based on Greimas’s program, developed in *De l’imperfection* (1987), which extends the plastic/figurative distinction in signification processes beyond visual semiotics.

Marrone (2016; 2022) proposes distinguishing between “gustoso” and “saporito”; where “gustoso” is based on sensitive recognition of what is already known, and “saporito” refers to the affections that the gastronomic substances unfold. Battistini maintains that Hennion’s “attachment theory” can be interpreted as the art of shifting from “gustoso” to “saporito”, and that this is cultivated through practising encounters (repeated contacts between the subject and the object, the body and food) within specific practices. With Battistini’s words:

The more I practice, the more I can expose myself to the emergence of the sensitive by probing it in an increasingly subtle way, thus refining my sensibilities at the same time. (p. 86, *our translation*)

In this dialogue between the pragmatist and the semiotics of taste, Battistini emphasises a compelling convergence centred on the importance of the body, interest in multimodal phenomena, focus on aesthetics and cultural practices, and the role of amateurs’ expertise.

We believe this convergence indicates a growing interest in new directions for exploring fascinating everyday phenomena related to taste, expertise, judgment, practical knowledge and aesthetic practices, while moving beyond an anthropocentric perspective.

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Performing Ensemble. Practices, Theatre, and Social Change

by Carmen Pellegrinelli (2025), Leiden and Boston, Brill, 130 pp.

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Practice constitutes a dimension of social life that, in some respects, pertains to how people and things are intertwined – or, better, *entangled* (Barad 2007). In the performing arts, there exist creative groups that engage in practices conducive to this entanglement, thereby enhancing collective creativity and fostering artistic innovation. Dealing with one of such groups, *Performing Ensemble* goes deeply into this matter and aims at elaborating the idea of the ensemble through the history of the Independent Theatre Association for Research (*Associazione Teatrale Indipendente per la Ricerca* – ATIR), an Italian theatre company founded in 1996. Carmen Pellegrinelli, an experienced theatre practitioner and a social scientist, offers readers a vivid account of how ATIR formed as a theatrical ensemble, providing an in-depth understanding of theatrical practice through this case study.

In the Introduction, while outlining the book's argument, the author puts emphasis on the notion of practice as a key feature of theatrical activity. In particular, Pellegrinelli states that her book is an attempt to fill a gap in the literature on the ensemble – this literature being focused either on the ensemble as a transient “epiphenomenon”, or on those traits that qualify the ensemble as a long-term, stable entity, namely “the group ensemble” (as is the case with the more standard interpretation of the notion of theatre company). In doing so, Pellegrinelli approaches the ensemble through the lens of the “posthumanist theory of practice” (Cozza and Gherardi 2023), articulating “an argument from a theoretical paradigm that places ensemble practices at the centre of the analysis” (p. 5), also aiming to overcome “the tendency toward dualistic and descriptive positivist human-centric narratives” (p. 10).

The book's argument also relies on the notion of *agencement* derived from Deleuze and Guattari (1987), along with the *assemblage theory* developed by Manuel DeLanda (2016), who is himself indebted to Deleuze and Guattari's original formulation of *agencement* – though his appropriation of the latter was subject to criticism (Buchanan 2015; 2021). While I shall return on this point later, it is worth noting here that Pellegrinelli uses the concept of *assemblage* to explore “ensemble-making practices” and to account for the different sets of relationships forming the ensemble and connecting it to other entities. Through the case study of ATIR, the ensemble itself is understood as “a complex processual phenomenon of connection between heterogeneous human and nonhuman elements” (p. 6). In fact,

these latter include “the school, rehearsal room, the Ringhiera theatre [the venue in which the company resided for a given period], and the city” (p. 15).

In addition, Pellegrinelli follows Latour’s (2005) “recommendation to trace the associations between phenomena and entities” as a methodological guide to analyse the traces that constitute the foundation and development of ATIR (p. 13). To this aim, the author scrutinises aesthetic practices relating to actors’ bodies, gestures, and collective energy, drawing upon empirical materials comprising interviews, ethnographic notes, and documents.

Pellegrinelli followed the traces of ATIR’s artistic path through three phases: first, the nomadic period lasting from 1997 to 2007; second, the resident period, during which the company ran a theatre venue designated as the group’s home (2007–2017); third, the “homeless” period lasting from 2017 to the present. The book’s chapters are thus devoted to describing and analysing these phases.

Pellegrinelli began this research with the accomplishment of her master’s thesis in 2003 at the University of Bologna. In this initial endeavour, the author considered the span between 1992 – when ATIR’s members first met in Milan’s *Civica Scuola di Teatro Paolo Grassi* (“the Paolo Grassi” henceforth), one of the leading drama schools in Italy – and 2002. This first study was based on interviews with both the company’s members and the teachers of the Paolo Grassi, the voices of whom punctuate the author’s elaboration on how ATIR’s assemblage evolved since the training of its members at that school.

