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This cover of Tecnoscienza reproduces* the first page of the *Report of the Special Rapporteur on the situation of human rights in the Palestinian territories occupied since 1967* by Francesca Albanese, entitled "From economy of occupation to economy of genocide". The report investigates the "corporate machinery sustaining the Israeli settler-colonial project of displacement and replacement of the Palestinians in the occupied territory". It highlights and denounces the responsibility of the Israeli military-innovation ecosystem and its economic, technological, and political infrastructures, as well as the international corporate connivance and technopolitical collusion in human rights violations and crimes, including genocide as defined under international law.

The report adopts a transdisciplinary perspective, drawing also on STS, to unpack the "heavy machinery in service of settler-colonial destruction". In so doing, it represents a remarkable example of infrastructural inversion. It foregrounds the complex and opaque network of public, private, academic and NGO actors enabling a regime of illegal occupation and apartheid. It ultimately traces the deep roots of the economy of genocide to the historical entanglements of corporate power and the violent dispossession of Indigenous peoples from their lands.

Standing in solidarity with the Palestinian people and in support of Francesca Albanese, the editorial board of *Tecnoscienza* publishes this cover to honour their resistance, to express hope for a lasting ceasefire, and to affirm the Palestinian right to self-determination.

The Editorial Board of Tecnoscienza

* The cover layout is a graphic adaptation of Francesca Albanese's report, redesigned to enhance readability and visual clarity. For access to the original document, please visit: www.ohchr.org/sites/default/files/documents/hrbodies/hrcouncil/sessions-regular/session59/advance-version/a-hrc-59-23-aev.pdf.

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From economy of occupation to economy of genocide,
report by Francesca Albanese (2025), graphic adaptation of the cover

BOOK REVIEWS

Venturing Outside the Comfort Zone: The 20th Anniversary of STS Italia, a Project Born Out of Detachment, Torque, and Diaspora

Although none of us members of the STS Italia Steering Board is new to spokesperson challenges, it's difficult describing the mixture of anxiety and excitement that accompanies the writing of a piece for *Tecnoscienza* celebrating the 20th anniversary of the Italian Association of Science and Technology Studies. Anxiety is rooted in the awareness that any attempt at reconstructing the history of STS Italia since its inception would inevitably do wrong to many. If any, such an enterprise should be a collective one, and cannot be only consigned to a presidential address. On the other hand, excitement spreads from the possibility to share our vision of what STS Italia has meant for us over these twenty years, and how we see its future. In highlighting some aspects, we do not intend to make others invisible, but rather invite the whole community to connect the dots in a sort of serious game. We see these dots as emerging networks: constellations of possibility, waiting to connect. For these points to become actual networks, they must form arcs: links that spark communication, enable collaboration, and share ideas. With every new connection a node can sustain, attraction grows, trust deepens, and relationships strengthen. As any serious game, this is meant to strengthen a sense of belonging, while at the same time leaving space for including the underrepresented, the unexpected, the unnoticed. And it is intended to provide a space for reflexivity while inducing amusement.

If we had to portray what STS Italia has been for us (and – we dare to say – a few others) over these twenty years in one sentence, we would say it is a project born out of detachment, torque, diaspora. The Association was founded in 2005, when the project of raising a community that could study science and technology from a social and humanistic perspective was an act of detachment from the institutionalization of disciplines in force in Italy. It might be worth recalling that while the 2010 reform of higher education probably exacerbated the situation, such discipline-based scaffold – and in particular the sharp distinction between Science, Technology, Engineering and Mathematics (STEM) and Social Sciences and Humanities (SSH) – in Italy goes back to the Fascist regime and its 1923 educational reform. A disciplinary (and disciplining!) system that has represented a sort of "torque" and continues to constitute one of the reasons of the delays of the Italian research system vis-à-vis international debates.

In this institutional landscape, STS Italia has constituted for many in Italy and beyond an opportunity to connect through SSH sensitivities to those debates that in these last decades have spanned from nanotechnologies to blockchains, from biotechnologies to machine

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learning, from energy transition to securitization, among others. We write "beyond", as – being a response to a structural condition of torque – over the years STS Italia has provided with a port scholars who were trans-disciplinarily oriented, often unfit for the Italian academic system and thus affiliated abroad, especially at the early stages of their careers. The richness of involving national and diaspora scholars has nourished the community over these two decades and continues to do so.

STS Italia has indeed seen its network take shape and grow stronger at national and international level through the passion and work of individuals who have gathered and activated contributions. These contributions derived nourishment from two powerful and complementary currents: scientific insight and practical action. The STS scholarship is now recognised across Italy, and has fuelled trans-disciplinary dialogue. From organising events to opening conversations, from inspiring debate to sustaining dialogue, these efforts have woven a vibrant and generous intellectual fabric.

At the international level, this generosity is clearly revealed by the unexpected attention received by STS Italia conferences and summer schools over the last editions. An attention that positions our community as a focal point of a multi-faceted, international and renewed interest towards the social studies of science and technology. This year this journey has reached a milestone that reflects more than growth: transformation and collective achievement. The 10th STS Italia conference has constituted the most far-reaching expression of the network to date. When the Steering Board asked the META research unit at the Polytechnic University of Milan to organize the 2025 edition of the conference at the Department of Design, we thought we had already reached the crystal ceiling in 2023 in Bologna, with around 500 participants from Europe and beyond. However, with the 2025 edition we had to move that ceiling upwards, up to counting almost 700 participants.

We are of course honoured that our Society is becoming a reference for many scholars in and beyond STS. A network thrives not simply because it connects, but because it inspires others to connect. At the same time, STS reflexivity urges us to adopt a humble attitude and be aware that conferences' gigantism raises questions that as STS scholars we cannot avoid. Such questions concern, for example, how our communities are changing, what is the role of scholarly work in society, and ultimately the valuation of research enterprises.

These reflexive questions ran transversally to the conference in Milan in the past month of June. As the title "Technoscience for Good: Designing, Caring, and Reconfiguring" recalled, straightforward and one-fits-all calls to morality cannot be deemed adequate to deal with contemporary dilemmas, and this also puts pressure on our own community. Technoscience for Good constitutes a call to address complexity, uncomfortable questions and even less comfortable attempts at reassuring. As the conference chair Paolo Volonté recalled in his opening address:

> We are called to confront questions of what "good" certain sociotechnical developments are serving, who gets to define what counts as "good", for whom technoscientific developments might be "good" (or not), how actors and institutions have historically worked towards defining and achieving the "good", and how such a goal might be collectively accomplished in a democratic order.

The contributions to the conference that the following section features have addressed these questions. Ruha Benjamin challenges us to subvert an alleged realism that justifies the status quo to collectively produce imaginations that liberate. Karen Gregory displays workers' ability to foresee new connections and make them happen. Her contribution documents the challenges that platform workers face in drawing meaningful links between their own research, exploitation and discrimination, and broader policy regulation. Kylie Jarrett provides an intentional provocation about the positive experience of "good" platform work, with the goal of broadening our critical response. Finally, Emiliano Treré proposes a conceptualization of moral economy as emerging at the interface of designers' and users' moral frameworks.

All in all, these contributions speak of the power of performative thinking and acting. We suggest that what has characterized STS Italia over these twenty years is the ability to perform identities along ever evolving cuts. This could be explained against the diasporic origins of STS Italia, and its foundation as a response to institutionalized conditions of torque. What is key is that at several moments STS Italia has been able to avoid to resort to the reassuring strategies of identity politics, and has ventured outside its comfort zone. This is deeply ingrained in STS performative ontoepistemologies and methods, and is a richness we must continue to nurture even in these interesting times that seem to be losing an interest in becoming.

The STS Italia Steering Board
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Remembering Mario Biagioli, A Scholar Who Reimagined Science and Society

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Abstract

Our journal remembers with deep gratitude Mario Biagioli (1955-2025), a towering figure in the STS community who served as member of Tecnoscienza's International Advisory Board since 2012. We honor his legacy through Alessandro Delfanti's tribute, which traces Biagioli's groundbreaking contributions from the study of Renaissance courtly networks that enabled Galileo's endeavour to the investigation of contemporary circuits of science, law, and economics, celebrating his intellectual generosity and enduring influence as scholar, mentor, and builder of collaborative communities.

Keywords

Mario Biagioli; Galileo; courtly networks; intellectual property; science as social practice; moral economies of science.

Few figures embody Science and Technology Studies' intellectual range, political concerns, and transdisciplinary foundations as fully as Professor Mario Biagioli (1955-2025). His passing leaves an immense void in our community. Mario was a historian, theorist, and teacher whose work redefined what it means to study science as a social practice. Across four decades, his scholarship bridged history, law, philosophy, and cultural analysis. The breadth of his knowledge and his disciplinary flexibility made Mario the rare full-fledged intellectual. He could move seamlessly from the definition of property in Roman law, to the diaspora of Soviet engineers, the history of the garage as a symbol of Silicon Valley's political economy, the role of French critical theory in STS, and of course the political underpinnings of Renaissance science.

His first major book, Galileo, Courtier: The Practice of Science in the Culture of Absolutism (1993) took Mario back to his native Tuscany. The book broke from the conventional image of Galileo as a lone scientific hero, situating him instead as a figure deeply embedded in the courtly world of patronage, politics, and persuasion. Science, Biagioli showed, was not merely the accumulation of empirical facts – it was a performance of credibility. Galileo's telescopes and letters were as much instruments of social negotiation as of discovery. By tracing

these networks of public reputation building, Biagioli participated in building a vision of science as a communicative practice. His follow-up, Galileo's Instruments of Credit (2006), extended this analysis, exploring the economies of trust and authorship that structured early modern science. In both books, Biagioli revealed how technologies of inscription – images, texts, tools – shaped the very meaning of objectivity.

These studies became foundational texts for a generation of STS scholars, demonstrating how epistemic norms and social institutions co-construct one another. His massive edited collection The Science Studies Reader (1999) defined the field for many years, both showcasing the wealth and depth of STS scholarship at the time, and inviting us to study the many factors that shape and are shaped by science as a human enterprise deeply enmeshed in the societies it emerges from.

In later years, Mario turned his attention from early modern courts to the contemporary circuits of science and law. His research on intellectual property, plagiarism, and patenting illuminated how scientific authorship operates within the global knowledge economy. This is work that has deeply influenced me. A postdoc at the University of California Davis in the mid-10s allowed me to work with Mario and strengthen my ability to look critically at intellectual property. Just a few short days before he passed, I was pitching to some colleagues the idea of inviting him to Toronto to discuss some new ideas about the patenting system. Mario's co-edited volume Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective (2011) remains a stepping stone for those who study patents and copyright from a cultural viewpoint.

Overall, he argued that the rise of the knowledge economy blurred the boundaries between scientific discovery and commodified invention, raising questions about ownership, credit, and the moral economies of science. His work on the history of plagiarism and academic misconduct revealed how technologies of measurement and evaluation – citation indices, metrics, rankings – reshape scholarly behavior. In Gaming the Metrics: Misconduct and Manipulation in Academic Research (2020), co-edited with Alexandra Lippman, Biagioli brought STS insights into the heart of academia's present crisis. He examined how systems meant to quantify knowledge often distort it – encouraging strategic behavior over genuine inquiry.

For Mario, transdisciplinarity was not a slogan but a way of thinking. Over his career, he held appointments across history, law, and communication, at institutions including Harvard, Stanford, and UCLA. At the UC Davis Center for Science and Innovation Studies, he built spaces where historians, social scientists, legal scholars, and natural scientists could engage as equals. At UCLA, where he was Distinguished Professor of Law and Communication, Mario continued to expand STS conversations into new terrain – digital communication, data governance, and the politics of innovation.

What made Biagioli's scholarship so enduring was his capacity to engage with science in such rich ways. He could be deeply critical of science as an institution, yet profoundly admiring of its creativity and capacity for self-renewal. He insisted that STS is not simply about critique – it is about understanding the conditions that make knowledge possible. He saw fraud and misconduct not as mere deviations from science's ideals, but as reflections of its deepest social structures. He invited STS scholars to look at our own academic practices with the same skeptical lens we apply to others.

Mario's humor and generosity made him a beloved colleague. He approached intellectual debate with playfulness and empathy, able to disarm complexity with a well-timed joke or an unexpected historical analogy. Ever the generous mentor of junior scholars, organizer of conferences, and editor of collected volumes, he spent time and energy to make other people's work visible and generate new ideas through the connections he so loved to establish and nurture. Sometimes I think that the extent to which he saw knowledge as produced collectively and within webs of communication, collaboration, and creativity is what defined him as a scholar, advisor and colleague.

Mario Biagioli's passing on May 17, 2025, marks the loss of one of STS's most original voices. Yet his voice is still with us – in the books and articles that continue to shape our and many other fields, in the students and collaborators who carry his questions forward, and in the broader ethos of STS as a field committed to reflexivity, transdisciplinarity, and justice. Probably more than anything else, Mario's endless curiosity about how people build meaning together is the lesson we must continue to renovate and carry forward. Doing so without him will not be easy.

Collateral Pedagogies: Exploring the Performative Powers of Workload Allocation Models

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Abstract

In Science & Technology Studies and beyond, administrative instruments are recognized for their capacity to impact organizations and institutions. Whether intended or not, administrative instruments rework the core activities that organizations or institutions are put into the world to conduct. In this article, we study an important type of administrative instrument in universities, namely workload allocation models (WAMs), and how it impacts a core activity of universities, namely teaching. In order to explore this question, we draw on the concept of performative effects from Science & Technology Studies (STS). We conceptualize these effects as "collateral pedagogies", drawing inspiration from the Science and Technology Studies approach to performativity and building on John Law's concept of "collateral realities". We argue that, while some performative effects of administrative instruments such as workload allocation models are visible because they constitute matters of concern in the contexts where they are introduced, such instruments may also produce more subtle effects. These effects may not be immediately apparent yet impact fundamental aspects of organizational practices. For example, most WAM's in our study enacted university teaching as a standardized/able enterprise disconnected from its context and content by way of standardized formats and quantities, instead of an open process that takes the students, the particularities of the course, or teachers' professional backgrounds and experience into consideration. Thus, it is important to examine WAMs closely.

Keywords

university teaching; education; administrative instruments; workload allocation models; ontological politics.

1. Introduction

In Science & Technology Studies and beyond, administrative instruments are recognized for their capacity to impact organizations and institutions (Espeland and Sauder 2016; Gorur 2018a; Kornberger et al. 2015; Piattoeva and Boden 2020). Administrative instruments, such as performance measurement and funding models, are far from neutral. They may organize and disorganize social relations (Ratner and Plotnikof 2022), order time (Lunde and Piattoeva 2025; Piattoeva

and Vasileva 2023), standardize goals (Fenwick and Edwards 2014; Gorur 2018b), configure their users (Gorur and Dey 2021), and shape organizational decision-making (Madsen 2025). Many of these consequences are strategically envisioned – and perhaps even intended – by the actors introducing the instruments and are furthermore articulated openly. Meanwhile, administrative instruments often do much more than reorganizing intended aspects of social life of organizations. Sometimes they rework the core activities of organizations such as universities. These impacts, though unintended, are significant to the organizations involved, yet they often escape the scrutiny of researchers studying administrative technologies. In this article, we seek to address this oversight by focusing on how an important type of administrative instrument in universities, namely workload allocation models (WAMs), impacts a core activity of universities, namely teaching.

As existing research demonstrates (Kenny 2018; Kenny and Fluck 2014; Kenny and Fluck 2017; Papadopoulos 2017), the aim of introducing WAMs in universities is "to find a way to allocate academic work in a fair, credible and transparent way" (Kenny and Fluck 2017, 504). However, WAMs often fail to achieve the aims of transparency and fairness that justify their introduction. For instance, WAMs' granular calculations "do not reflect the actual true time it takes to accomplish a task" (Vardi 2009, 506). While making some parts of work more transparent, WAMs render other tasks invisible. These include "academic housework":

> [...] service "chores" such as complex module leadership, degree program management, student recruitment or admissions work, membership of teaching committees, personal and welfare tutoring, attending graduation ceremonies, and many other activities grouped under the catch – all formal and informal terms of "citizenship" or "being a good colleague". (Steinþórsdóttir et al. 2021, 1861)

Housework tasks are often allocated to women yet remain uncounted in WAMs (Steinþórsdóttir et al. 2021), thereby perpetuating existing gender inequalities and negatively impacting the promotion and careers of female academics. The resulting controversies regarding the accuracy or fairness of calculations often lead to dissatisfaction (Kenny and Fluck 2014; Papadopoulos 2017).

Other studies have focused more on unintended impacts of WAMs on social relations within universities. One study has investigated WAMs as manifestations of political and administrative reforms such as academic capitalism and New Public Management that commodify academic work, even though "academic labor, as intellectual work, is a highly personal and personalized process that is a key part of academic identities" (Nedeva et al. 2012, 350). Another study has pointed out how WAMs also lead to gaming practices and (re)valuations of academic tasks (Steinþórsdóttir et al. 2021). Hence, the introduction of WAMs can clash with the self-management approach that traditionally characterizes academic work (Kenny et al. 2012). The measurement of productivity conducted through WAMs and other instruments leads to a sense of inauthenticity among academics (Ball 2000). It is thus a known critique that WAMs impact academics' social relations and attitudes. Nevertheless, only very few studies have investigated how WAMs impact the core activity of university teaching, for example by producing forms of strategizing (Kenny 2018; Kenny and Fluck 2017). Teaching-related decisions are sometimes driven by the allocation of points, rather than considerations of what constitutes good or appropriate pedagogy. Staff seek to maximize their points and minimize work excluded from WAMs, such as updating teaching materials (Vardi 2009). In this article, we follow this line of research to study how WAMs impact university pedagogies.

Pedagogy is a tricky notion because it refers to slightly different questions in different languages and scholarly traditions. In the Cambridge Dictionary, pedagogy is defined as "the study of the methods and activities of teaching" (Cambridge Dictionary, *n.d.*), thus relating pedagogy narrowly to teaching. In the Nordic tradition, the scope is broader, including questions concerning how upbringing, teaching, and "bildung" (which could be translated as *education*) relate to society and the individual – for example, in terms of the purposes of these activities and the intentions of the "pedagogues" (Sæverot and Kristensen 2022). Based on these understandings, "pedagogy" thus refers to a specific set of norms regarding how to educate and for what purpose, and to associated methods or approaches for achieving this purpose (Curren 2003, 2). As we argue in this paper, administrative technologies such as WAMs do not explicitly address pedagogy but nevertheless begin to co-constitute aspects of pedagogy, including teaching arrangements, meaning that it is no longer (or not merely) defined by professional norms and methods.

We proceed by developing the notion of "collateral pedagogies" based on key concepts from STS, including calculative practices and collateral realities. Next, we outline our methodological approach to analyzing calculative practices and contrasting different WAMs. We then present four cases of WAMs, analyzing how their calculative practices produce particular collateral pedagogies. We conclude the paper with a discussion of collateral pedagogies in studies of administrative instruments in educational contexts.

2. Collateral Pedagogies: A Performative Perspective on Workload Allocation Models

In order to study how administrative practices produce pedagogies, we draw on the concept of performative effects from Science & Technology Studies (STS) (Gorur et al. 2019). Performativity has at least two different meanings (Wilkins et al. 2024): a neoliberal technology of governance based on judgments, comparisons, and displays of performance (for example, Hardy and Lewis 2017; Morrissey 2015); and an onto-epistemological position in research inspired by socio-material and new materialist perspectives (for example, Law and Urry 2004). While WAMs can be conceptualized as an example of performative technologies in the former sense, it is the latter meaning that we explore here. In STS, as well as other socio-material and new materialist approaches, all practices are seen as producing, and thus performing, realities. Reality is *done* and *enacted* rather than merely observed and represented (Mol 1999, 77, *emphasis in original*). The notion of "enactment" here references the idea of bringing reality into being rather than describing a gap between policy and implementation familiar from the studies of education policy (for example, Ball et al. 2012; Finefter-Rosenbluh and Perrotta 2023; Rainford 2020). Performativity as an onto-epistemological position thus invites us to go beyond critiques of WAMs as neoliberal governance technologies and instead focus on how specific *practices* produce specific realities. The performative perspective asks what realities emerge from the calculative practices of WAMs and thereby examines the implications for universities of introducing such models.

The performative perspective focuses on what emerges from various practices, including administrative instruments. However, the terms "performativity" and "performative effects" remain broad and cultivate different empirical focuses in terms of what types of effects one pays

attention to. We draw on Law (2012), who suggested that the notion of "collateral realities" may be useful for distinguishing between different kinds of performative effects. Law (*ibid.*) differentiates between *explicit* realities that are explicitly described and enacted, and *collateral* realities. Explicit realities are articulated openly, like WAMs addressing workloads. Explicit realities are in this sense easy to see and critique (as many of us do when we feel misrepresented by the calculative techniques used by WAMs). Previous studies have examined explicit realities through controversies in the wake of the introduction of new administrative or calculative instruments. For example, educational studies have examined the understanding of learning and curriculum enacted by PISA (The Programme for International Student Assessment) (Pettersson 2020) and the production of categories of non-European students as low achievers enacted by Danish national testing (Ratner 2020). In turn, *collateral realities* are enacted indirectly, accidentally, and along the way, without being strategically pursued by anyone. They are not declared as an instrument's purpose, but are implicit effects of practices (Law 2012). For instance, as shown in a study of alcohol policies, gender as an individual attribute is enacted as a collateral reality by the discursive practices of Australian alcohol policies (Duncan et al. 2022). As an analytical concept, the notion of collateral realities differs from the notion of unintended consequences by combining an attention towards the specific assemblage of specific and vernacular or general realities emerging from local practices. Collateral realities include both the reproduction of vernacular social theories through a range of parallel practices (for example, standard calculations of time, binary notions of gender, or singular understandings of national belonging) and performative effects that are particular to the instrument in question. In our understanding, unintended consequences reference effects of the implementation of specific policies compared to pregiven intentions located with particular (individual) actors (Dahler-Larsen 2014), and thereby the notion of unintended consequences draw on a different philosophical tradition than STS, which is less focused on intentions and more inclined to view practices as emerging from a multiplicity of human and non-human actors.

Both vernacular and particular effects are important as part of the ontological politics of the production of realities in/through practices. Ontological politics are "not a politics of who (who gets to speak; act; etc.) but a politics of what (what is the reality that takes shape and that various people come to live with?)" (Mol 2014). With the concept of ontological politics, we are sensitized to the multiple performances of a university and university pedagogy through a myriad of (sometimes routine and mundane) practices and tools – including administrative and statistical tools and practices. It is in relation to this sense of ontological politics that we find it important to study WAMs and the collateral pedagogies they produce.

By focusing on the collateral realities that get done and undone by WAMs, we may get a sense of what kinds of academic worlds and subjectivities they make more or less real (Law and Ruppert 2013; Mol 1999). However, while the WAMs analyzed in this paper produce explicit realities related to academic work and management as well as a range of conventional collateral realities related to measurement and time, we focus on the specific collateral realities that we term *collateral pedagogies*. Recalling the definition of pedagogy in the introduction as a set of norms for how and why to educate, the notion of collateral pedagogies may at first glance appear like an oxymoron. However, drawing on STS, we suggest a slightly different conceptualization of pedagogies as constituted by *practices* rather than merely by norms. In this conceptualization, pedagogies can

be understood as both practices and realities emerging from other practices, such as the explicit articulation of norms and didactical orchestrations of teaching. However, our interest concerns the production of pedagogies through administration and its underpinning instruments. We argue that these practices perform or produce particular pedagogies (or rather aspects of pedagogy such as teaching arrangements), but often without a stated intention of doing so.

Based on the notion of collateral realities and our performative conceptualization of pedagogies, we understand collateral pedagogies as educational practices that emerge implicitly, accidentally, and unremarkably as a result of seemingly unrelated practices. These were not mentioned unprompted by the interviewed teachers and managers in our study, but only reflected upon and unpacked when we asked about the effects of calculative practices on teaching. Collateral pedagogies are a fundamental part of the reality that emerges from WAMs and, by extension, other instruments used in educational management and administration (see, for example, Decuypere and Landri 2021; Laursen and Jensen 2025).

3. Methodology: Contrasting Calculative Practices

Like several other socio-material theorists, Law proposed to study performativity by studying practices:

> Practices are detectable and somewhat ordered sets of material-semiotic relations. To study practices is therefore to undertake the analytical and empirical task of exploring possible patterns of relations, and how it is that these get assembled in particular locations. (Law 2012, 157)

In this article, we examine the realities that are constantly produced and reproduced through the various calculative practices constituting WAMs.

Vardi (2009) differentiates between three types of WAMs: actual-hours-based, contact-hours-based, and points-based models. Actual hours models quantify and document the actual time it takes to complete a task. Contact hours models are centered on, for instance, the number of hours an academic should teach per week. These two types of models use time as a unit of calculation. Meanwhile, points-based models use utility units to describe workload. Our empirical material includes three contact-hour-based models and one points-based model. All WAMs in our study seem to depict the same thing – academic work/workload in universities. But the principles at work are not the same. The criteria for defining, selecting, measuring, and dividing workload vary despite a common official purpose of establishing fairness, transparency, and objectivity in the allocation of work. For instance, some WAMs include the allocation of a lump sum of work hours for the development of a new course or the revision of an existing one, while others do not. This difference matters for both the general idea of what university teaching is and the likelihood of teachers rethinking curriculum and teaching methods in ways that go beyond minute changes to already well-rehearsed course designs. Similarly, some WAMs include extra preparation hours for those teaching a course for the first time, while others do not, thereby enacting the resources of early career academics or academics with new tasks differently. In this sense, the specificities of calculative instruments construct their performativity.

Methodologically, studying performativity and the produced collateral realities involves empirical attention to practices of producing objects and subjects through assemblages of relations and the gaps, aporias, and tensions between practices and the realities they produce (Law 2012, 171). Law speaks of "selection", "juxtaposition", "deletion", "ranking", and "framing" as the practices that we might look for in our material. However, as practices are specific and related to particular contexts and instruments, we find other practices to be of importance for our analysis of WAMs. We are particularly interested in the ways in which WAMs partition, categorize, standardize, commensurate, particularize, frame, and name what they calculate: the workload. In addition, we are interested in how the calculative practices establish relationships between academic work and university pedagogies. In our reading, such practices are performed by a multiplicity of actors including the calculative models of WAMs in various hybrid assemblages also involving human beings. In our study, we focus on the calculative practices displayed in the documents defining the WAMs of the case universities as well as practices involving humans in specific situations and locations.

Meanwhile, WAMs and their calculative practices are not foreign to us but part of our everyday lives as academics working in two different universities. Furthermore, they function through conventional practices of standardization. Both factors mean that we need to defamiliarize ourselves from the WAMs to analyze them. Hence, we have selected four different WAMs to be able to contrast different practices across several models. The four cases are not national cases – because of the status of the university as "an international institution embedded in the nation-state" (Brøgger and Moscovitz 2022), we cannot first and foremost understand the WAMs as determined by their national contexts. Instead, we view them as instruments embedded in specific organizations and determined by a complex set of international, national, and local influences. The purpose of contrasting WAMs is not to compare and evaluate the models, but to make visible the specific practices and collateral pedagogies each performs.

The four WAMs were first and foremost examined in their textual form (i.e., official instructions in written documents or on university websites). In our first reading of the documents, we sought to familiarize ourselves with the models, selecting the most relevant text passages for our analysis of calculative practices. In our second reading, we mapped similarities and differences in relation to calculative practices. To support our readings and analyses of the documents, as well as develop insights into the use of WAMs, we interviewed 23 members of university staff, including heads of schools and their administrative managers, heads of departments, teachers, and union representatives. The interviews serve as background information rather than an object of analysis. However, we include some excerpts from the interviews in the analysis below to either provide background information or further illustrate points from our document analysis.

4. Analysis: Four Cases of Workload Allocation Models

In this first part of our analysis, we present four different empirical examples of WAMs and their configurations of workload, including two from a Danish university (Cases 1 and 4), one from a Norwegian university (Case 2), and one from a Finnish university (Case 3). All universities are research intensive, but highly reliant on public funding, and cover a broad spectrum of

academic subjects. In our study, we focused on social science, education, and humanities faculties. The four WAMs have different histories and are decided and implemented at different organizational levels of the universities as displayed in Table 1. Whereas Cases 1 and 2 were developed at faculty level, thus covering study programs representing neighboring disciplines, Case 3 was developed at university level as part of a university merger and thus required more flexibility to accommodate different traditions across the previous universities and across different disciplines. In turn, Case 4 was developed at school level by the head of school in a school that offers one major degree program as well as a few additional programs, thereby allowing this model to be specific about workloads allocated for each course, rather than using broader standards. The organizational levels at which the WAMs are implemented thus partially explain their differences.

As already mentioned, we approach the four WAMs as cases of different models introduced in particular HEI contexts, rather than national cases. There are nevertheless national regulatory frameworks and tacit conventions with implications for the WAMs. For example, Danish monitoring of higher education includes a "soft" standard (i.e., a voluntary but powerful norm) for the weekly number of contact hours that should be provided to students at BA and MA levels. The equivalent standard regulating the provision of teaching in Case 2 (Norway) is decided at faculty level and is thus more flexible.

	Case 1	***Case 2***	***Case 3***	***Case 4***
Country	Denmark	Norway	Finland	Denmark
Type of WAM	Contact-hour-based model	Contact-hour-based model	Contact-hour-based model	Points-based model
Definitions of workload	Generic standards	Generic standards	Intervals up for negotiation	Course-based standards
Organizational anchor	Decided at faculty level, adapted at school level	Decided at faculty level, adapted at school level	Decided at university level as a compromise during a merger of several universities into one	Decided at school level

Table 1.
Overview of the four cases and their context.

Table 2 provides an overview of the four WAMs, including their workload units; annual teaching workload requirements; and workload calculations for teaching, supervision, exams, and coordination activities. The table is not comprehensive but illustrates the most important categories and standards from each of the four WAMs, thereby providing a solid basis for an analysis of the models and their mutual differences and commonalities. As the table shows, the first three WAMs quantify workload in work hours, often defined in relation to the number of contact hours.

For example, one hour of lecturing equals four work hours (i.e., one hour in the classroom and three hours of preparation) in Cases 1 and 2. The fourth model measures workload in "K", which is a locally developed arbitrary unit of measurement that is much coarser than work hours. This and several other differences make case 4 an interesting and revealing contrast to the other cases.

All four WAMs are partial, meaning that they only register some tasks. In Cases 1 and 4, only teaching-related tasks are registered, whereas the remaining workload is considered research time, besides 25 work hours per year allocated for administrative tasks. In Cases 2 and 3, the workload

	Case 1	*Case 2*	*Case 3*	*Case 4*
Workload unit	Work hours	Work hours	Work hours	K (originally referring to weekly contact hours)
Annual teaching workload requirement (associate professors)	986h	705-797h (depending on age)	80-484h (negotiated)	9K
Teaching workload allocation (examples)	Lecture: 4h per contact hour	Lecture: 4h per contact hour	2-4h per contact hour (negotiated)	Introductory course: 16.5K
	Workshop: 2.5h per contact hour	Seminar: 3h per contact hour		MA seminars: 2K
		Group work: 2h per contact hour		BA seminars: 3K
				Project seminars: 0.5-1K (depending on number of students)
Teaching a new course	0h	15h	Negotiated	0K
Redesigning a course	0h	25h	Negotiated	0K
Supervision of master's thesis	20h per student	30 ECTS thesis: 30h per student	10-30h per student	0.25K per student
		60 ECTS thesis: 60h per student		

	Case 1	*Case 2*	*Case 3*	*Case 4*
Other supervision (examples)	Collective supervision: 2.5h per contact hour	With assessment at the end of the semester: 1.5h per student	BA thesis: 2-15h per student	Often integrated in course workload allocation
	Individual supervision before exams: 1.5h per contact hour	With assessment integrated in the semester: 2.5h per student		
	Individual supervision after exams: 1.25h per contact hour			
Written examination	5 minutes per page up to 10 pages 4 minutes per page for 10 or more pages	Semester assignment: 1h per assignment	5-45 minutes per assignment	Integrated in course workload allocation
		4h written exam: 0.5h per assignment		
		3-day home exam: 0.75h per assignment		
Oral examination	1.5h per contact hour	0.75h per examination	N/A	Integrated in course workload allocation
Master's thesis examination	10h per thesis (30 ECTS)	6h per thesis (30 ECTS), 12h per thesis (60 ECTS)	4-8h per student (negotiated)	Included in master's thesis supervision
Course responsibility	0h (but sometimes negotiated)	10h per course	0h	0K

Table 2.
Overview of the calculative models of our four case WAMs.

for administrative tasks and for teaching is allocated separately, with the remaining workload considered research time. In all cases, teaching workload is defined a priori (either through norm-based standards or negotiation) rather than registered a posteriori as time spent on teaching tasks.

In the following analysis, we focus on teaching workload.

5. Calculative Practices and their Enactment of Collateral Pedagogies

Based on Table 2, it is clear that the calculative practices underpinning the four cases of WAMs differ in a number of ways. The calculative practices of achieving accuracy and objectivity in workload allocation, through which the models enact fairness and transparency, produce various collateral pedagogies. The analysis is organized according to three different categories of calculative practices: *measurement units*, *partition*, and *standardization*. These calculative practices produce different collateral pedagogies captured in the sub-headings of the ensuing sections.

5.1 Teaching as Time and Teaching as Task

The first of these calculative practices concerns **measurement units**. Here, we see two overall framings across the four models. Cases 1-3 frame teaching through standardized time units, measuring workload as work hours. The measurement unit of work hours establishes a workload ontology of *time*; that is, measuring, standardizing, and making tasks commensurate in minutes and hours according to how much time academic staff are expected to spend on them. Cases 1-3, which we may collectively name "work hour models", thus render workload seemingly equivalent to actual work time. This equivalence draws on, and reproduces, a long-standing modernist notion of time as existing in a standardized form, independent of the social world (Adam 2004). The use of standardized time – minutes and hours – as the unit of measurement for workload enacts objectivity and accuracy in the allocation and calculation of workload by drawing on this notion of time. Cases 1 and 2 include standards for a larger variety of categories of tasks than Case 3, and thus a more finely determined model as a basis for achieving mechanical objectivity (Daston and Galison 2007) in the allocation of work. Here time is a unit of measurement with a very fine granularity, down to minutes. The finely granulated framing of work enacts precise measurement as an achievable ideal.

While the workload unit of time thus serves as a means of achieving an objective and accurate workload allocation, it also enacts a collateral pedagogy where time is considered a main attribute of teaching. In Cases 1 and 2, the number of weekly contact hours constitute a standard that programs are required to live up to, as indicated by a head of section:

> The documents state that the students have a claim for 12 hours of teaching per week, right? (Interview with head of section)

Time becomes a key measure of teaching quality, and time furthermore becomes a measure of fairness towards students by providing a means of ensuring equality in supervision time per student or equality in total teaching time across programs.

In Case 4, the workload ontology is connected to tasks instead of time and measured through the "arbitrary" unit called "K", sometimes also referred to as "K-hours", which does not refer to any calculative unit beyond itself. As the head of school explains, the measurement unit of K was originally partially linked to time, but in a different way than the measurement unit of work hours:

> K originally represented a contact hour [per week] [*konfrontationstime*] and you... I mean, the equivalent was that you... every semester, you should teach two master's level seminars [with two contact hours of teaching per week], and each seminar then triggers 2K. And when it [the requirement] is 9K [per associate professor per year], that is because you then in addition had to supervise four master's theses. So that was the main idea.
> (Quote from interview with head of school, Case 4)

As the quote shows, K was originally connected to time in terms of contact hours as the most important definition, even though one K was also considered approximately equivalent to 100 work hours as a rule of thumb. While this framing reproduces time as standardized, K has over the years developed into an arbitrary or abstract unit of measurement that is no longer directly connected to contact hours, or work hours for that matter. This is for example illustrated by a course including 3 hours of lectures and 2 hours of exercises per week that triggers 8K, because a certain number of K covering the supervision and examination of many students has been added up to provide a better approximation of the course workload. The measurement unit of K frames workload in relation to tasks rather than in relation to the number of work hours staff are expected to use to perform the task, thereby framing the task of teaching on its own terms instead of via a standard measure. This workload ontology enacts teaching as a composite task, not defined in terms of time to the same extent as Cases 1-3.

The measurement unit in Case 4 is framed much more loosely than the work hour models since the unit of work hours constitutes a much more finely granulated unit of measurement than K. As indicated above, one K was originally supposed to be equivalent to the rough unit of one hundred work hours. In addition, the K model breaks down tasks to a quarter of a K as a minimum, while work hours are sometimes broken down to minutes, as we see in Case 1 where written exams are allocated 4-5 minutes of workload per page, or Case 3 where written exams receive between 5 and 45 minutes of workload per exam. The rough granularity of the K model also has an impact on the following calculative practices following from it.