Indeed, in Chapter 1, entitled “The School”, the author takes readers on a journey into the milieu that gave rise to ATIR. The Paolo Grassi is understood as “a community of practice” and a locus of effervescent creative effort: “The school’s activities were part of a dynamic movement of renewal in theatre training and education which was spreading in Italy and Europe” (p. 19). Under the direction of Renato Palazzi between 1986 and 1995, the school welcomed this movement of reform, “privileging the experimental workshop over the traditional dimensions of ‘instructing’ acting techniques and pre-established models linked to the prose theatre tradition” (*ibid.*). To readers familiar with theatrical practice, the idea of the workshop may easily sound evocative of a particular creative style and atmosphere. In a workshop environment, the aesthetic power of human and nonhuman entities participating in a performance can be expressed at the highest level. The degree of openness is maximised, and this turns out to be highly beneficial to bringing about novelty in terms of creative outcomes. This is the way the Paolo Grassi set most of its education and training philosophy, with an experimental vocation that was conducive to building some of the key principles informing ATIR’s foundation and activity.

This appears most vividly in Chapter 2, “The Rehearsals Room”, where the emergence of ATIR’s performances is described in detail. The notion of assemblage matters here, in so far as the author’s dissection of the creative process focuses on the practice of shaping the play and the scenery, as well as the collective development of acting intensity (e.g., through choral exercises). Adopting Deleuze and Guattari’s (1987) conceptual architecture, Pellegrinelli recalls that “an assemblage operates on two axes”, of which the first, horizontal one, consists of two segments related, respectively, to content and expression (p. 46). Content is meant to be a “combination of various heterogeneous materials”, including actors’ bodies, performance venues, costumes, or scene sets. Expression refers to “semiotic forces like words, statements, discourses, declarations, texts, scripts, manifestos, and tacit or explicit norms” (p. 47). As for the second, vertical axis, it is dealt with in Chapter 3, discussed later.

The second chapter thus explores the ways in which the creative process revolves around these elements. For instance, as for the semiotic forces implicated in the assemblage, working on Greek classics leads the group to experiment “the polis”, and “allows each company member to be equally enhanced by their scenic role” (p. 58). The staging of classical texts actualises the choral orchestration of voices and bodies in the performance – the chorus being a chief expression of the ensemble and a central element of ATIR’s training at the Paolo Grassi, particularly under the guidance of Gabriele Vacis. Notably, the entanglement among scenes, texts and bodies seems to overcome the potential dualism that the distinction between content and expression might entail (although such dualism is not highlighted in the book).

Chapter 3, “The Theatre”, focuses on the temporary stabilisation of ATIR’s assemblage, when the company became resident in the Teatro Ringhiera, a theatre located in a Milan’s semi-suburban area. In this way, the group found its stability in the 2007-2017 decade and, consequently, started to build intense relationships with the local territory, which resulted in the active involvement of the local community in various activities, including the organisation of annual theatre seasons. Indeed, this is the path that many nomadic theatre companies undertake when they succeed in finding a home and thus have the opportunity – and often the necessity – to extend the range of their activities from theatre production to educationally and socially oriented projects. As for ATIR, some of these projects were addressed to “vulnerable people and non-conforming subjectivities” (p. 75). At the same time, the group evolved organisationally (another typical route for theatre companies becoming resident).

Central to this elaboration is the notion of *territorialisation/de-territorialisation* borrowed again from Deleuze and Guattari (1987), namely the second, vertical axis on which an assemblage operates. Territorialisation, as Pellegrinelli put it, “is the process by which an assemblage can express its potential by expanding its action into the environment and making it familiar” (p. 71). Therefore, the *Teatro Ringhiera*, “as a nonhuman object, entered the ATIR assemblage and modified, reinforced and made it capable of profoundly impacting (territorialising) the neighbourhood and the city” (p. 72).

Chapter 4, “The Community”, is then devoted to the process of de-territorialisation experienced by ATIR when the group lost its home due to the closure of the *Teatro Ringhiera*. In that case, forced to de-territorialise itself from the Ringhiera theatre, “ATIR realized their home [...] needed to be found in the community gathered around its activities” (p. 98). In this manner, ATIR’s assemblage demonstrated its strength and resilience – that is, its *resistance* – by leveraging the group’s connections to the local community, fostered through “participatory theatre projects put in place to forestall the dispersal of its extensive community” (p. 95).