5.2 Teaching as Partitioned and Teaching as Integrated

A second difference between the calculative practices concerns the **partition of tasks**. In Cases 1-3, tasks are partitioned into teaching, supervision, and exams, and each of these categories further partitioned into various *types* of teaching, supervision, and examination. For example, Cases 1 and 2 distinguish between different types of teaching, such as lectures, seminars, and workshops, as we for example see in the following excerpt from the workload agreement in Case 1:

> The forms of teaching and learning used at [the named faculty] are and should be diverse and demand various levels and types of preparation. In order to best support the quality of the

> programs and simultaneously safeguard the workload of the staff, different standard types of teaching (Types 1 and 2) [...] with associated different preparation norms are defined. (Internal document: "Workload agreement", Case 1)

Equally, supervision is in Case 1 partitioned into different types of supervision and broken down to single contact hours, while in Cases 2 and 3 (and in the category of master's thesis supervision in all four cases) it is broken down to individual students. The partition into small units entails a fragmentation of teaching, which is configured as made up of small building blocks that can be combined in a number of ways. This calculative practice distinguishes between different teaching tasks, such as evaluation, supervision, or lecturing, yet makes them commensurable (Espeland and Stevens 1998) and thus highly interchangeable by measuring all of them in units of time. The fine granularity and partition of tasks makes them combinable and, in principle, flexible to manage.

The partition of teaching into various categories furthermore constitutes a framework for how to think and design teaching in the form of a number of mutually exclusive types of teaching. Cases 1 and 2 both include a category for "lecturing" as well as categories of "seminar" and "group work" (Case 2), or simply "workshop" (Case 1). In Case 1, the categories imply that teachers predominantly teach in the format of lecturing. In Case 2, the different categories reflect different types of teaching as well as different sizes of student groups:

> Lectures are often more like one-way communication to a larger group of students, right? [...] That needs to be prepared, and it is assumed that the preparation of such a monologue is a bit more comprehensive, so therefore the rate is a bit higher. When it comes to seminars, these often involve smaller groups of students and a more interactive form of teaching that is thought to demand less preparation, and therefore this rate is lower. [...] And group work is lessons where an academic in a sense just leads student activity that requires a minimal preparation. (Interview with head of teaching, Case 2)

Thus, all teaching is framed according to this handful of preformatted categories in order to be comprehensible and calculable and to fit the models. The implication is that other kinds of teaching are *erased from the repertoire* of this collateral pedagogy. For example, the categories only include teaching in which all students and the teacher are present at the same time in the same room, doing the same activity. For one head of teaching, the limited repertoire of teaching formats became evident during the Covid-19 pandemic, when another format of teaching was suddenly required:

> In particular, we experienced during the pandemic that [the WAM] did not have categories for all types of teaching, including digital teaching and stuff like that [...] If you were to conduct a digital lecture, then you obviously had to prepare the content, but the teacher then also had to record the lecture, and some had digital skills at a high level and others maybe had a low level of digital skills... so that was the discussion: How many hours should be registered for a recorded lecture, for example?
> (Interview with head of teaching, Case 2)

As this head of teaching explains, the pandemic suddenly required academics to conduct online teaching, such as recorded lectures, making the WAMs' existing categories somewhat problematic. In the cases we analyze here, teaching workload was still allocated according to the existing categories rather than questioned and readjusted to suit the changing conditions of the pandemic. Regardless, the fragmentation of teaching not only concerns its partition into small tasks, but also a collateral pedagogy where different activities need to take place at different times. Overall, teaching is made to fit the model, not vice versa, even under conditions that expose its limits.

In turn, the point-based model in Case 4 enacts a collateral pedagogy of integrated teaching, as well as the inseparability of teaching, supervision, and examination. The points allocated for various teaching tasks take into account the particularity of courses, thus entangling teaching tasks with teaching content – and to some extent also students' progression. Teaching is still fragmented, but at a much coarser level of individual courses. Teaching is also still preformatted, but not as a result of the WAM – there are a range of other practices, including local traditions, national regulations, and even room booking systems, that frame teaching in terms of various types and volumes.

5.3 Decontextualized and Situated Teaching

Finally, the four WAMs perform different but overlapping kinds of **standardization and decontextualization of teaching** in their process of translating workload into calculative units. First, Cases 1, 2, and 4 standardize workload irrespective of who conducts the teaching (including their level of experience and whether they have taught the course before) and of the context of teaching and supervision (including the number of students and who the students are). This standardization is particularly promoted in Case 1, where the standards of, for example, workload per feedback hour or workload per written exam page are compatible with many different types of feedback and examination. Second, Cases 1 and 2 standardize workload irrespective of the content of the teaching (including the level of the program and the character of the knowledge taught). These standards are the same for all, no matter who conducts the teaching, most likely as a means of achieving an objective and thus fair workload allocation. The only difference that is taken into account is the type of teaching, with lectures, workshops or seminars, and group work corresponding to different allocations of work hours.

The decontextualization of teaching, especially in terms of students and content as found in Cases 1 and 2, has the potential to enact particular collateral pedagogies. The calculative practices of standardization imply that it becomes impossible to accommodate students or teaching content that might be considered more demanding in regular programs. Only special circumstances allow for such changes to be made:

> When we developed a new master's degree program, we had to address some challenges related to dropout, right, and also a lack of a sense of belonging [among students enrolled in] the program, and the social part – the team spirit... Then we relatively quickly received this extra funding for the program, which was funding given to two or three programs, I believe, which were then supposed to be enhanced master's programs. And then we had really good

> resources... We were able to travel and have a 2-day seminar with the students with an overnight stay. And also to monitor students more closely – mentoring hours, actually. Plus, we had a principle about co-teaching. (Interview with teacher, Case 2)

As illustrated by the quote, there needs to be special circumstances (i.e., the categorization as an "enhanced program") for extra resources, such as work hours for mentoring or the presence of two teachers during all teaching activities, to be made available.

Case 4 in many cases particularizes workload as defined in relation to each individual course, while abstaining from standardizing types of teaching.

Case 3 differs from these modes of standardization by allowing the model to be adapted to each individual staff member, depending on their specific circumstances and priorities, as well as the nature of the teaching conducted. As stated in the WAM:

> Work time can be flexibly allocated to different tasks and activities within an employee's primary sphere of responsibility. (Internal document: "Guidelines for preparing annual work plans", Case 3)

While the reason for this adaptability was to develop a model that could accommodate different traditions during an organizational merger process, it resulted in the introduction of intervals, leaving the allocation of workload open to negotiation and thus individual assessment and decision-making to ensure fairness appropriate to the specific situation. Thus, while drawing on the objectified notion of minutes and hours, and on the accuracy achieved through a fine granularity and the partition of tasks, Case 3 also situates and adapts workload allocation to specific situations as a premise for achieving an accurate and realistic allocation of workload hours, quite contrary to the standardization taking place in Cases 1 and 2.

6. Conclusions

In our study of four WAMs, we chose to investigate their performative effects, drawing on the notions of explicit and collateral realities (Law 2012). All the WAMs that we studied either refer directly or indirectly to transparency and fairness in official descriptions of their purpose and were acknowledged by several of our informants for their positive functions in the allocation of work, including their role in promoting equity by breaking down previous power structures in academia where senior staff were able to evade teaching tasks through delegation to junior colleagues. A number of informants – including those acknowledging the positive functions of the WAMs – furthermore highlighted how WAMs promoted certain inequalities in workload allocation. For example, different groups of staff end up spending different proportions of their working hours to "earn" the same number of workload hours. In addition, all informants questioned the standard rates of workload allocation in terms of their correspondence to reality. Academic staff and scholars alike thus critiqued the WAMs according to their professed core task of a fair and transparent allocation of workload – a critique emanating from and framed by the promises made in their name and the explicit realities that WAMs seek to enact.

Furthermore, an innumerable number of collateral realities are performed. Many of these realities are familiar and become re-inscribed and reproduced in the WAM as well as in other practices along the way. One example in our analysis is the standardized measurement of time in minutes, hours, days, and years. Another example is the standard rules for calculation via addition, subtraction, multiplication, and division. These kinds of collateral realities encompass the foundations for workload calculations, ensuring they make sense to their producers and users, and they are the premise for the enacted reality of quantified academic labor.

Meanwhile, the analysis of four WAMs has also shown how various calculative practices enact different collateral pedagogies. Through their fine granularity and standardization and commensuration of tasks, the work hour models (particularly in Cases 1 and 2) enact teaching as flexible and combinable, and thereby optimizable. Teaching thus becomes a standardized/able enterprise disconnected from its context and content by way of standardized formats and quantities, instead of an open process that takes the students, the particularities of the course, or teachers' professional backgrounds and experience into consideration. Any differences between academic subjects or student progression are rendered irrelevant when considering the kind of teaching that is required. In turn, the points-based model using K (Case 4) enacts teaching as an integrated enterprise, adaptable to shifting students and circumstances, whereas the interval-based model (Case 3) allows for adaptation at the level of the individual teacher. In this sense, instruments like WAMs are overtly political.

In this paper, we sought to approach WAMs as an issue of ontological politics. We argue that the focus on calculative practices and the collateral realities they produce enables us to examine both the realities that are performed by the administrative instruments and – in parallel – the realities that get undone in the process. Our comparative approach, combined with the perspective of ontological politics, encourages us to remember that the realities of academia could be different and that, as researchers and academics, we should keep asking which alternative realities we want to produce – and through which practices that could become possible.

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Need for Speed: Practicing Speed in Times of Ecological Collapse

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Abstract

This article theorizes the climate hack as a space of overlapping and clashing timescapes: indebted to speed; set against catastrophic climate change and slow institutional change; and threaded with care, community, and collective intelligence carrying different temporalities. The case study examines a Swiss-centered, globally-dispersed group of climate activists, tech entrepreneurs, software engineers, designers, researchers and students meeting weekly since 2021 to build climate technologies. Based on six months of ethnographic fieldwork, this article explores how participants negotiate temporal dissonances in their hacking practice. The online meetings employ agile methods oriented towards speed, efficiency, and disruptive action. The urgency of "the hack" promising to "do something now" clashes with slow legacy infrastructures and bureaucratic systems, alongside contrasting temporal outlooks like long-term planning. Participants prioritize start-up methodologies to "get stuff done", yet acknowledge this model's imperative for action is part of the late capitalist timescape that accelerated climate change. Expanding on cognitive dissonance, we introduce temporal dissonance and propose that living with conflicting temporalities is a condition of climate action. Beyond recognizing that any space incorporates conflicting timescapes, we suggest addressing the climate crisis "now" means dealing with potentially unresolvable temporal dissonances. In the hack, temporal dissonances are side-lined to synchronize action. Efficiency-based temporal orders dominate despite investments in alternatives. We argue that not foregrounding temporal dissonances risks reproducing entrenched, privileged temporal orders that may accelerate rather than mitigate the climate crisis.

Keywords

climate hackathon; temporal dissonance; speed; synchronization; sustainable mobility.

1. Introduction

Speed is a central driver of environmental action and activism. For decades, the Intergovernmental Panel on Climate Change (IPCC) has urged industrialised economies to slow down the speed of global heating (IPCC 2023). More recently, in response to the widely felt "dramatic intensification" of climate change (Latour and Schultz 2022, 8), both activists and

others who have never participated in environmental activism are coming together in novel forms of environmental action. Acting quickly to slow down drastic climate transformation – by reducing car transport, forms of consumption, and flight travel – as fast as possible are all part of the discourse and practice of climate action.

When speed is considered a condition of meaningful environmental action, the power to perform speed, to define what and who does or doesn't count as fast, and the power to determine what must be sacrificed in the name of speed becomes crucial for environmental politics, practice, and justice. Our aim in this paper is to slow down to investigate the politics of speed at a moment when accelerating environmental changes and corresponding calls for urgent action threaten to sideline critical reflection as obstacles to action.

We draw on twelve months of participatory observation in a weekly climate hackathon based in Switzerland. The climate hackathon aims to accelerate environmental action and provides a rich site for investigating speed as a key ground of environmental politics.

In Barbara Adam's work, the concept of temporality captures how time is structured, valued, and experienced in practice (1998). Engaging with the notion that speed is established in practices and the editors' invitation to think through infrastructures of climate change, we revisit the climate hackathon as a site where speed is performed and negotiated through (digital) infrastructures.

The observed Swiss climate hackathon is a rich case because it demonstrates the potential of speed to mobilise action as well as how certain issues, questions, and concerns are silenced in the name of speed and efficiency. This climate hackathon, which we will pseudonymize as ClimateHack, was initiated by Swiss tech start-up entrepreneurs that we refer to as the ClimateHack Cooperative. Every Friday afternoon, the members of the cooperative host an online hackathon that we will refer to as the ClimateHack Sessions. These sessions include participants of all ages from public and private sectors based in various locations, including Columbia, Germany, India, the US, the UK, and Singapore. For the sake of clarity, the participants of these sessions will be addressed as "the hackers".

In pursuit of an "incredibly powerful method to move fast from problem to solution", our hackers repurpose practices of speed that value acceleration as a good for environmental action. During our time at the ClimateHack, they mainly focused on Swiss public transport. By following the ClimateHack both online and offline, we think through the politics of speed in times of environmental collapse by investigating what happens when practices of speed, such as hacking that emerged to manage fast-paced (digital) production, are employed to encourage Swiss car drivers to use public transport in an attempt to meet Swiss national emission targets.

In the first part of the paper, we situate the ClimateHack in the wider start-up, agile management, and hacking scene. We then show how speed is performed and valued within the decontextualised space of the ClimateHack sessions, and how the hackers bring the promise of speed that drives the online sessions to partners and sites outside the ClimateHack. Looking at how speed is performed in the ClimateHack Sessions and in relationship to partners enables us to think through the politics of speed in the ClimateHacks, and in environmental action more broadly.

2. Introducing the ClimateHack

To give a bit of background to our field, we first introduce some of the main actors. Doing so is not a straightforward task, as the organisational structure of the ClimateHack isn't immediately apparent, even to its participants[1]. In a young organisation that is still in the process of forming itself, the clarification of the roles and hierarchies is a sensitive topic. The following diagram (see Figure 1) represents our understanding of the organisational structure.

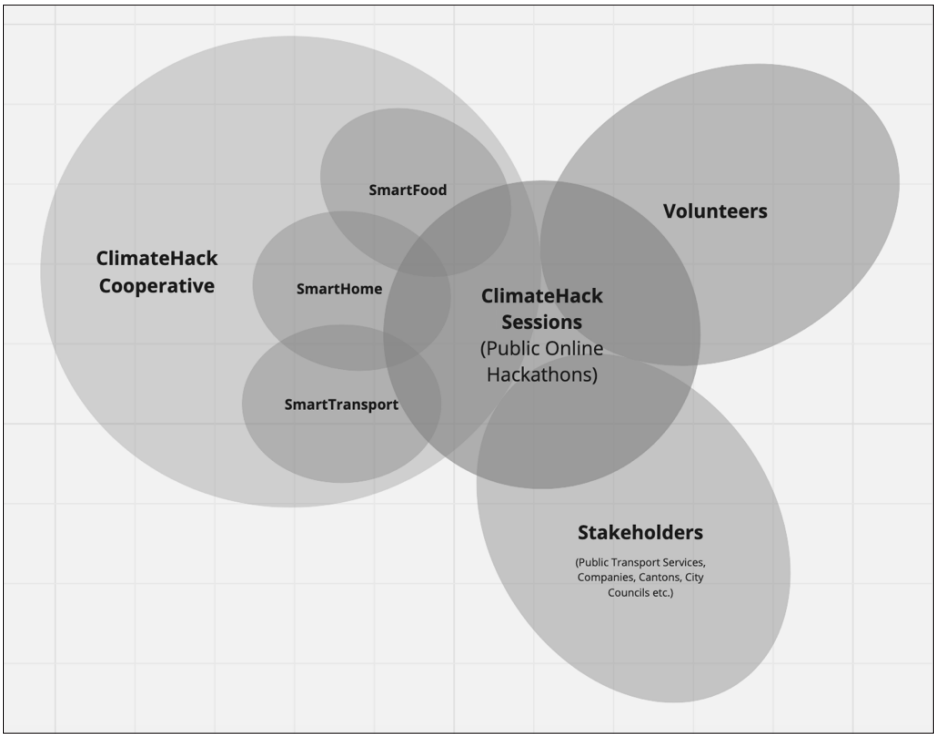

Figure 1.
ClimateHack's organisational structure (mapped by the research team).

At the heart of ClimateHack are the public ClimateHack Sessions that act as both an innovation lab (which generates a constant influx of ideas and re-evaluations of ideas) and a recruitment tool for the three subgroups of the ClimateHack Cooperative that are dedicated to the sustainable transition of food, homes and transportation. Each of the subgroups is incorporated as an independent cooperative under the umbrella of the ClimateHack Cooperative. Regular hackers might be hired to join SmartFood, SmartHome or SmartTransportation. In this paper, we focus on SmartTransportation, which is the most advanced in its financing, organisation and scope.

ClimateHackFridays began in 2021 when a Swiss start-up entrepreneur turned his attention toward doing something about climate change. After a lucrative exit from a successful start-up, followed by a sabbatical and some dabbling in another enterprise, Dominic wondered what he "would tell his kids in ten years" when they asked him, "What did you do, with all your possibilities, while the world went to shit?".

Facing his imaginary future children and further propelled by the Fridays for Futures movement, Dominic – a former frequent flyer – took a long train ride from Switzerland to Scotland to attend the COP26 climate summit. Trying to establish a network of useful contacts from his Glaswegian hotel room, Dominic noticed that neither the police-cordoned policy crowd nor the climate activists had time for a start-up entrepreneur. Yet, in the spirit of start-up culture, Dominic loved a good failure and returned home determined to "activate one million climate hackers to close the gap between climate protest and climate action".

Dominic's call to action soon gave rise to the ClimateHack Sessions. By the time we joined the sessions, Dominic and a regular core group of volunteers had abandoned the ambition to build a massive movement of climate hackers in favour of a regular online hack. Since 2021, every Friday from 3 pm to 5 pm (CET), a group of tech start-up entrepreneurs, software engineers, psychologists, designers, researchers, retired managers, students, and young professionals have been joining the online ClimateHack Sessions to "do something" about climate change. While most participants come from German-speaking Switzerland, where the organization is based, the ClimateHack has become international, and people from elsewhere help shape it. For example, a young couple of physicists-turned-app-developers from Bogotá do most of the coding. Some committed participants turn up weekly; others join sporadically, and the odd visitor drops in occasionally or sticks around for a session or two.

The focus on speed in the ClimateHack is informed by corporate start-up culture's efforts to accelerate innovation and capitalisation cycles and thus precedes, and perhaps even contradicts, environmental concerns. The following section provides a brief history of hacking, allowing us to situate the ClimateHack's focus on speed in the broader culture of agile start-up and software development.

3. Hacking Speed

Hacking, which can be defined both as creative play with new technologies while sharing one's skill with others (Levy 1984) or cleverly and quickly circumventing imposed technical limitations of a computer system (Coleman 2013) is no longer only practiced exclusively by "basement geeks" and subversive "security nerds" but has moved into the public and private sector. Today, hacking sprints, where a group of software developers work on something together for a short amount of time, have been adopted by cities, civic organizations, as well as the corporate tech office and the software start-up through "hackathons". Computer science and communications scholar Lilly Irani ascribes the appeal of hackathons to the premise of "high-velocity, demo-driven collaboration", which hones "fast development with a visionary's hand" (Irani 2015, 816). Irani highlights that both internal and publicly facing hackathons have become a way to enact entrepreneurial citizenship (*ibid.*). Irani's observation resonates

with our experience at the ClimateHack, where people enact entrepreneurial agendas in the name of the common good of emission reduction, combining entrepreneurial and responsible citizenship. Hacking through "hackathons" has thus ceased to be an expert, software-driven domain and has been reinvented as a tool for collective problem solving. For example, in urban initiatives to create "smart cities", hackathons have become a tool of contributing to the

> transition from managerial to entrepreneurial urban governance by demonstrating how technological innovations can improve the delivery of public services and how markets can respond to emergent conditions and sustain such service provision and urban development. (Perng et. al 2018)[2]

In line with the idea that digital tools transform issues, hacking expanded from developing code to hacking solutions for any problem. For example, since 2015, the EU's main climate innovation initiative, Climate-Kic, promotes "climathons" that are run in partnership with the UN Environment Programme, local organising committees, and municipalities as a tool to "tackle climate breakdown". Clearly, hackathons have entered the climate change arena. "Climathons", the website blurb reads, are "an opportunity to collaborate, rethink and come up with creative solutions to help cities make a fundamental transition to a sustainable future" (ClimateKIC 2019). The double promise of hackathons to create disruptive systemic change through "creative solutions", and to involve various participants in doing so, appeals to a broad group of people who want to do something about climate change, while businesses and governments continue to lose public trust, dramatically failing to even remotely reach climate targets.

As exceptional spaces set aside from ordinary time and politics, hackathons promise rapid change, heroic action, and futuristic data-driven innovation. It isn't a coincidence that speed-induced concepts, such as efficiency, velocity, or agility, that feature heavily within hackathons originate in the labour processes of start-up and corporate tech culture. As acceleration "became a key measure of progress" in our modern societies (Wajcman and Dodd 2017, 2), and digital media technologies were linked to such progress, the software industry started to foster a culture of acceleration.

Software itself – in its very logic of production – is about acceleration. With each next software iteration, the functionality (the click, the route, the search result, etc.) should become even faster, more seamless, and so forth. This "intentional, goal-directed processes of transport, communication, and production that can be defined as technological acceleration" (Rosa 2013, 82). Although it is not always easy to measure the average speed of these processes, Rosa explains that the general tendency to accelerate in the realm of technology is undeniable (*ibid.*).

The main drivers of this discourse are industry-wide software development management tools or "methodologies". The most prominent tool throughout the global software industry is something called the "Scrum" or "Agile" methodology. The internet changed how software was built and deployed because it allowed continuous updating, making it very reactive to market demands. A need for "agility" emerged. With this "agile turn" (Gürses and Van Hoboken 2018), software's complexity, distribution, and infrastructure changed, as well as the temporal orders of production. A new production order, characterised by short development cycles, continuous testing, and greater simplicity of design (Douglas 2015), also attempted to speed up

the developers' work and the delivery of their products to customers and users. While Scrum was not initially intended for software development, it became key to the new temporal orders of software development emphasizing and encouraging rapid and flexible response to change.

While we won't get into further details of Scrum or Agile in software development, it is important to mention it here as it is one of the central methods that temporally order the work of the participants in any hackathon. While our climate hackers don't explicitly use the Agile methodology during the ClimateHack Sessions, its culture of speed and efficiency is ingrained in the structure of the hackathon. As we will highlight below, the hackathon is a method – much like Agile or Scrum – that organizes work in such a way to foster quick ideas and quick iterations, leaving little room or understanding for slowdown (Bialski 2020). Before we turn to the way in which speed is performed in the ClimateHack sessions we observed, we briefly introduce Swiss public transport as the hackers' main field of intervention.

4. Hacking Swiss Public Transport

On the lookout for issues with sizeable climate impact and keen to utilise the power of their Swiss networks, the hackers directed their efforts to a well identified, but poorly addressed conundrum in Swiss public transport. Switzerland has one of the world's most extensive and well-funded public transport networks. And still, most people moving about Switzerland continue to use their cars most of the time. The enormous infrastructure expenditure of the last three decades failed to shift the "modal split", a transport industry term meaning the pivotal variable of public transport, measuring the total passenger-kilometres travelled by public transport compared to the total person kilometre travelled by private motorised transport. In Switzerland, this national indicator stubbornly sticks to about 21 percent[3] (Citec Ingéneurs SA 2021). 21 percent is a top score in the global ranking, and yet, measured against emission reduction targets, it remains dramatically insufficient (Petersen 2016).

Having so far failed to reach the emission reduction targets of the 2015 Paris Agreement, the Swiss government committed to national net-zero greenhouse emission targets for 2050. The 2021 CO_2 Act is setting interim emission targets for 2030 and as part of these efforts, the Swiss government committed to doubling the modal split of public transport to 42 per cent by 2030[4]. Like all climate targets, the doubling of public transport use is at once i) incredibly ambitious, ii) dramatically insufficient, and iii) out of reach without the kinds of drastic transformations that, at this point, neither politics nor industry is willing to consider seriously.

The hackers promised to address this deadlock. Within a few months, the hackers built the SmartTransportApp, a mobility data analysis and visualisation app uses mobility data from Switzerland's largest mobile phone operator to analyse mobility patterns. It became evident to us that this highly motivated but ill-defined group of climate hackers had grand ambitions. By their own admission, they knew next to nothing about public transport, and yet they aimed to accomplish a significant modal split shift. This shift is something the industry has struggled with for decades, and this goal aligned with a major Swiss Government legislation aimed at building a publicly financed mobility data infrastructure to enable sustainable mobility innovation (Swiss Federal Council 2022). Finally, after having struggled to secure a

collaboration with any of the major European rail companies, the ClimateHack succeeded in partnering with three Swiss public transport companies and a canton – cantons being responsible for commissioning and financing public transport in Switzerland. This promise to bring speedy change to a Swiss public transport landscape characterised as conservative, overregulated, and utterly unable to lead the required transition was at the core of the hackers' pitch. In July 2022, the initial partners took a leap of faith and invested to fund six months of staff hours, rolling stock, and access to public transport networks to run collective experiments led by the climate hackers. The ClimateHack leaders founded a nonprofit cooperative. They hired a salaried core team recruited from the regular hack participants and set up the first spin-out SmartTransport dedicated to innovation in Swiss public transport. To identify how the hack's technical infrastructure and working methods perform, enable, and value speed, we need to sketch out what happens in the weekly ClimateHack Sessions.

5. Performing Speed in the Hack

During a typical ClimateHack session, hackathon participants click through the ClimateHack website, where they are asked to click on a "Join LIVE Hack" link and then get redirected to the online hackathon platform run by the virtual event platform Veertly (an external company that has nothing to do with our ClimateHack group). The Hackathon begins with a general virtual "room" where the ClimateHack Session hosts introduce what will be "hacked" that day, summarize what was done during the more recent hacks, and usually lead the entire team in a quick introduction round.

After the introduction, the hackers split up into different groups, choosing one of the thematic rooms, such as the "food hack", "mobility hack", or "green housing hack". The sessions can become hectic, which is hardly surprising because the hack sessions are designed to be hectic. When a hacker enters the working room of her choice, the hack-room host gives her another introduction to what will be "hacked". Each hack-room is organized based on a set of hack-exercises. Facts about the given session and topic are presented on a "Miro board" (an online visualization tool), and the type of introduction differs from host to host. For example, Oscar from the food hack working room would present screenshots of the carbon footprint of different types of foods and supply chains, with sources included (quoting newspapers such as the *Guardian*, the Swiss federal statistical office, or online statistics platforms such as ourworldindata.org). Gianna, who hosts the green housing hack, prefers to dive right in and uses a collective visualisation exercise as an entry point for the discussion: she assigns each hacker the same picture of a (rather American-looking, upper middle-class) house. Following this introduction, all participants are encouraged to add digital sticky notes (via the Miroboard) to the parts of the house where they see potential for energy-saving measures. No experts or sources are introduced for the whole of the hack; instead, the exercise draws entirely on the knowledge in the room to get the participants' "brain juices flowing" in the desired direction.

Most hack-room hosts don't explain the reasoning behind the choice of methods or the tightly timed tasks. Participants, for example, are invited to add virtual sticky notes with ideas for energy efficiency in buildings on top of the picture of a house, while a count-down

timer provides a visual reminder of how much time is left for each given exercise. Often music is played in the background (chosen by the hack-room host) as an auditive timekeeper, helping hackers keep track of when the exercise begins and ends. When the music is playing, conversations and questions are postponed for another time. During most sessions, hackers work in sprints of two to five minutes.

One of the most popular collaborative formats is an Agile-inspired method called the "tower of ideas": there are three columns of post-its, and the hackers write three ideas – for example, on how to save energy in buildings – on the lowest row of post-its. Then, the hackers switch to the "tower" of post-its to their right. They are then invited to improve on the ideas of their neighbouring hacker in the row of post-its just above the one from the last round, and so on.

The exercise works on the premise that keywords can convey ideas on small post-its without context (usually, the idea must be formulated within two minutes and with fewer than seven words). Another premise of the exercise is that participants can improve on an idea in less than two minutes without the opportunity to converse with the original author of the idea about her intent. Also, the participants rarely react with statements such as, "I can't improve this idea". We didn't encounter any negative reactions to the ideas or hacking process during our fieldwork. Comments that might negate or question ideas are not shared. After the group has run out of time, the best ideas, or rather the ideas on the top row of the tower, are voted on by the whole group. Ideas deemed the best by this process then go on to be presented to the whole hack in another hack room called the "pitch stage".

In the "pitch stage" room, one hacker is assigned to "sell" the idea in a catchy and "attractive" way, tasked with conveying an idea that supposedly reflects the views and efforts of the whole sub-group. Pitching requires an aura of efficiency and winning confidence that contributes to the hack's image as a place where "stuff gets done". The audience expresses agreement, excitement, or praise with digital emoticons. Negative reactions are discouraged and can only be expressed with a "🥲" emoji or silence. After the pitch stage, everybody is invited to the digital lounge room for pre-weekend beers and an informal chat. The most productive conversations often occur in the *slow* space of the lounge.

6. Performing Speed through Abstraction and Temporal Framing

Drawing on Barbara Adam's (1998) understanding of temporality and our observations of the hack, we reiterate that speed, like all temporalities, is a relational effect. What counts as fast or slow depends on one's frame of reference, and framing time requires negating some relations and realities as out of scope. Referring to processes of abstraction in laboratory science, Adam writes that in the lab:

> abstracted from interdependencies and context, processes can be controlled, programmed, manipulated, changed, speeded up and slowed down. (*ibid.*, 39)

In line with Adam and the tradition of laboratory studies (for a foundational text, see Latour and Woolgar 1986), we suggest that the online infrastructure that powers the ClimateHack's

distributed virtual meetings allows the hackers to translate complex questions about Swiss public transport into the abstract space of the digital whiteboard, while the SmartTransportApp that they are developing allows them to track and predict national mobility patterns. The app and digital whiteboard can be understood as a kind of quick and dirty laboratory that allows hackers to render complex issues into abstract and manageable formats (post-its and mobility patterns) that lend themselves to rapid experimentation.

Porting complex issues into the infrastructured timescape of the digital ClimateHack Sessions only enables speed when time is framed and thus made productive. In the two-hour sessions, time is considered scarce, which makes speedy action a prerequisite. Once issues are abstracted into *insights*, *challenges*, and *opportunities*, they can be split into subtasks that are timed by a countdown timer located at the top right-hand-corner of the screen and motivational background music that provides the session with a certain tempo. A ClimateHack Session, in short, enables efficient *ideation* by making issues available in an abstract format within tight temporal frames.

Rapidly translating, often still quite vague ideas into executable experiments requires quick decision-making. Silent voting helps identify which ideas might be of value. Still, decisions about which ideas to pursue, in the end, are made by the ClimateHack leaders, often outside of the session and with little transparency or accountability to the ClimateHack Session participants. In the jargon of the hack, culling valuable ideas from the larger "crop" of ideas is called *harvesting*. The ClimateHack Sessions perform speed by establishing separate timeframes for collective idea generation and goal-oriented decision-making. Harvesting is how ideas are moved from one time frame to another.

Barbara Adam argues that the speed of journalism "as the here and now of events" makes it impossible for news media to grasp "chronic environmental hazards associated with the industrial way of life" (1998, 20). Adam's point that some time frames might make it hard or even impossible to grasp realities that unfold outside of that frame opens up the question of whether ideas fall outside of the temporal framing of the session because they cannot be grasped or are disregarded as slow impediments. The following examples show that the ClimateHack invites a broad range of contributions and participants while ultimately tending to limit the scope of ideas in the name of speed.

Isidro participated in the ClimateHack sessions for several months. Dialling in from Arizona, he was much appreciated for skillfully attending to the well-being of the collective. And he brought something else that is harder to pin down. Unlike most participants, who tend to follow the ClimateHack's flow, he calmly claimed space for his contributions in the busy agenda of the hack. Identifying as a Two-Spirit Indigenous climate activist, he would find a moment at the beginning of each hack to "honour our ancestors" (as he would call it) and to offer a short mantra for a future when Indigenous people everywhere stand united as custodians of the land. Isidro's vision of an Indigenous-led climate coalition brought to the sessions the insight that the environmental crisis cannot be addressed independently of the colonial and post-colonial realities that continue to shape environmental degradation. In our reading, Isidro's appeal to "our ancestors" evoked a shared humanity while also serving as an invitation to pay attention to differences in how participants understand, relate to and are affected by climate change. The fast-paced sessions are designed to level differences between participants to enable acceleration.

By pointing out that climate change futures and pasts affect hack participants differently, Isidro created frictions in the flow of the hack that opened up room for questions of climate justice and positionality that do not fit easily into the session's focus on getting stuff done.

Isidro's story is one example of our observation that the focus on speed shapes what can and cannot be articulated in the ClimateHack Sessions. In a different incident, the hackers spent one week running real-life hackathons with hundreds of young people. One of the key findings was that young people, especially young women, feel unsafe on public transport, but to the frustration of some hackers, the hack leaders did not take up solutions that promised a safer journey. The leaders seemed to be unable to hear needs that weren't in line with their start-up mindset, as if needs were relevant if they had something to do with speed, practicability, affordability, and efficacy. One of the frustrated hackers said, "The hack operates at a speed that does not allow for empathy". Issues that fall outside of the frame of speed tend to not register in the ClimateHack; and a focus on speed makes it hard for the hack leaders to recognise realities that lie outside of their own frame of experience such those of indigenous climate activist or young women on public transport.

In another instance, Francisca, the lead designer, confronted Dominic at end of a week-long in-person hackathon because she felt that she and a fellow developer named Ines had been repeatedly disrupted by male colleagues who took work out of their hands in the name of speed. Dominic apologised and added that there is just no time to negotiate carefully in the heat of the moment, arguing that a hack is like a war room where some forms of care and deliberation must be side-lined to enable rapid problem-solving. Francisca questioned whether working to exhaustion while skipping meals and sleep is the only way to perform speed. She recalled that she delivered excellent and timely results in her previous job at an all-female design agency where collaboration and mutual care were considered crucial to sustained performance under pressure.

Issues that do not fit the ClimateHack's temporal frame, such as emotions, negativity, critique, community for community's sake, or overt politics, tend to be politely side-lined as slow. Speed is performed in relationship to the time frames that structure the hacking sessions, and in relation to the conceptual time frames that shape which issues the ClimateHack can or cannot consider. Having started to unpack how speed is performed in the ClimateHack Sessions, we turn to the role speed plays in the hacker's partnerships with industry and public service actors.

7. Real Solutions Beyond the Hack

While the figure of speed is deployed within the hack sessions, it is also essential in convincing stakeholders that ClimateHack Cooperative aspires to work beyond the online space and create "real solutions" offline.

The ClimateHack Cooperative positions itself as an incubator for creative climate solutions. But to bring the ideas to fruition, they must be transplanted into big corporations who are *doing* the doing. In the following section we will outline how the hack moves from being a space of ideation to applying its ideas in practice. The ClimateHack Cooperative understands ideation as a public matter. Authorship is framed almost as a public good and ideas and solutions are framed as the results of the swarm intelligence of the hack. Implementing *solutions* by contrast is the job of middle managers and experts within relevant companies. In this regard, ClimateHack

Cooperative is not a start-up incubator because it isn't centred around treasured assets that will allow for the scaling of businesses. Instead, the ClimateHack is happy to give away its ideas and thus also its authorship for free in the name of its larger goal "to save the world".

As we mentioned in a previous section, from the group of drop-in volunteers that join every Friday, there is a small core-team that is paid a regular salary from the money the ClimateHack Cooperative raises from public and private companies. The core team has convinced some of the biggest transport companies in Switzerland to get involved. This is highly important to the whole ClimateHack endeavour, as these companies help realize and test the hackers' ideas within the material and organizational infrastructure of the "real world". The public and private companies (in this case, various public and private transport companies), as well as the local canton where the climate hack is based, are willing to take a chance on the unorthodox methods of ClimateHack Cooperative because they are faced with the fact that, during the last decades, they didn't manage create any drastic change in their practices to mitigate the climate crisis (in our case, to compete with the car).