In Chapter 5, “Conclusion”, Pellegrinelli summarises the main aspects of ATIR’s ensemble-making and provides the reader with a commentary on the posthumanist approach adopted to understand the performing ensemble. These concluding remarks are concerned with the emergence of the performative ensemble, the influence of the context on the ensemble, the stabilisation of ensemble practices, and the nexus between the aesthetic and political-ethical areas pertaining to ensemble-making. In this posthumanist reading of the ensemble, a noteworthy aspect is, for example, the “significance of nonhuman agency”, as is the case with texts and scenography (p. 118).

Indeed, it is vital for theatre-making that the material elements of the scene participate actively in the creation of the performance. For Pellegrinelli, this constitutes a chief trait of

ATIR, the working style of which is taken as an instance of the intimate relationship between human and nonhuman agency in shaping theatrical performances. The interplay – or entanglement – among the diverse human and nonhuman elements of the show is far clearer if one considers how, in the words of ATIR's scenographer Maria Spazzi, the scene setting composes a "sounding board" for the choral performances of the group (p. 54). This approach confronts the reader with an idea of scenography – which is one of the largest nonhuman elements of the performance – that differs from the one usually related to the "background" of acting.

Readers of this book could well be satisfied with how ATIR's practice-based work is investigated. Less satisfaction would probably derive, instead, from the use of the theoretical framework of *agencement/assemblage* informing this inquiry. First, although Pellegrinelli states that "this work is not a historical investigation" (p. 14), the book can be regarded as a dense and insightful exposition of the history of ATIR, with the four chapters all featuring mentions of assemblage in the beginning, though not systematically engaging with the empirical material through that framework. (On the contrary, the posthumanist approach seems to involve a more substantial dialogue between theory and empirical material.)

Secondly, the terminology of *agencement/assemblage* would have required a more thorough explanation. As Ian Buchanan (2015) observes, *assemblage* is the English translation of the French term *agencement*, which was proposed by Brian Massumi and adopted by DeLanda, as Pellegrinelli recalls (p. 46). This translation might be problematic, as it risks losing the sense of contingency inherent in *agencement* (Buchanan 2015, p. 383). Yet, throughout the book – if I am not mistaken – the use of the term *assemblage* is prevailing over that of *agencement*, though more often referring to Deleuze and Guattari (1987) than to DeLanda (2016), a choice that is not explained.

Thirdly, it seems that the concept of *assemblage* – including all elements of content and expression (with reference to Deleuze and Guattari), mentioned about the "nascent ATIR" (p. 47) – might also work well with many other theatrical ensembles. Nonhuman entities are often meant to be organisations, spaces or territorial domains interacting with or traversed by the ATIR ensemble, and yet it is hard not to think of them as part and parcel of the existence of many, if not all, theatrical groups.

Nonetheless, the originality of *Performing Ensemble* lies in the analytical lens through which the aesthetic matter of the theatrical ensemble is investigated, one which goes beyond the domain of theatre studies and the sociological perspectives on culture and the arts. Notwithstanding the absence of relevant studies in the sociology of theatre and performance (e.g., Shevtsova 2009) within the theoretical framework informing the book, one merit of *Performing Ensemble* is to suggest a connection between the theatrical tradition of experimental directors and pedagogues (such as Jerzy Grotowski) – via the apprenticeship that ATIR's members had at the Paolo Grassi – and the concepts of assemblage, sociomateriality, symmetry, the de-centring of the human, and so forth. Therefore, the book also appeals to the social studies of science and technology, nurturing the extant common ground between this field and the sociology of the arts (e.g., Hennion 2015), as well as organisation studies, due to its focus on group dynamics and group creativity. Notably, *Performing Ensemble* offers valuable insights into the study of human-nonhuman interactions in theatre-making, thereby contributing to a deeper understanding of the fundamental grammar of practice in both the performing arts and the social world.

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Middle Tech: Software Work and the Culture of Good Enough

by Paula Bialski (2024) Princeton and Oxford, Princeton University Press, 224 pp.

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On Monday morning, Tobias and his co-workers participated in an onboarding session. The team had worked together for years at a German software development company but was recently bought out by an American corporation with regional offices in Europe. During an online meeting, human resource managers from the American headquarters introduced their new employees to the organization and its core values. A manager explained: “Working at our company means challenging yourself while facing each challenge with a positive attitude.” Tobias noticed that his German colleagues looked a bit startled. After some hesitancy, one of them interposed: “This may be an example of cultural differences. In Germany, employees are not expected to display a positive attitude if they do not feel like it on a hard work day. We do our work properly, but pretending to be cheerful is not part of the job.”