A select number of representatives from the canton as well as private and public companies began joining the weekly ClimateHack Sessions. Sometimes, their participation in resulted non-public hacks. It remains unclear if the cooperative shields such sessions from public engagement or if the companies protect their ideation phase from the public. These private hack sessions are sometimes carried out in the offices of said companies; sometimes they take place in a private room of the online hack (which happens simultaneously to the public hacks). Before the ClimateHack Sessions, the core-team – sometimes joined by employees of the involved companies – hosts meetings to prepare the sessions, which are also not open to the public and presumably have a different character than a typical ClimateHack Session. The ClimateHack Cooperative provides its tools – such as Agile methods, their special "start-up sauce" or their motivational energy, the Veertly infrastructure, and the SmartTransportApp (that analyses anonymized mobile phone data of the traffic in Switzerland) – to the industry stakeholders and acts as a facilitator for pilot projects that involve more than one company. The participating companies provide funding, staff and infrastructure to roll the experiments out in real life.

8. Pitching Speed

Somewhat remarkably, the ClimateHack Cooperative gained serious traction in the Swiss public transportation scene within months, even though they entered with zero knowledge about public transport or sustainable transition. So far, the most productive spin-off of ClimateHack is the subgroup called "SmartTransport". A year on, the hackers formed a working alliance of three Swiss public transport companies and a canton, gained funding to hire a growing team, and entered conversations with the Swiss Ministry of Transportation while pursuing leads in Lichtenstein, Austria, and Germany. The hackers used their SmartTransport project to develop the SmartTransportApp, a mobility tracking and prediction app that analyses mobility patterns in Switzerland based on mobility location data. Along the way, the hackers learned much about the practicalities and politics of public transportation and built an extensive network of contacts and a portfolio of experimental real-world interventions.

Returning to the moment when the ClimateHack Cooperative first formed the coalition of public transport companies helps to illustrate how the promise of speed granted the hackers credibility in an industry that struggled for decades to achieve a shift in modal split. This was a big day for the ClimateHack. The three Swiss public transport companies had finally agreed to join the ClimateHack for an initial six months of real-world experiments in public transport, and this was the first time that the ClimateHack was in a sustained relationship with external partners. With the incoming funds, some of the most committed hackers were hired to work full-time on the project now run as a newly founded not-for-profit cooperative. The purpose of that day's meeting was to onboard staff from the participating companies. Dominic, joined by the companies' CEOs and hackers from the core group, pitched the project to an audience of mostly male, white-collar railroaders with a penchant for train-themed zoom backgrounds.

Everyone discussed this pitch in the previous hack, and while several hackers suggested that there is too much to take in, Dominic pushed back, saying, "We sold them speed, and that is what they need to feel". Presenting a well-timed cascade of ideas, persuasive numbers, personal anecdotes, and ambitious timelines, Dominic, flanked by the CEOs, delivered a stellar pitch, as usual.

Ideas for the experiments, he explained, "have been co-created with citizens" in areas where the "AI has identified a high potential for shifting car drivers to public transport". Each experiment is scheduled to run for a couple of months, which is incredibly ambitious, especially in the world of public transport, where project timelines often stretch to decades. "We're coming from a very different world to public transport, the digital and start-up world", Dominic continued, inviting his audience to imagine that seasoned railroaders too can break free from the frustrating and comforting constraints of their jobs to join the club of the fast and daring. Having explained that those who experience slow infrastructure development and frustrating municipal politics can do something about climate change, Dominic moves on to address anticipated fears around experimentation.

> The word "experiment" [*Dominic said*] is carefully chosen [...]. I understand that it creates scepticism, [*he told the mobility representatives*], when you're about punctuality, tact and reliability [...] understand all that [...] But I believe to drive innovation, we can't always think about the entire network.

Instead of being afraid of massive change, he suggested that:

> [*they*] try it [...] small; as small as possible; try it minimally invasive, like a surgeon who begins with a very small scalpel, so that it doesn't hurt much at all, so that I can be extremely brave, in this small experiment, that I can do things that I would never do on a national level.

If successful, these experiments will be scaled by a factor of ten and eventually rolled out nationally before being exported as best practices around the world.

Framing time is as crucial to the promise of scale in the pitch. The proposed experiments can be fast precisely because they are small. Pursuing small and fast experiments enables a *feeling of speed* in the face of the paralyzing scope of the changes required to meet the emission reduction goals while also serving to manage risk.

In the logic of the ClimateHack, the small, contained experiments serve as seeds of change, because those that have proven successful will eventually be rolled out at scale. "Small, experimental, incremental steps", in the words of one of the CEOs, "will allow us to eventually reach the big quantum leaps". Scaling up is the ultimate promise of techno-scientific acceleration based on the notion that labour-intensive, situated experiments can eventually be sufficiently abstracted so that they can work more or less independently of the given context. The experiments that the ClimateHack proposes are time and resource-intensive, requiring intimate and ongoing conversations with all participants about their specific circumstances, needs, and worries. Caring for specifics in this way is slow and costly and, in the realm of the ClimateHack, can only be justified with the promise that much of this work will eventually be streamlined and automated at scale. That the acceleration of scale implies abstraction is evident in the metaphor of "going viral" that the hackers frequently employ, which suggests that once the virus is out of the lab, it no longer requires care or attention to detail because it will spread rapidly and indiscriminately.

> We can bring speed [*Dominic promises*] but we need, and that's really important, we need you. We can bring speed, but we do need you, and only standing shoulder by shoulder can this work [...]. My wish is that we adopt these values: first, it's better to be fast than perfect. Second, an experiment in practice is better than a study. And third, we need to work together to be able to work at high speed.

One of the CEOs chimes in to support Dominic, saying, "It's all about breaking new ground; it's all about brave, clever, explorative forward chances". His colleague chips in, declaring that:

> We're not doing this for our companies; we're doing this for the larger goal, for the sector, but of course also for the population... and if we succeed than we have a pioneering role, not just in Switzerland, but also in Europe... and that alone makes it worth to take the risk.

Promising speed, first through temporal framing and consequent scaling up, enables the hackers to recruit initially sceptical partners. Over and over, we observed that the hackers' promise of speed elicited a shift in initially sceptical audiences, instilling a difficult-to-quantify feeling of possibility that the thus far unmanageable or unthinkable might indeed be possible if only we dared unite behind the bandwagon of speed. The promise of speed, made tangible through the promise of contained experiments and the potential for scale, provides the hackers with a mobilising power that changes the horizon of possibility, at least for the moment of the pitch. It also serves, to use the terms of a classic study of alliance building, as an enrolment device that establishes the climate hack as an obligatory passage point for public transport innovation (Callon 1986).

If speed grants the ClimateHack credibility and authority, their power is always conditional on delivering speed, which brings us back to the question of how speed is performed, not in the abstract space of the online hack, but in the "real world". Orlando and Ines, two young AI developers from Bogotá, do the work of making the analytics engine of

the SmartTransportApp shine. They work mostly in the background, even if their work is mentioned and praised. Orlando shares with us that:

> We used to work at a fast but still normal working pace. But back then, nobody from the Swiss transport companies would listen to us. It was only when we made the first intensive weeklong work sprint and proved to them that we could do things at a miraculous speed that they would even sit down with us for a meeting.

The experience of having to excel to be good enough is familiar to many immigrant and minority workers, but in the case of the ClimateHack, the pressure to demonstrate miraculous speed extends beyond particular workers in the hack. Dominic, for one, confirmed Orlando's observation that only by virtue of being exceptionally fast are they taken seriously by their partners in public transport and municipal bureaucrats. When speed is a condition of valuable work, it must be performed independently of the question of whether it furthers the goal of reducing emissions.

A few weeks after the railroaders joined, Dominic signalled a shift. Some of the public transport managers and bureaucrats who were now obliged to attend the ClimateHack Sessions proved to be enthusiastic participants who seemed to value the playful exploration outside their usual institutional constraints. Others, however, resisted the hack more or less actively, seemingly out to prove right their initial scepticism that a bunch of tech outsiders would be able to solve long-standing industry issues. Changing the strategy and scope of the ClimateHack Sessions, Dominic said, "The majority of the work has to happen over the week so that we can blow their minds in the ClimateHack Sessions with what we have achieved". Dominic's insight that demonstrating speed to some (during the ClimateHack Sessions) requires hiding the work of others (during the week) resonates with geographer Doreen Massey's observation that the speed of some requires the hard and often unacknowledged work and immobility of others (Massey 1994). Evoking Erving Goffman's conceptual division between back and frontstage performances (2007), we suggest that working hard backstage enables the performance of speed on the frontstage of the ClimateHack Sessions.

A few months later, Dominic reflected, "It sometimes seems as if the ClimateHack Sessions have become weekly rituals of speed and collaboration while the main work takes place elsewhere". Whether conceptualised through Goffman's frontstage-backstage binary or Dominic's notion of performative ritual, we suggest that the ClimateHack is only able to achieve its desired speed by rendering labour and infrastructures largely invisible.

Sociologist Arlene Kaplan Daniels (Daniels 1987) coined the term "invisible work" to describe gendered and racialised labour like care work, housework, or volunteer work that makes society possible while being culturally and economically devalued and frequently delegated to women and minority workers. The corresponding notion of invisible infrastructures goes back to the work of Susan Lee Star and Geoffrey Bowker who coined the term to highlight how infrastructures that enable and constrain social practices tend to fade into the background (2000). In line with the notion of invisible work, we observe that the care it takes to build and maintain communities of hackers and partners, as well as the digital infrastructures of the ClimateHack, is a rarely acknowledged condition of the performance of speed. While care work is rendered invisible other kinds of work is celebrated in the ClimateHack Sessions.

In pitches and informal chats, the hackers frequently share tales of working long and hard while achieving surprising results, strategic victories or analytical breakthroughs. We argue that fetishising some work as exceptional is the flipside of rendering support work and infrastructures invisible. We propose, in other words, that deleting some work and celebrating other work enables the hackers to perform, what we will call, *heroic speed*.

Besides rendering care work largely invisible and other kinds of work as exceptional, the hackers perform speed by pitching it as an inert technological capability. The SmartTransport app that the hackers are developing, often simply called the A.I., provides seemingly instantaneous insights into where people have travelled and will travel in stunning detail and resolution on a population level. The hackers, for example, identified the parking lot of a major local employer as the source of 20 million annual car kilometres by tracing in and outgoing traffic. Pulled up during presentations, this digital map does not fail to impress. The mobility data and prediction provide valuable insights for traffic planners and mobility interventions, but there is more: the abstraction of real-life movement into elegant lines and dots gives viewers a sense that real-life mobility patterns might be just as easy and quick to manipulate as their digital representations. Programming the A.I. to a point that it can provide instantaneous data insights requires long hours of development work. The difference in time zones between Columbia and Switzerland means that the hackers often promise their partners data insights that miraculously materialise overnight, i.e., the Columbian working day. When the A.I. requires more attention than Orlando and Ines can summon, they subcontract to developers from their Columbian network. Known to the other hackers only as the Columbians, these invisible workers are working from a distant, radically different reality to enable the A.I. to operate seemingly automatically. Feminist scholar of science and technology Lucy Suchman elegantly shows how making technologies work during demonstration events requires infrastructure and labour, which is cut during demonstration events so that the technical object can appear self-sufficient and self-actualizing (Suchman et al. 2002). In line with Suchman's observation, we conclude that the speed of the A.I. and the speed of the hack experiments equally depend on the deletion and mythification of labour, care, and infrastructure. Testing ideas from the ClimateHack Sessions through the data models of their mobility pattern prediction app, and then conducing real-life experiments, allows the hackers to extend the digital laboratory of the ClimateHack Sessions into the "real world". While doing so, they also build feedback loops through the AB testing marketing messages on social media, as well as evaluate people's responses to the real-life experiments. The performance of speed in the sessions and the performance of speed through data modelling and rapid, small-scale real-life experiments are coupled in a resource and labour-intensive loop that maintains speed. Maintaining speed perpetuates the promise that some ideas will eventually scale and enable significant emission reductions, which, if successful, would justify the initial expense. Testing is how the hackers maintain the promise that the exceptional *heroic* speed of small, short-term experiments will eventually lead to solutions that can be scaled up and rolled out. Noting that scaling up implies acceleration, we suggest that the promised speed of scaling up is crucial to justifying small, specific, and resource-intensive experiments.

So far, we described how the ClimateHack's digital infrastructures, tools, methods, and timeframes prioritise and perform speed. We argued that the ClimateHack's focus on speedy

forms of idea generation, technological solutions, rapid real-world testing, and short-term timeframes affects what does and does not count as fast and valuable. Following the hackers from their ideation sessions to the "real" world, we also showed that as experts in speed, the hackers must be exceptionally fast to retain their credibility with various collaborators and partners. We further conceptualised speed as a relational effect achieved in practice. Having noted that the performance of speed in the hack renders enabling care work and infrastructures invisible so that speed can stand out as a miraculous achievement, we proposed the notion of *heroic speed*. Exceptional speed achieved in specific, resource-intense experiments is justified with the promise that solutions will eventually scale up.

9. Speed as a Mode of Doing Politics

Having shown that in the hack, promising, defining, and delivering speed comes with the power to define the framework, methods, and timeframes of meaningful action, we return to our opening promise to think through the politics of speed. The ClimateHack's timers, post-it notes, pitching phases, digital modelling, rapid experiments and short-term consultancy contracts prioritise speed in ways that make some realities urgent while rendering others less relevant or invisible. Second-wave feminists, the black power movement and the civil rights and student movements of the 1960s fought to expand what counts as politics to reveal how oppressive norms shape and constrain the lived reality of oppressed groups. Feminist and black feminist activists and intellectuals, in particular, have worked to demonstrate and undo the bifurcation of politics into official public politics and the domestic sphere (see, for example, Hanisch 1970; Lorde 1984; Moraga and Anzaldúa 1981). The rallying cry, "The Personal is Political", continues to inspire scholars and activists because it powerfully summarises the crucial insight that political and economic structures shape racialised and gendered personal experiences. Science and technology studies expanded the claim that the personal is political to technoscientific practices, artefacts and infrastructures. Dispensing with the notion of unbiased technoscience, scholars such as Donna Haraway (1988) have demonstrated how practices, infrastructures, scientific methods, and artefacts order, value, and distribute realities. In his classic study, for example, Langdon Winner asks, "Do Artifacts Have Politics?" and writes that "Many technical devices and systems important in everyday life contain possibilities for many different ways of ordering human activity" (1980, 127). Whether consciously or not, Winner argues, actors such as climate hackathons and green start-ups establish technologies that influence, for example, what route people drive to work, what forms of life are considered valuable, and which kinds of future visions can and cannot be addressed in the name of green transformation. Bruno Latour suggested that technoscientific development, innovation, and implementation – and, by extension, all human practice – can be understood as ways of doing politics by other means (1988).

The members of the ClimateHack cooperative tend to insist that their actions, artefacts, and methods are strictly technical or economical and thus non-political. Sociologist David Tyfield, in contrast to the hackers' understanding of technology and hacking as non-political, argues that sustainable technology development and deployment is unimaginable without

massive state subsidies (2018). He argues that liberal narratives of self-actualising technology and free market-driven innovation, also favoured by the hackers, can only be maintained if the crucial role of state funding, infrastructure, education, and policy is largely ignored. Concluding that green innovation projects are inherently political because they order what kinds of futures and interventions become imaginable or not, Tyfield proposes the notion of innovation as politics. Considering speed as politics matters because politics are frequently veiled in the name of speed. Once we think about hacking as a mode of doing politics by other means, we can ask what kinds of unacknowledged political assumptions play out in the ClimateHack.

10. Speed Circumvents Politics

Although the hackers are frustrated that many of their working hours are spent on liaising with government officials, local politicians, and state-funded public transport companies, they insist that their *real* innovation work has nothing to do with official politics or what in STS terms is sometimes called politics with a capital P. Bracketing the ClimateHack's implicit politics allows the hackers to position the speedy hack as a site outside of official politics that by contrast is characterised as cumbersome, incompetent, and slow. A participant in a ClimateHack Session populated mainly by government and company mobility managers remarked that "an alliance of the biggest employers taking the lead would be quicker and more agile than politics". Insinuating that speedy action can outpace politics is a roundabout way of understanding speed as a way of doing politics by other means. Establishing the ClimateHack as an initiative where change can manifest relatively unhindered by institutional constraints at a speed that potentially circumvents official politics has allowed the hackers to mobilise partners, participants, and resources to realise a series of real-life experiments that industry insiders initially considered impossible to pull off. The ClimateHack demonstrates the power and perhaps even the necessity of forming new alliances for environmental action outside established institutions. Rather than offering a coherent logic for action, we suggest that appeals to speed allow actors to mobilise people, organisations and resources while remaining ambivalent about effects and intentions.

11. Practicing Speed Otherwise

If speed is a mode of doing politics by other means, then the means through which speed is achieved matter. Let's recall that in Barbara Adam's work (1998), temporalities such as speed are an effect of how time is structured, valued, and experienced in practice. All practices in this way of thinking imply specific temporalities (and thus certain forms of slowness, speeds, and rhythms), as well as normative judgments about what counts as a good or bad pace. The insight that value judgments, for example, about speed are embedded and reproduced in practices is core to the so-called "practice turn" in the social sciences that prioritises practices as the focus of analysis[5]. With a focus on practices in mind, we can revisit Isidro and Francisca's stories as moments when different practices and theories of speed clashed and the implicit politics of speed in the hack became available for negotiation. Francisca and Isidro's stories stand

in here for many other moments in the hack where participants take the time to care for each other, for the organisation, or for the projects they pursue in ways that don't fit the mould of heroic speed. Our point is not to draw a binary between heroic speed and embodied pace, or to suggest that the hack is devoid of practices of care but to point out practices of care and collective production are frequently rendered secondary or harvested in the name of heroic speed.

As mentioned above, Dominic associated the ClimateHack with a war room in his confrontation with Francisca. We noted that dominant theories of speed associate speed with military logics, justifying mobilisation and abstraction to bypass political deliberation. We showed that practicing speed in war mode requires rendering supporting infrastructures, practices of care, and explicit politics invisible. And while we acknowledge the mobilising power of heroic speed in the hacker's pitches, and while immediate environmental emergencies, such as floodings or heatwaves, might justify the logic of a "war room", we ultimately side with Francisca, who, in our understanding, proposes that the ongoing urgencies of overlapping environmental and social crisis require forms of practising speed that centre care, embodiment, connectedness and attention to differences. We might think of attempts to work towards meaningful impact without giving in to the logic of heroic speed as attempts to establish a situated, embodied pace. We argue that reconceptualising speed is necessary because the logic of heroic "war speed" drives regimes of accelerating production and extraction at the root of the environmental crisis and the post-colonial realities that characterise it.

At the same time, calls for slowing down are unsatisfying in the face of environmental collapse that requires timely action. During an interview with Isidro, we tried to frame his care for the collective and Indigenous politics in opposition to the hack's dedication to speed. Isidro resisted our binary framing of care as slow or other to speed, patiently pointing out that in his understanding, caring for ancestors and other participants is not about slowing down, but about elevating the ClimateHack's pace and scope. Like Francisca, Isidro invites us to let go of the slow/fast binary in search of ways of practising speed that gather momentum through care, embodiment, and connectedness. To arrive at a working concept of speed for environmental action, we must resist both the seduction of heroic speed and binary thinking that romanticizes slowness as the antidote for speed.

Notes

[1] The organisational structure shown in Figure 1 was created by us and embraced by one of the central figures of the ClimateHack (who we pseudonymised as Dominic), while another member of the core group (who we call Francisca) rejected it.

[2] Hackathons are not always technically oriented and can also be "issue-driven" – focusing on social themes and conditions (Lodato and Disalvo 2016). That said, we focus here on more software-driven, technosolutionist approaches to hackathons.

[3] The hackers work with the figure 21% and rely on a sample census from 2015 based on interviews conducted with 57'090 citizens.

[4] The Swiss Energy Strategy 2050 in Public Transport (ESPT 2050) provides more detail on how global Swiss emission reduction targets translate into public transport targets pivoting on a shift in modal split.

[5] Versions of the idea that people's multiple, partially overlapping doings establish actual and possible socio-technical worlds, value judgments, and emission patterns are central, amongst others, to the work of Boltanski and Thévenot (2006), Mol (2002), and Shove (2022).

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Theatre as *Techne*: How to Account for the Epistemic Work Across Arts and Science

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Abstract

This article explores how theatre can serve as a tool for self-reflection and co-creation of knowledge for healthcare professionals, particularly those who have faced the trauma of the COVID-19 pandemic. A case study is presented of doctors and nurses in Bergamo who used a theatre workshop to rework their experiences, culminating in the creation of a theatre play performed for the city. The article contributes to the fields of Art, Science, and Technology Studies (ASTS) and Medical Humanities, arguing that theatre, as *techne* (practical knowledge), not only disseminates research findings but can also provide epistemic work generating new narratives and fostering a deeper understanding of care practices, highlighting the importance of affective communication. The article illustrates how the project served as an epistemic laboratory where knowledge is co-generated among healthcare professionals, theatre professionals, and researchers, and then divulged to the public. The detailed analysis of the project's unfolding, from the theatre workshop to the performances, shows how art can engage critically with science, challenging traditional conceptions of knowledge production and communication.

Keywords

ASTS; theatre; epistemic laboratory; arts and science; dramaturgy; collaboration; COVID-19.

Introduction

In March 2020, Bergamo was the European epicentre of the COVID-19 pandemic. Within two months, the city and province of Bergamo lost approximately 6,000 people. Doctors and nurses in the Emergency departments (EDs) and intensive care units of hospitals had to manage a challenging situation, working in exceptional conditions for months. The ED of the city's main hospital was at the centre of the crisis. Papa Giovanni XXIII is a large, highly specialised hospital that serves an area with over 1,100,000 inhabitants and more than 98,000 annual accesses. In March 2020, the Emergency Department of Papa Giovanni XXIII was

overwhelmed by the COVID-19 health crisis and tried to cope with the tragic situation by mobilising all its resources. The acute crisis receded after about a year, but having faced such a desperate situation, it remained in the memory of healthcare professionals as something difficult to overcome (Paganini et al. 2020).

Therefore, two years after the pandemic outbreak, a small group of doctors and nurses believed it was essential to find a way to collectively process the traumatic experiences of the crisis. They decided to use the arts and chose theatre as a medium to work collectively on their experiences. This article presents a case study of the theatre project "Il Tempo della Cura" (*Time of Care* in English), created by doctors and nurses from the emergency department of Bergamo's largest hospital, to rework their traumatic memories through a theatre workshop and the creation of a performance on COVID-19 to be shown to the city.

The case aims to enrich the emerging field of Arts, Science and Technology Studies (ASTS), which has recently emerged as a multidisciplinary and interdisciplinary field in which traditional STS methods merge with tools related to art history, aesthetics and media theory. Recognising the need for a new conceptual framework to analyse these hybrid practices (Rogers and Halpern 2021), ASTS aims to bridge the fragmentation of existing literature on art and science and establish itself as a canon with its own methods, institutions, cases and common topics.

This contribution aims to enrich ASTS literature by presenting a case in which theatre has functioned as a tool for self-reflection on medical practices and as an epistemic laboratory, where knowledge has not been transmitted but co-generated. The contribution highlights how theatre, as a performative practice, belongs to the ASTS field because it is capable of exploring, staging and troubling the relationships between scientific knowledge, imagination and technology. Through theatrical devices, theatre makes the social, emotional and political implications of science visible, encouraging forms of public reflection and critical participation.

The case focuses on how theatre allowed participants to engage in embodied self-reflection exercises and practices regarding their own direct experiences of caring for and treating patients in an emergency (the pandemic). The case also illustrates how, through this experience, theatre (with its tools) has produced embodied knowledge of care practices and a new narrative about the role of healthcare professionals during the pandemic, promoting the importance of affective communication as a crucial element of the healthcare profession (Bensing et al. 2000).

To explain the agentic role of theatre as a producer of self-reflection, embodied knowledge and new narratives, we draw on the concept of *techne* versus *episteme* (Gavrilov 2021) as a repository of techniques that enable the processual unfolding of creative experiences. In ancient Greek tradition, *techne* embodies a type of practical, artisanal, situated, tacit knowledge linked to doing and production, as opposed to a universalist theoretical knowledge that aims to identify a corpus of abstract truths. With this contribution, we reiterate that the embodied knowledge produced through techne belongs to the realm of knowledge and that exploring it helps to unpack "artistic facts"[1], showing their narratives and how they are constructed.

The article aims to contribute to the interest of ASTS in examining the relationship between art and science by exploring the concrete processes involved in constructing that relationship. It supports Rogers' proposal, which suggests the artwork acts as an agent that creates a space, an opening, in which different types of conversations on a scientific theme can take shape (Rogers 2021). Art in ASTS is not an embellishment of science, but a tool

that allows those outside a scientific field of study to engage in reflection on science in society. In the context of our work, when we discuss science, we refer more specifically to medical science and healthcare practices.

The article is structured as follows. The first section outlines the theoretical context of ASTS, the role of theatre in ASTS, the relationship between ASTS and medical humanities, and the role of theatre in medical humanities research. The second section provides a brief overview of the challenges faced by healthcare professionals during the pandemic. The third presents the case and methods. The fourth section delves into the various stages of the project's development, from the workshop to the creation of the theatre show. The fifth discusses what emerged from the presentation and analysis of the case, and finally, the conclusions summarise the path outlined in the article.

1. ASTS and Theatre

Over the past twenty-five years, Art, Science and Technology Studies (ASTS) has developed, giving rise to new practices that challenge traditional disciplinary distinctions between art, science and technology. ASTS is emerging as a framework capable of reading, interpreting, and problematizing the forms of collaboration, contamination, and co-production that traverse the worlds of art and science (Rogers et al. 2023; Rogers 2024). Rogers and Halpern (2021) have worked on gathering and systematising this new field of study. The authors have clarified the terminology used in the field, its dominant topics and narratives, and the methods and approaches used in ASTS. One of the dominant narratives identified by Roger and Halpern regarding the relationship between art and science, which is helpful here, is the metaphor of the "two cultures".

This metaphor identified a supposed divide between the arts and sciences, characterised by mutual incomprehension. This logic of the two cultures promoted art as the handmaiden of science. In contrast, Rogers and Halpern argue that the arts have the potential to problematise the position of science and promote collaborations between art and science through a more equal encounter between these categories of knowledge. ASTS is committed to decentralising the written word as the primary mode of expression, embracing various forms of knowledge and methods. It adopts a symmetrical approach to art and science, considers artistic practice as research, and brings new perspectives to STS, such as the sociology of art, philosophies of aesthetics, and literary analysis.

One of the central issues of ASTS is the definition of art and artistic practice. According to Horst (2025) in her recent review of the *Routledge Handbook of Art, Science and Technology Studies* (Rogers et al. 2021), while some traditions focus on the idea of art as the translation of the artist's impulses into an artefact or performance, others describe art as a form of knowledge or research. Even in the second tradition, however, according to Horst (2025), the practices of establishing artistic facts and the controversies surrounding the epistemic claims of artistic research are not made explicit. Although STS typically account for the processes that stabilise scientific "facts", this practice is rarely applied to artistic and cultural products at the intersection of art and science. Horst claims:

> I would have liked more discussion and reflection on how the knowledge production of artistic practice can be documented in ways that can engage with more classical epistemological practices of STS. (Horst 2025, 137)

Documenting creative and artistic processes at the intersection of art and science is, therefore, essential, as it supports the central claim of ASTS that art is not ancillary to science.

Theatre is a form of art that is well represented in the ASTS debate. Theatre is a place that allows hybridisation between art and science (Palmås 2024; Farnell 2021), conveying important social messages (Lioi 2014), exploring ethical dilemmas (Takala et al. 2014); promoting social sustainability (Pellegrinelli 2025a); showing the dimension of power and inequalities in the production of knowledge (Green 2020); and re-imagining academic communication as performance (Schneider 2011).

However, we argue that theatre (in this case, theatre in conjunction with science) can contribute further to the ASTS because it is a collective art in which both humans and nonhumans participate. The collective, processual, and participatory nature of theatre practices allows us to account for the processes of composition of artistic products, documenting the production of knowledge, as STS has done with science. By unpacking the processes that have occurred over time in the creation and production of art, it is possible to outline the path that led to the emergence of the artistic product and its capacity to generate knowledge. This does not mean that it is not possible to do the same with other art forms, but rather that theatre, due to its collective practices, has greater potential for unpacking. For example, Gluzman (2021) suggests looking at theatre practices to reflect on scientific practices. The author claims that the dramaturgical issue is illuminating for STS, because they take the performativity of science to be a concern and the reflexivity of STS scholars to their own practices to be essential. Pellegrinelli (2023) uses the process of creating a theatre show to analyse the framework of human and non-human relationships and the practices that lead to the collective creative process (see Pellegrinelli and Parolin 2025). Theatre, as a collective and sociomaterial art form, is a privileged space for giving an account of the construction process. In their 2022 publication, Römgens and Benschop explore artistic research collaboration in practice. They reflect on the challenges of working and becoming together as a heterogeneous team comprising people from theatre, academia and research who embark on a collective project without a fixed method. "Getting out of the groove" is essential for navigating complexity and fostering connection.

1.1 ASTS and the Medical Humanities

In both Arts, Science and Technology Studies (ASTS) and Medical Humanities, scholars have demonstrated how artistic practices highlight the relational and lived dimensions of health. Artistic interventions in healthcare not only support patients but also challenge institutional practices and rethink care (Jensen 2019; Thompson 2020). They create participatory spaces where knowledge is co-produced, not imposed. Such approaches broaden the epistemological frameworks of health, going beyond clinical logic. Recognising this growing body of work is essential to understanding care as a culturally and politically rooted practice. For example, Bates and colleagues (2014) explore the recent history of the relationship between

different art forms and medicine, emphasising the value of historical context and reciprocity in the relationship between medicine and visual art, literature, performance and music. Bleakley (2020) examines the role of the Medical Humanities, proposing that it can reintroduce an aesthetic, political, and therapeutic dimension to medicine, challenging patriarchal hierarchies, the objectification of patients, and the poor self-care of doctors. Bouchard and Mermikides (2024) analyse the intersection between performance and medicine, outlining how these disciplines intertwine through different theoretical lenses and emphasising their socially and culturally constructed nature, as well as the profound interconnectedness between individuals.

1.2 Theatre as a Tool for Creating Knowledge and Dissemination in the Medical Humanities

The relationship between the theatre and medicine unfolds not only in the context of artistic therapeutic interventions but also in research. Rossiter and colleagues (2008) provide a fascinating overview of how theatre can serve to interpret, translate and disseminate healthcare research. According to the authors, theatre can relate to knowledge and academic research as a means of dissemination and as a tool to co-produce new knowledge (Rossiter 2012).

Rossiter and colleagues (2008) identify four main theatre genres related to the production and diffusion of healthcare knowledge. The first is non-theatrical performances, consisting of dramatised readings of researchers' interview transcripts translated into monologues. The second genre is ethnodrama, which reproduces "real-life" situations emerging from data such as interviews, focus groups, or ethnographic notes. The third genre is theatrical research-based performance. The performance is based on research; however, it does not strictly follow the data as a script. Rather, it entails the writing of a play by a theatre professional in collaboration with academics as an output of a research project. Denzin (1997a) argues that these kinds of performances can challenge and deconstruct the idea of a single "truth" by presenting narratives from multiple perspectives and angles. These performances can help deconstruct the traditional textual research output's linear, naturalistic form to represent its complexity better, creating a space for interpretation and "cultural critique". The fourth and final genre is fictional, theatrical performance, which includes works performed for healthcare education that are not research-based.

Rossiter and colleagues (2008) note that each of these forms relates to the data and theatre tools in a specific way. There are cases in which these aspects are in balance generatively. For example, in theatrical research-based performance, the theatre's dramaturgical and performative potential is fully used to present research data and narratives from different perspectives, as we will see in the case we present.

2. The Front-Line Healthcare Professionals during the Pandemic

The COVID-19 pandemic stressed healthcare systems worldwide. Emergency Departments (EDs) had to introduce substantial changes to manage the pandemic emergency and its consequences (Schreyer et al. 2020; Cao et al. 2020). As Nadarajan and colleagues (2020) highlight, the exigency was to redesign the EDs to control the spread of the virus better and

manage the pandemic. As Paganini and colleagues (2020) noted, "The COVID-19 pandemic has presented the health-care system with challenges that have limited science to guide the staff and structure surge response" (p. 541). The authors highlighted how, during the pandemic, the sheer number of patients arriving unpredictably increased, and at the same time, there was a lack of inpatient discharges, causing congestion in the EDs. Paganini and colleagues (2020) refer to the adaptations introduced in the ED in Bergamo as exemplary. The authors use as a source a podcast by Simon Carley with Roberto Cosentini, the head of the ED at the Papa Giovanni hospital and one of the participants in the "Time of Care" project. On March 21, 2020, Cosentini explained on the Emergence Medicine St. Emlyn's blog what the peak of the pandemic looked like. He described the pandemic as "like an earthquake every day" and, based on Bergamo's early experience, offered some essential guidelines to better prepare the EDs worldwide for the pandemic.

Among other things, Bergamo's experience suggested increasing supplies (Personal Protection Equipment – PPE, oxygen tanks, CPAP ventilation helmets), organising the ED space to separate respiratory and non-respiratory patients, and training clinicians who do not usually work in the ED to join during the emergency. Cosentini also warned about the importance of the flow of patients through the ED onto other wards and out of the leading hospitals to units that can provide rehabilitation. Finally, he highlighted how the pandemic in the ED was emotionally exhausting, suggesting that being prepared to support staff psychologically was crucial (Carley 2020).

Several authors have investigated the pandemic's impact on frontline workers, revealing high levels of stress (Attili 2020; Barello et al. 2020). According to Shanafelt and colleagues (2022), the professionals' stress and emotional exhaustion were due to a significant risk of exposure, extreme workloads, moral dilemmas, and rapid changes in their work practices. Moretti and colleagues (2021) highlight how the COVID-19 pandemic affected nursing care in Italy, emphasising the prioritisation of clinical practices and life-saving techniques over a holistic approach to patient care.

Focusing specifically on ED workers, Bahadirli and Sagaltici (2021) highlight how the high risk of being infected, the risk of transmission to relatives, often with the choice of being isolated from the family, and the continued exposure to a high rate of death created psychological pressure and stress during the pandemic. Gesi and colleagues (2023) show how experiencing a threat to one's family and unusual exposure to suffering negatively impacted the psychological well-being of healthcare frontline professionals. Drawing on her professional experience in mental health support for humanitarian aid workers, Cherepanov (2022) examines the psychological needs of healthcare workers during the pandemic. As with other Complex Emergencies, the pandemic exposed healthcare professionals to an overwhelming rate of death, frustration with the shortage of resources, and fear of being contagious to loved ones, but it also mobilised their sense of purpose.

The pandemic reminded healthcare professionals, particularly ED staff, of their mission to rescue and care for needy people. It also prompted reflections on the purpose of the medical profession. The theatre project organised by doctors and nurses at the Bergamo Emergency Department provided a space to expand on these reflections and make them collective, as we will see in the case study described in the next section.

3. Materials and Methods

"Time of Care" was an organizational and fundraising initiative set up by a group of doctors and nurses from the Papa Giovanni XXIII Hospital Emergency Room in Bergamo, which involved a one-year theatre workshop, produced, and staged a drama play titled "Giorni Muti, Notti Bianche" (*Silent Days, Sleepless Nights* in English), a documentary film, a website and several project presentations in public libraries, schools and other community centres[2]. The project offered a free-of-charge one-year-long theatre workshop for professionals at the Papa Giovanni XXIII hospital's Emergency Department (ED). Approximately twenty doctors and nurses, around one-third of the entire ED staff, participated in the theatre workshop and took four performances of the theatre play to the stage.

We, as researchers, came into contact with the project because Pellegrinelli is not only a researcher but also a playwright and theatre director. She was involved in writing the script for the show by the group of doctors (Pellegrinelli 2024; 2025b). The engagement took place through the theatre director chosen by the group (to conduct the theatre workshop and create the play), who often collaborates with the second author in the creation of theatre plays. This opportunity therefore opened up collaboration between the doctors and researchers[3], who had the chance to conduct collaborative affective ethnography throughout the theatre workshop and the preparation of the play. The aim of the academic research, shared with the doctors and all participants, was to follow the project and understand how this performative experience could help healthcare workers elaborate on the trauma of COVID-19 and reconfigure the concept of care and care practices (Pellegrinelli and Parolin 2024a; 2024b; 2025).