This is one of the many anecdotes we have chatted about over lunch during a homeworking day. Our conversations resemble the lunch talks that Paula Bialski describes in her ethnography *Middle Tech: Software Work and the Culture of Good Enough*. Similar to Bialski, Mareike is interested in uncovering the social dimensions of computing from a Science & Technology Studies (STS) perspective. Similar to the interlocutors who Bialski met during ethnographic fieldwork, especially her software developer friend Ori, Tobias opens the door to peek into the world of Medium Tech: middle-sized companies located outside of global tech hubs like the San Francisco Bay Area, Singapore, and Tel Aviv, whose products are well-established on the market and whose employees are moderately ambitious.

The anecdote above illustrates the juxtaposition between what Bialski calls “the culture of good enough” and the discourse of excellence. The discourse of excellence touts a work ethic of outperforming any competitors, engaging in long working hours with a positive attitude, and striving for extraordinary technology that changes the world. This discourse is reiterated in management handbooks, business schools, and the media. Bialski observes that software developers also aspire to such excellence, including those she met during two years of fieldwork at a Berlin-based company, dubbed MiddleTech, which develops mapping, routing, and navigation software for cars. However, her ethnography shows that a culture of good enough hides behind the hegemonic discourse of excellence.

In doing so, Bialski pursues two objectives. First, by making good enoughness visible, Bialski celebrates it. She considers it as a form of resistance against exploitative work environments which squeeze out as much labor power as possible from their employees, milking their (overly) ambitious work drive. Employees protect themselves from work pressure and demands by drawing boundaries around what it entails to do a “good enough” job. For Tobias and his German co-workers, this means doing their work “properly” but without making pretense of a positive attitude. Bialski acknowledges that such boundary-drawing is not available to those working under precarious conditions. In fact, it is enabled by the German labor law which provides greater protection of employees against unfair discharge than in the United States and even includes a *right to average performance and quality*. Second, Bialski exposes excellence as a myth. She distinguishes between what it means to be a “good enough” software engineer and what makes “good enough” software. Her ethnography shows that no matter how good a software developer performs, software can never be more than good enough because of its “material and human sociality” (p. 47).

In five chapters, Bialski describes different aspects of this sociality based on her experiences in MiddleTech. After presenting the company as a case of Medium Tech (Chapter 1), Bialski elaborates on the complex team work required for making software (Chapter 2), the problems that can emerge in team work (Chapter 3), and the role of management (Chapter 4) and temporalities (Chapter 5) in shaping software engineering culture. This culture is characterized by good enoughness partly because the best engineer cannot speed up the time-to-release of a product beyond the slowest worker in the team. Bialski elucidates this phenomenon by highlighting the coordination between multiple interdependent sub-teams who all work on the same product without knowing exactly what the others are doing. They need to ensure that what one sub-team builds fits with what the others are building, and they review each other’s code. In unpacking the review process, Bialski highlights how “good enough” code is defined in a social process of negotiating between the standards of a team, the time it would take to fix some lines of code, and other demands experienced by software developers.

Software developers can afford to release “good enough” code and take the risk that “stuff goes wrong”. According to Ori, “it’s cheaper to fail with our kind of work” (p. 69) than with building a car. Once a car is built and sold to a customer, it is not so simple to fix. Software, by contrast, can usually be updated quite easily via the internet. This has two effects: one relates to the malleability of software whose ongoing mutation implies that negotiations about whether it is “good enough” are repeatedly re-opened in a continuous social process; the other refers to the attitude of software developers to “fix things later”. A big part of software development is fixing bugs. This is the case because software consists of layers on layers of code, some of which – the so-called “legacy code” (p. 86) – is inherited from the original developers. As software grows older, it becomes increasingly complex, to the point where software developers cannot fully understand it, let alone predict how newly written code will affect the whole.

The relation between developers and managers is another aspect of software’s sociality. Managers and management tools, such as Scrum, aim to find the sweet spot between structure and flexibility. Whereas a structured work flow supports the coordination among developers and with their customers, there is also a need for flexibility to handle the complexity, fluidity, and unpredictability of software. In balancing structure and flexibility, negotiations

between management goals of efficiency and customer satisfaction, on the one hand, and software developers' care for software quality and reasonable workload, on the other hand, produce a culture of good enough.