The research project was registered at the University of Southern Denmark and, according to the Danish regulations, did not require prior approval from the Ethical Committee , nevertheless the researchers structured a set of practices to ensure research ethics. An illustration of the project, outlining its characteristics and aims, was shared with all participants, who provided consent for the ethnography, interviews, audio, and video recordings to be used for research purposes during the workshop. The researchers were not supported for this research, neither from an internal grant nor from any external body. Instead, a grant from a local foundation supported the "Time of Care" project through the "Bergamo e Brescia Capitale della Cultura" grant program for cultural initiatives. Moreover, it collected several private sponsorships.

The researchers participated in coordination meetings, group chats, and mailing lists for the coordinator group, as well as several project activities. They kept two ethnographical diaries and shared audio research notes. They also conducted several interviews with participants, organised in two rounds. The first round involved only a few organisers and participants during the first weeks of the project (January-February 2022). The second, more participated round was conducted after March 2023, following the premiere of the drama play "Silent Days, Sleepless Nights". The two researchers joined the coordination group, which included the director, gaining access to all internal communication and materials shared in the group chats, mailing lists, and the project's shared documents. They collected written materials about the project (i.e., the grant proposals and the PowerPoint presentations used for fundraising), and on some occasions, they also participated in their development. Thanks to Pellegrinelli's

dual role as researcher and playwright, the researchers also had access to the written materials produced by the participants during the pandemic, which were collected by the project, as well as those created during some workshop sessions. They recorded videos and took pictures during the workshops, collecting all photos and videos also recorded by the participants, the coordination team, a professional photographer, and the communication team for internal or external purposes. They participated in the preparation and assisted at three of the four performances included in the project, collected video recordings, and shared the experience with the group before and after their performances. They also participated in social moments (i.e., after-theatre dinners), tracing the affects and atmosphere of these moments.

Methodologically, the research was based on a collaborative affective ethnography (Gherardi 2019), a research style that focuses on the affects and atmospheres that occur during fieldwork. Its peculiarity lies in the use of the researchers' bodies to feel and resonate with the other participants (Pellegrinelli and Parolin 2023a), thereby grasping moods and how people interact and affect each other. The use of collaborative affective ethnography proved helpful in this context, as it enabled the authors to account for their differing positions during the research. While Parolin participated in theatre exercises alongside doctors and nurses, serving as an equal in the workshop, Pellegrinelli observed the workshop as a spectator to capture the affective highlights and write pieces for the dramaturgy.

The material produced by the research was substantial. To analyse the material, we conducted a thematic analysis of the interviews and of what emerged in general from the project (mainly based on diaries), but above all, we developed a processual narration of the experience, entering into the three practices of the project's production (workshop, dramaturgy, performance) to understand what each of them had produced and what the turning points in its development had been.

4. The Case "Time of Care"

Following the initial meetings of the project's management group, which lasted approximately four months, the theatre workshop commenced in early 2022. The first months were spent on theatrical training and collecting stories and dramaturgical materials from the healthcare professionals' experience with the pandemic. The second part of the workshop was dedicated to composing a themed drama play. More precisely, the first part of the year was dedicated to creating the group, building awareness of the stage with some basic theatrical training exercises, and playing improvisations.

In the workshop's first weeks, written testimonies were collected from the professionals: letters, scattered memories, stories, and reflections. Then, the theatrical work used improvisations to share and gather experiences and stories about what the professionals experienced in March 2020. Sometimes these improvisations were prepared by working on a topic suggested by the workshop leader. At other times, improvisations emerged from physical exercises such as walking in the space, dancing, mimicking, and making choral and coordinated movements. One of the improvisations that emerged from the choral and coordinated movements was, for example, a scene in which the professionals performed donning PPE before starting a shift.

Figure 1.
The improvisation during the theatre workshop. Photo courtesy of Laura Lucia Parolin.

This improvisation was created by a small group of five healthcare workers, who, through very slow movements, mimed putting on the protective suits, gloves, masks, and shields. It focused on this moment of preparation for the shift, which for professionals was a decisive, dramatic moment, a daily entry into a battlefield.

Through the embodied performances (Myers 2005; Vertesi 2012) in the theatre workshop, professionals delved into their memories. These memories focused on the patients' suffering bodies distributed everywhere: in the rooms, in the corridors, and on improvised beds and stretchers. They evoked the noise of the patients' bodies breathing heavily, the continuous roar of the oxygen helmets, the requests for help, the laments, and the moans. A widespread memory was about the feeling of being physically and emotionally exhausted, sweating under PPE, and struggling to communicate with the patients. Furthermore, two themes that emerged most frequently were the emotional difficulty of dealing daily with so many deaths and the loneliness of dying patients due to the separation from their loved ones.

One of the improvisations, for example, about the painful separation between patients and their relatives, was the story of a dying father who repeatedly asked to see his son. The doctor who had told this story remembered that it was impossible to satisfy this request, given the restrictions in place during that period. However, the doctor had managed to organise a very brief, exceptional meeting between the dying father and his son in the corridor when the father was moved from the ER to another department.

Sharing this story evoked a range of emotions among the workshop's participants, triggering many similar memories about trying to help patients in every way possible. For example, some professionals mentioned the small things they gave to patients to try to make them feel

better, i.e., a lip balm to manage dryness of the lips due to the respiratory helmet, a brioche to try to convince a patient to eat who could not eat, a rosary taken by the Madonna statue in the hospital square brought to a dying patient who had requested it to pray[4].

It is important to note how many of these memories came to the surface as the work of the theatre workshop progressed (Pellegrinelli and Parolin 2024b; 2025). Doctors and nurses had forgotten some of these episodes with patients because they were too painful, as one of the doctors reported:

> **Excerpt 1**:
> When I heard various stories of the father and son, or the other calling his wife home, something came back to my mind that I have never forgotten. [...] When I heard the story of the relationship of the family members, this memory came back to me that I had really hidden, I don't say erased. I had hidden it in my head. (E., female doctor, second-round interview)

The exercises, improvisations and performances embodied during the theatre workshop highlighted how the interaction with patients and their relatives had become of primary importance in managing the crisis. This was true not only for the relatives' need to receive news about the patients but also for the doctors' need to share the emotional burden of caring for them. Indeed, the pandemic was emotionally exhausting for frontline health professionals. Caring and helping people humanely had become the only way to support and give comfort and hope to many dying patients and their relatives, but it was also a way to not feel lost in a very distressing situation. Several doctors mentioned the frequent, long, painful phone calls with the patients' relatives. As access to the hospital was restricted to the relatives, the daily phone calls (or even every six hours) with them had become essential in the hospital's routine. Even if painful, this connection was also valuable for doctors, as evidenced by the following excerpt from the play script, which was written by the same doctor who acted in the drama play (see Benatti 2020).

> **Excerpt 2**:
> This daily round of phone calls to the relatives is a sad ritual for us doctors who have found ourselves performing it every single day.
> Nonetheless, I realise that I do await this moment: I myself need to keep these unreal conversations with invisible strangers going, so together, we peer into the darkness of our fears.
> In that motionless moment, that is the *time of care*.
> (Excerpt from the dramaturgical text, Pellegrinelli 2025b, p. 56, *emphasis added*)

All the written materials produced by professionals during the workshop were given out during the summer break (2022) to the researcher-playwright Pellegrinelli, for writing the dramaturgy. She used all the materials produced, including the dramatizations from the improvisation exercises, and chose and re-elaborated some of them. The dramaturgy included materials produced in the workshop's improvisations, written texts, and choral exercises. To frame the story, Pellegrinelli drew on classical Greek traditions that referenced epidemics, providing a more comprehensive narrative of the pandemic as a plague. She rewrote excerpts from Homer, Sophocles, Ovid, and Virgil to design a frame where stories and scenes

from ED staff experiences could be interpreted. Finally, she added some tragicomic choruses about what ordinary people were saying before the pandemic outbreak in Western countries, the catchphrases during the lockdown, and the standard arguments of denialists[5]. The researcher-playwright composed a dramaturgical text as an organised collage of these elements, bounded together by the director's expressive modulation of the bodies on stage.

At the end of August 2022, Pellegrinelli presented the script to the participants, who sat in a circle at the table and read it. At the first reading, some doctors and nurses found the story of the drama play unclear. They expected the script not to be a collage, but rather a drama with Aristotelian units – a story set in specific locations with a clear beginning, progression, and end. This initial misunderstanding opened an interesting discussion on the meaning of the story and its narration among all participants. The director and Pellegrinelli agreed and explained how this dramaturgical collage, written according to the conventions of a contemporary type of theatre, moved towards an emotional climax unfolded by the story of the doctor's phone call above. Here, the other small stories of care for the patients flowed into the tale of direct interaction with a dying patient's relative. The telephone calls to the relatives aimed to provide information, but also to represent sharing moments. The phone call, as performed, brought a moment of intensity and meaning not only to the patient's relative but also to the doctor (Excerpt 2).

In the discussion about the play script, it emerged that empathetic sharing of the suffering thus represented a change in the vertical doctor-patient (and relatives) relationship, promoting a more human approach to communication. During the discussion, most participants agreed with the message in the text, recognising how these moments of affective intensity, empathy, and horizontality in the relationship with the patient had punctuated the entire experience of living in that period.

Since the script's presentation, the workshop's weekly meeting was dedicated to staging the dramaturgical text. On the 16th of March 2023, the drama play "Silent Days, Sleepless Nights" premiered and sold out in the main theatre in Bergamo. Three other dates were planned at some places more affected by the pandemic's peak. The period chosen for premiering the play coincided with the anniversary of the first wave of the COVID-19 pandemic.

The audience of the performances included the mayor of the city, municipal and provincial councillors, the management of the Papa Giovanni XXIII hospital, the local and national press, the colleagues and relatives of the doctors and nurses on stage, and relatives of the victims and survivors of the pandemic, and public. The premiere performance was video recorded and broadcast on local television a few weeks later. These events impacted the local community, whose media devoted much attention to the drama play and the "Time of Care" project. National television (RAI) journalists were at the premiere, and interviews with the doctors and nurses were conducted after the performance and broadcast on the main national TV news.

The event was covered by the most relevant national TV news and featured in several newspapers and magazines, including a six-page spread in the "Sette" insert of "Corriere della Sera", one of Italy's most prominent newspapers (see Figure 2).

In addition, several events were organised, including presentations and projections of the broadcast performance in public libraries, schools, and citizen centres in the Bergamo and Brescia provinces. One year after the performances, on National Commemoration Day, March 18, 2024, several teams of "Time of Care" participants spread across the city and the province to

Figure 2.
The first two pages of the article in the *Corriere della Sera*'s insert *Sette*.
Photo courtesy of Laura Lucia Parolin.

present the project, the recorded performance and answer the public's questions. Four different schools in the Bergamo province were involved, and other presentations took place during the evening of the same day in public spaces of some of the villages more affected by the pandemic.

The dissemination of the "Time of Care" is still ongoing, with several invitations from schools and municipalities to participants to share the story of healthcare professionals with COVID-19 from their perspective. In a group chat used by the participants for practical issues of the project and the theatre workshops, but also to share thoughts, reflections, and impressions of what has been experienced, a participant recently shared an episode that testifies to the meaning of their path:

> **Excerpt 3**:
> Interview room. I informed the wife of a patient that he would be hospitalized and that he was still in serious condition. The lady, heartbroken, maintained a natural composure that comes from her innate class. When I said goodbye, I chose to take off my protective mask because I felt as naked as her: we are only wrapped up in our deep emotions. I removed the mask slowly, giving solemnity to the gesture. I thought: "Will she hug me?" The lady gets up and gently brings me closer to hug me. I went out with the resident, who witnessed the whole scene. We commented that we had our beauty bath today. Thank you forever for what you have taught us in these long months. (A group chat message from one of the partecipants)

The group chat was still active when this article was revised (June 2025) and was used to share thoughts, comments, and professional experiences, as well as coordinate presentations and other social events.

Figure 3 and 4.
Photos from “Silent Days, Sleepless Nights”, courtesy of Andrea Frazzetta.

5. Discussion

The case presents an original example of self-reflection in medical practices, serving as an epistemic laboratory where knowledge is co-generated among healthcare professionals, theatre professionals, and researchers, and then shared with the general public. As highlighted in the first part of the article, COVID-19 represented a moment of rupture from usual medical practices, straining the world's health systems. The crisis created by the pandemic thus offered an opportunity for reflection and rethinking of care practices and medical knowledge. In this context, "Time of Care" created a space, an opening, an area of negotiation and meaning-making that unfolds through the artistic tools of theatre. The contamination of medical practices and knowledge with theatrical knowledge enabled health professionals to reinterpret their own experiences, discover new ways to interpret them, and communicate these insights to the city.

In the discussion, we underline two essential aspects. The first is related to how to account for creative and artistic processes at the intersection of art and science. As we have seen, the processes and practices that allow the construction of artistic facts and the controversies surrounding the epistemic claims of artistic research must be made explicit (Horst 2025). With the creation of the theatre play "Silent Days, Sleepless Nights", which emerged from collective work in the workshop, the ED professionals in Bergamo, together with their theatre coaches, created a new narrative around the events of COVID-19 and what happened in the emergency room during the pandemic (Pellegrinelli and Parolin 2025). This article provides a detailed account of how this new narrative was constructed and emerged.

We have shown how theatre and its professional knowledge functioned as a *techne*, an art of practical knowledge capable of eliciting a group's reflective and creative process on a given topic. As underlined by Gavrilov, "techne is a collection of knowledge that describes methods about how to do something theoretically or practically" (Gavrilov 2021, 114). According to Gavrilov (2021), we cannot develop or construct theoretical knowledge without understanding the processes that make it possible – such as writing, thinking, or observing – just as we cannot carry out practical actions without the theoretical understanding and methodological guidance that support them.

As can be seen from the case in question, theatrical technique functioned as a set of artistic tools that allowed emotional, affective and mnemonic content to emerge, thus building a repertoire capable of fostering a more nuanced understanding of care practice. The set of artistic tools fostered a collaborative environment where narratives and emotions, often sidelined in clinical settings, became central to the knowing process and to building a different narration (Pellegrinelli and Parolin 2025). The theatrical tools operating according to different mechanisms of representation and acting on various levels relate to the processes of self-reflection and medical knowledge production in different ways. Analysing the case, we highlight three main mechanisms: the workshop, the dramaturgical text and the performance.

The first mechanism is the theatre workshop, which can be understood as a moment (and a space) of collectively producing affectively dense, embodied knowledge related to medical practices during the pandemic. Rossiter and colleagues (2008) have not highlighted this form of artistic action. Still, it is essential to co-create knowledge through theatre in various fields. In the observed case, the theatre workshop provided professionals with a safe environment to

share personal stories and feelings about their experiences with COVID-19. It allowed the professionals to express themselves physically and affectively, immersing their bodies in memories of the pandemic. It provided a safe environment where small stories of resistance and personal episodes could finally be told and shared. It highlighted the importance of their "suffering with", empathising with patients, and family and friends, to alleviate healthcare professionals' sense of helplessness and bereavement (Excerpt 2). It provided a grid of improvisations, physical exercises, peer discussions, and embodied performances that elicited the participants' previously repressed or confused painful memories (Excerpt 1) by allowing them to revisit them. It led practitioners to recognise how their individual pain and despair were, in fact, collective and shared. Thus, the workshop constituted a moment of rethinking, negotiation, emergence and elaboration of medical knowledge and care practices during COVID-19, recognising the importance of affective and relational knowledge as an essential part of care practice.

The material emerging from the workshop formed the basis of the second mechanism: the dramaturgical text. Thanks to dramaturgical work, the text stabilized the materials emerging from the workshop within a form with specific meanings. The text connected and grouped the testimonies and improvisations thematically in a common dramaturgical narrative thread. This thread was outlined in a broad perspective, juxtaposing the emerging stories with pieces from the classical tradition and testimonies from the world outside the hospital. Furthermore, before its definition (stabilisation), the text and its meanings were negotiated with the workshop participants. During the negotiation, the playwright explained and justified her choices to the group of informants by clarifying the logic behind the juxtaposition of the different pieces and the story's focus. As Denzin (1997b) famously affirmed, any good ethnographic research account is not limited to a description of data but is always an interpretative account.

Finally, the third mechanism concerns performance as a means of knowledge communication and science dissemination (Weitkamp and Almeida 2022; Vanin et al. 2024). As shown in the case illustration section, the theatrical performance constituted a moment of sharing, communicating and disseminating the workshop's contents, which were stabilised in the theatrical text. The performance, featuring embodied stories and figurative choreography supplemented by theatrical tools (acting, music, etc.), highlighted the importance of affective knowledge and empathic communication in medical practice. The theatrical form of text-mediated restitution of the workshop content had a significant impact on the audience, as evidenced by the media coverage and numerous invitations to present the project. As a dissemination tool, the performance "Silent Days, Sleepless Nights" functioned as a research-based theatrical performance (Denzin 1997a), capitalising on the dissemination potential of theatre art and its ability to convey content through emotionally and affectively engaging the audience. Therefore, the three theatrical mechanisms (workshop, dramaturgical text and performance) were the areas to be analysed to unpack how the creation of a new narrative on COVID-19 emerged. To understand how artistic facts are constructed, it is necessary, as in science, to enter the laboratories and studios where the products are created and understand the process by which the artistic facts emerged.

The second aspect, in line with the first, is that this detailed analysis of the mechanisms of processing and constructing new content (self-reflection, knowledge construction and public narration) with theatre troubles the linear conception of science/knowledge as produced within academic venues and then communicated. The case illustrates how art (in this case,

theatre) can engage in dialogue with science, questioning its assumptions and results. According to Rogers and Halpern (2021), art in the ASTS conversation should not assume a secondary role, such as that of dissemination, but should utilise its tools to acquire a critical perspective and challenge what emerges as fact from science.

Our story illustrates how theatre can serve as an element of reflection and rethinking of practices in a ward, a scientific laboratory, or any other setting where science and its discourses are conducted. The case illustrated how a new awareness emerged among health professionals, prompting them to reflect on a more holistic model of care. The experience of doctors has highlighted the importance of attention to communication, empathy and understanding the pain of others (patients and relatives). Moreover, it gained social strength through empathic sharing with the audience who attended the performances and with all the people who participated in sharing the project. The story shared in the project group chat by one of the doctors (Excerpt 3), exemplifies the project's impact on the participants. The story tells how the doctor recognised the importance of empathising with the relative and showing his humanity when communicating bad news. The message explains the connection between theatrical and medical knowledge by describing how, in the art of theatre, beauty is not an aesthetic category linked to the harmonies of forms, but something connected to being authentic. It implies being with (and becoming with) patients or relatives without wearing the mask of scientific medical knowledge, but with compassion and humanity. As the excerpt shows, bodies, voices, gestures, and physical interactions are orchestrated in a new way to interpret the medical role differently, as a professional who is both influenced by and influences everyday encounters with suffering.