While Tobias enjoys recognizing his own working life in Bialski's ethnographic stories, Mareike appreciates the ways in which these stories engage with literature from organization studies, workplace studies, computer science, and STS. To develop the concept of software's sociality, Bialski draws on classic STS literature, including Wiebe Bijker, Thomas Hughes, and Trevor Pinch's *Social Construction of Technological Systems* as well as John Law and Anne-Marie Mol's "Notes on Materiality and Sociality". When flipping through the pages, one also finds references to Karin Knorr-Cetina, Bruno Latour, Lucy Suchman, Sheila Jasanoff, and Sherry Turkle. Bialski refers to diverse STS authors to reflect on her rich fieldwork experiences, instead of diving into theoretical discussions on the differences and overlaps between their works. This way of thinking and writing with theory creates a light and immersive reading experience because it allows for ethnographic story-telling.

Surprisingly, however, Bialski does not engage with STS literature on how scientists, medical practitioners, and other professionals try to accomplish something good in practice, thereby advancing their values, tastes, and preferences. Informed by overlapping discourses on valuation studies (Heuts and Mol 2013) and empirical ethics of care (Pols 2015), this literature examines the everyday labor and care practices of producing different sorts of goods or values in heterogeneous networks of actors and non-actors. Such a practice-oriented, relational perspective resonates with Bialski's "constellations of good enoughness" (p. 161) which capture the relations that shape the meaning of good enough "for what" and "for whom" (*ibid.*) in a particular context and situation. Examples of these constellations are the relations between a software developer and their company, customer, professional community, tools, and private life. Within these constellations, different values conflict with one another, which induces software developers to make compromises between aesthetic code, production speed, application safety, a good life, and other values.

Research on what is good somewhere can inform critical reflection on what is good elsewhere (Pols 2015). A critical view can also foreground the "dark sides" of good enough, i.e., how it is shaped by power and politics, advancing the interests of some while putting others at a disadvantage. This view seems to fade into the background in Bialski's book. Bialski emphasizes what many of her book's readers may consider "bright sides" of good enough by framing it as a resistance against capitalism: placing care for the self and for others before profit, and prioritizing repair and maintenance over innovation in a degrowth-oriented mindset. She indicates that this emphasis helped her respond to software developers who felt offended by her book (p. 159), associating good enoughness with mediocracy and a sense of being left behind by colleagues who move to Big Tech companies. We also recognize good enoughness as a "freeing gesture" (p. 174). Inspired by a culture of good enough in software work, Mareike asked herself what it meant to be a good enough academic and felt relief while listening to a podcast episode with Bialski that was hosted by STS scholar Lee Vinsel (Peoples & Things 2024). In the episode, Bialski mentions that balancing her roles as academic, musician, and parent sometimes forces her to leave things good enough.

Nevertheless, we would have appreciated a deeper engagement with how power differentials can shape the situated construction of good enoughness. Bialski touches on an example

in analyzing the temporalities of software development. At times, managers make promises to a customer without ensuring that these promises, especially regarding timelines, are feasible for software developers. This can give rise to a situation in which managers decide that the software has to be “good enough” to be released at a particular moment. Under pressure from above, software developers agree with this decision but only after lowering quality standards regarding user experience and accessibility, aesthetic and efficiency of code, and undetected bugs or problems. By prioritizing speed over quality, such a renegotiation of good enoughness at least temporarily stabilizes capitalist dynamics rather than resisting them. Moreover, experience shows that it can have detrimental consequences for specific user groups, such as in the British Post Office Scandal (p. 143). Hundreds of postal workers were falsely accused and pursued for financial shortfalls which were actually caused by faults in an accounting software system. In this case, profit-oriented managers deemed the software to be “good enough” although IT specialists had expressed concerns. We add another example focusing on dynamics of inclusion and exclusion. If a culture of good enough is defined by white male software developers working in the Western world, this can exclude those who program otherwise and elsewhere. Such exclusion can exacerbate discrimination based on derogative stereotypes, for example of the “Bad Indian Coder” (Khazan 2013). Hence, it matters who has the power to define “good enough” technology and which values inform their judgement.

Attending to such “dark sides” of good enough is particularly important as artificial intelligence (AI) enters software development. We fear that GitHub Copilot and other generative AI companions for software developers “inject steroids” into a culture of good enough. They risk lowering the bar of what is seen as good enough, accelerating a race to the bottom. Trained on all kinds of publicly available source code, generative AI produces code that appears good enough at first sight but often turns out to be full of errors and inefficiencies when having a closer look – similar to a text written by ChatGPT composed of well-formulated sentences but filled with commonplace statements that, taken together, generate little meaning. In moments of high work pressure, the temptation to judge an AI-generated code as “good enough” is high. As generative AI seems to be here to stay, we have been excited to find out that Bialski’s current research focuses on Copilot (Peoples & Things 2024). We are confident that her study on Copilot will be a more than good enough complement to her attentive, insightful, and well-written ethnography of MiddleTech.

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