Conclusions

The article presents a case study of doctors and nurses in Bergamo who used a theatre workshop to rework their experiences, culminating in the creation of a theatre play and its performances. We describe the project as an original example of self-reflection in medical practices, functioning as an epistemic laboratory where knowledge was co-generated among healthcare professionals, theatre professionals, and researchers, and then shared with the public.

Our contribution falls within the field of Art, Science and Technology Studies (ASTS) and Medical Humanities, arguing that theatre, as *techne* (practical knowledge), not only disseminates research results but also generates self-reflection, a deeper understanding of care practices and a new narrative on the role of healthcare professionals during the pandemic.

The detailed analysis of the process, from the workshop to the performance, contributed to the ASTS by highlighting two main aspects. The first is that to account for artistic facts in the dialogue between art and science, it is necessary to enter the studios or artistic workshops where these facts are created, just as one enters scientific laboratories to understand how science is constructed. Arts, and in this case, theatre, are not the brilliant intuitions of artists, but rather processes of aesthetic construction of artistic products (Parolin and Pellegrinelli 2020a; 2020b; 2025; Pellegrinelli and Parolin 2023b). To illustrate the unpacking of an artistic fact, the article examines the primary mechanisms through which the Bergamo doctors' project developed: the workshop, dramaturgy, and performance.

The second aspect highlighted in the article concerns the relationship between art and science. In particular, we emphasise how a detailed analysis of the mechanisms involved in the development and construction of new content (self-reflection, knowledge construction and public narration) through theatre challenges the linear conception of science/knowledge as produced within academic institutions and then communicated. The case illustrates how art (in this case, theatre) can engage with science, questioning its assumptions and results, acquiring a critical perspective, and challenging what emerges as "fact" from science. The experience has brought about a new awareness among healthcare professionals, prompting them to reflect on a more holistic model of care that emphasises communication, empathy and understanding of the pain of others (patients and relatives). This awareness has gained social strength through empathetic sharing with the audience who attended the performance and with all those who participated in disseminating the project.

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Notes

[1] We use the term "artistic facts" to explicitly draw a parallel with "scientific facts". Similar to the way STS focuses on the social construction of scientific facts (Latour and Woolgar 1979), we suggest that ASTS should study the social construction of artistic facts.

[2] See www.iltempodellacura.it.

[3] The two authors of this article have been collaborating for years on topics related to theatre, organisation and STS (Parolin and Pellegrinelli 2020a; 2020b; 2025; Pellegrinelli and Parolin 2023b; 2025).

[4] See details of the playscript in Pellegrinelli 2025 (or Pellegrinelli 2024 for the original in Italian).

[5] During the lockdown social media were full of people that thought COVID-19 was a fraud. The script (Pellegrinelli 2025) includes choral scene composed of short dialogues and series of sentences on this kind: "It's one bit of fake news after another. They show these Chinese people all dressed up... but really: they were already wearing facemasks because of pollution" (p. 40); "You know, you can easily kill this virus with hot soup" (p. 41).

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Imagining, Critiquing, and Doing: An Interview with Ruha Benjamin

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Abstract

During the 10th STS Italia Conference (11-13 June 2025) at the Politecnico di Milano, Chris Hesselbein sat down for an interview with Ruha Benjamin who delivered the conference's opening keynote. This interview is not just in lieu of a transcription of her keynote speech, but serves also as an opportunity to draw out the (dis)connections between imagining, critiquing, and doing. In the interview, Benjamin also reflects on the role of emerging technologies in shaping and limiting our imagination, on the relationship between academic critique and political action and how this has shifted in STS over the past decades, and last, on the importance of solidarity as the bedrock for politically-engaged scholarship.

Keywords

imagination; inequity; emerging technologies; theory and practice; critique and action.

1. Introduction[1]

Currently the Alexander Stewart 1886 Professor of African American studies at Princeton University and Founding Director of the Ida B. Wells Just Data Lab, Ruha Benjamin is the author of four books, *Imagination: A Manifesto* (2024), *Viral Justice: How We Grow the World We Want* (2022), *Race After Technology: Abolitionist Tools for the New Jim Code* (2019a), and *People's Science: Bodies and Rights on the Stem Cell Frontier* (2013) as well as the editor of *Captivating Technology: Race, Carceral Technoscience, and Liberatory Imagination in Everyday Life* (2019b).

The organisers of the 10th STS Italia Conference were especially keen to invite Ruha Benjamin as a keynote speaker because she – besides being a prominent voice in STS – is a scholar who intervenes in issues that carry well beyond the confines of academia. Although it has become a somewhat outmoded term, Benjamin can be said to be a public intellectual in the tradition of scholars that emerged in the 1960-1970s, that is, someone who engages with the public sphere on important issues through popular platforms. This requires not just broad knowledge and an ability to translate complex ideas for different audiences and to deliver them through various media, but often also a willingness to take unpopular if not controversial

positions that might be in opposition to powerful actors and institutions. In other words, this requires taking a stance on what might be "good" or not, which is why we were delighted when she agreed to deliver a keynote speech on the topic of "technology for good". I think it's fair to say that many left the auditorium after her speech with an expanded imagination and an invigorated sense of how to deliver an academic talk as well as what this can instil in an audience.

Some of the recent work in which Ruha Benjamin is involved can be found in the output of the Ida B. Wells Just Data Lab, which brings together students, educators, activists, and artists to develop a critical and creative approach to rethinking and retooling the relationship between power and technology as well as data and justice. A particularly actual and poignant project is *The Phoenix of Gaza*, a documentary film with footage of Gaza shot right before the start of its destruction by Israel in late 2023, which now serves as a last record and archive of everyday life in the currently-occupied enclave. In her most recent speaking and writing, Benjamin has underscored the importance of imagination for developing fairer and more progressive technoscientific futures. My questions in this interview seek to explore the various uses and limits of imagination, particularly among academics in the humanities and social sciences, as well as how the structures we inhabit shape or limit our creativity and courage. I hope you enjoy reading the interview as much as I enjoyed speaking with Professor Benjamin during a warm summer afternoon in Milan last June.

◆

CH: *So, I'm wondering a bit about the term imagination, and especially if there is a crisis of imagination. Across various fields of research or professional practice, there have been worries, even fears maybe, that we're failing to go beyond the present. Designers and architects lament that we don't have new things. A lot of cultural production and consumption seems to harken back to a nostalgic past, and music is sometimes said to produce not much new. The past is treated as a source of future possibilities rather than the present. And this seems kind of ironic. Mark Fisher (2009), the British writer and cultural critic, likes to quote the following, "it's easier to imagine the end of the world than the end of capitalism"[2]. And this strikes me as quite true. And Fisher also commented on music a lot, precisely for this reason. So, are we in a crisis of imagination?*

RB: Yes, I think we are in a crisis of imagination if we presume that imagination is always future-oriented and always liberatory. If we infuse that term only with possibility then perhaps we might come to the conclusion that we're in a crisis. But one of the things that I was exploring in the book, *Imagination: A Manifesto* (2024) is how imagination falls along a wide spectrum, from more deadly eugenic forms of imagination to more liberatory, justice-oriented forms. And I think, when we look at the kinds of eugenic imagination that infect so many of our institutions, so many of our policies and even our interactions, interpersonally, that we can see that those kinds of deadly imaginaries are proliferating. Those kinds of imagination don't seem to be in crisis.

The other kind of orientation to imagination, which might lead to a different conclusion, is found in our historical imagination. When we look for possibility, I think it's not enough simply to turn towards a kind of future world-building, but to also think about the kinds of

imagination that we've inherited, that we've forgotten, that get buried, that are sometimes considered backwards and primitive even. And part of what the book is trying to do is to also get us to expand our historical imagination. To identify what we don't want to continue, but also to embolden us to do things that might be considered as far-fetched or impossible. And I do think, again, to go back to the question, that there is a line of thinking that might lead to an affirmative response, that we're in a crisis. But I also think that we can see all kinds of deadly fantasies that seem to be proliferating.

CH: *I guess the term crisis is also a bit loaded.*

RB: Exactly.

CH: *And it allows all sorts of extreme measures to be put in place. And that is something to watch out for. I like what you said also because it reminded me of a mantra often repeated in STS, "It could have been otherwise". And this takes us back historically. It's a fundamental insight into how different choices actually could have been made. And it is deceptively simple, but still an elegant way of reminding us that things are not set in stone.*

RB: Exactly. It's really a touchstone for me. To constantly have that vigilance about questioning what's sold to us as inevitable.

CH: *On that note. In your writing and speaking – and especially across your last three books, and of course your public talks, the many public talks you have given in the last few years – there is a distinctly forward-looking, future-oriented, and even positive or hopeful sort of message. But juxtaposed with a really devastating critique of existing inequalities and injustices. Critique comes naturally to academics. We thrive on this. We think it's very insightful. But hope is not at all fashionable. I suspect that this might be out of fear of being seen as naive or unscholarly, even that there's something...*

RB: Unsophisticated.

CH: *Yeah. And you've also called attention to organizations that employ or appropriate new technologies for the achievement of social justice. Now that's a much more constructively-oriented endeavour. Your Ida B. Wells Just Data Lab[3] is, of course, a prominent example of this, and there are several others. But for many academics, this combination of theory and critique with constructive action seems unintuitive or maybe just unimaginable. Do you have any thoughts on why this might be the case? Or on what constrains us in our scholarship in this way?*

RB: I think there could be many factors, but you've certainly put your finger on a kind of very deliberate shift in orientation that I started to make about 6 or 7 years ago around the time that *Race After Technology* (Benjamin 2019a) and *Captivating Technology* (Benjamin 2019b) were published. Part of it is that we know that this is not simply just about our individual orientation, but also about who we're around and how the context around us shapes how we think and what we think. And for me one of the big factors was actually reorienting

myself – in terms of my interlocutors, my collaborators or even audience – away from academia and toward people, organizations, movements that were actually taking the ideas that we elaborate in academia and giving them legs in a way, trying to put them into practice and trying to materialize alternatives. The more I situated at least one foot outside of the academy and inside social movements, that began to shape not just my writing but also the ideas that I thought would be useful and generative.

In fact, I get surprised when people assign my work in their classes, because that wasn't my initial audience, you know. So when people say, "I read this in my class" or "I'm going to cite this", I think "Really!?". I always feel a lot of gratitude when I hear this, but it always surprises me that people are taking my work up in contexts that I didn't initially see as my primary contribution, to syllabi and scholarly literature. I was writing more in conversation with organizations that I talk about in *Viral Justice* (Benjamin 2022) or that I've partnered with through my lab, thinking about what kind of conceptual tools would be useful to name the realities that people are living through, the experiences that they're having, giving a language to shine a light on things so that we can do something about it. For example, the "New Jim Code"[4] being a kind of conceptual lens that is naming a set of tech-mediated harms and injustices that young people, for example, might be experiencing in terms of surveillance in their schools and their neighbourhoods. Putting a name to it is a first step to mobilizing, so that we can do something about it, whether to protest, to pass laws, to build counter-imaginaries around these issues. And so, yes, I think there's an opening where more scholars are thinking along these lines, are realising that peer review is not the only kind of thing that we have to orient ourselves around, or perhaps also expanding who we think of as our peers.

CH: *Yeah, it's such an obviously important thing. And most major STS conferences now have Making and Doing sessions, for example, which seems to indicate an increasing orientation towards not just conventional scholarship in that sense. But I'm surprised to hear that you're surprised that people assign your work! Because I also assign chapters from Race After Technology. It's super accessible, especially for my students who do not have a background in the social sciences or humanities. They're mostly engineers. And they often like the book a lot as well, they find it easier to talk about it and so on.*

Speaking of breaking out of conventional scholarship or bridging the activist-scholarship divide, I'm also wondering about something. On the one hand, it feels almost like a lack of confidence that academics might have, or perhaps you could also say bravery, to defy our own disciplinary conventions, even though STS is probably more promiscuous than most perhaps more standard or older disciplines. But on the other hand, it's also a lack of creativity right? I think we worry about whether researching, thinking, and writing can really at the same time be combined with making and doing. Writing is a form of doing, one could say, but to write beautifully is another sort of challenge. But your writing feels to me like you make a conscious effort to not write in the standard academic manner, is that right?

RB: Yes, absolutely. When I was an undergrad student I studied sociology and anthropology but my minor was creative writing. So that was always in the background. Writing is something that I loved and appreciated, the beauty of language, the provocations, the poetics.

But during my grad school training that kind of pleasure was snuffed out. It was an orientation towards language that felt very insular. It wasn't about inviting people into conversations, it was about gatekeeping. It seemed more about speaking in a manner that all the insiders understand. I still think that there's a place for that, so I don't want to pit this as an either/or between specialized and accessible language. I will just say that I make a conscious effort to write and speak in a way that invites more people into the conversation. People who might not have the degrees, or academic training in a particular field, etcetera. And so, it's more a question of what we're using the language for, and who we see as our main audiences and interlocutors that then has an impact on how we go about doing it. So, I don't want the takeaway to be that it's a battle between arcane and accessible language. Context and purpose matter.

CH: *Of course. Well, it felt very real what you said about grad school. It's not that long ago for me. I also remember this. I don't think I'm a good writer or somebody who enjoys writing. But I'm very happy when I've written! I guess that's one of the clichés they say about writing. But I remember even losing the pleasure of reading in graduate school. I found it difficult to just read for fun. To read to relax.*

RB: Totally. I did not enjoy writing in that way in grad school. And so part of my approach to writing now is to consider that whatever I want people to experience as a reader of my work, I want to feel as I'm writing. If I want someone to enjoy it, I want to enjoy writing it. I think of it as contagious, and so that's part of what motivates me. I can't expect you to enjoy it as a reader if I feel like I'm pulling my teeth out as I write.

CH: *Yeah, you can tell! Did the writer enjoy writing this or not? It's very familiar, unfortunately. Well, so, moving from writing to stories. In your keynote, you talked about two predominant stories about technology. One is a doomer narrative that comes out of Hollywood, and the other a boomer narrative that comes out of Silicon Valley. And sometimes, of course, they overlap. They're both utopian as well as dystopian and present technology as inevitable and inexorable: this technology has to happen, it's going to happen. You didn't underline this in your talk yesterday, but you could say that these stories are conveyed through different media. One is cinema or film and the other is a social media narrative. Much of our cultural imagination is, of course, shaped through news and popular media. And much of the work of shaping these narratives now happens on social media platforms. These are operated by Big Tech companies. And we know that marginalised communities do manage to sort of carve out places in these spaces and find each other. But I'm nonetheless wondering what your thoughts are about the imaginaries emerging there. And how much does it matter that this is happening on these platforms specifically?*

RB: It's really a thicket in terms of what the possibilities and the downsides and the harms are. I definitely think it's not a deterministic story, that the platforms are created and therefore they always and forever have these impacts or outcomes, because as you remind us, there's all kinds of ways that people appropriate and use these tools. One book that gets into this is *#HashtagActivism*, which shows how marginalized groups, long excluded from elite media spaces, have used hashtags to put forth counternarratives, pre-empt political spin, and

build networks of dissent. And I've written a little bit about that in *Viral Justice* where Black creators pushed back against how their content was being used. Even still, I think that we're always going to hit up against certain walls where, for example, people get shadow banned, certain words and ideas are censored. But then again, people find ways to play with language, spelling, and memes to trip up the algorithms and communicate by all means available.

So it's a constant tug of war between top-down kinds of surveillance and censorship and people's creative responses. Part of this is a question of short- or long-term processes, and I think that in the long run, the goal should be to move completely away from these commercial platforms. I had a chance to meet one of the founders of the Platform Cooperativism Consortium[5] a few days ago in Brooklyn. And hundreds of different projects have emerged out of that. I think that opens up different possibilities for what worker-owned or cooperativist decision-making could look like as well as the sharing of profit and so on. So I'm more oriented towards investing in that, rather than always being in a reactive mode. And that's just one example for us to learn from and build on.

Another thing that I've written about as a prototype for thinking about what it would look like to create digital public spaces that are encoded with different values, is Breonna's Garden. This project grew out of tragedy when, in 2020, Breonna Taylor was murdered by police. And so a group of artists, technologists, and designers collaborated with her family and her sister, Ju'Niyah Palmer, to create an app and a virtual and augmented reality experience that they describe as a place to express and share grief but also organize in different ways towards justice. It's like a seed of a project that shows how things can unfold if the process is different in terms of who is designing and what values are shaping it.

CH: *Yes, I very much remember the Virtual Reality (VR) example, especially because it's also, in a way, surprising. I mean, we think of a lot of the VR stuff as completely co-opted by Meta and Zuckerberg, of course. And the whole metaverse discourse is of course very totalizing. And actually, this brings me very nicely to my next question, which is, when talking about imagining different worlds, how do we bring this in relation to how Big Tech companies engage in future-making? Because they also present us with imaginaries. They use much the same rhetoric and language actually.*

RB: Exactly. Exactly.

CH: *They make it sound great in many ways. But they are actually in such a strong position to shape our imagination. And so, if imagination is an antidote to or a way of making strange what is taken for granted or seen as normal, how exactly does imagination denaturalize such dominant narratives? It is sort of self-evident, of course. Thinking differently allows one to do different things, but how does it maybe also denaturalize what is presented to us as natural by very dominant companies?*

RB: That's an interesting question. Part of what I'm hoping to achieve by championing imagination is that I want us to think more and more about what we want to make *unimaginable* as well. It's not just imagination as a straightforward good, but there are certain possibilities,

ways of organizing life, that I think should be unimaginable. Even if we think about the most obvious, such as genocide and ethnic cleansing as the most extreme examples, but even things that get naturalized all the time, like homelessness or paying for health care. Things that are just so normal we don't even think about. It's just part of the air. Everyday forms of slow violence that should be unimaginable. And I think the mundane forms of harm can get lost when all of the attention, the hype and doom, is focused on Artificial Intelligence (AI). Before AI was on the scene, there were all kinds of analogue threats to people living good and meaningful lives, threats which are perhaps being amplified by emerging technologies.

CH: *Yeah, AI is fascinating in the way it has sucked in so much of our energy, both positive and negative, and is also used as such an umbrella term. But all of this also always seeks to underscore its power, right? That it is something intelligent and it will seek to dominate us. It's not at all obvious to me, actually. And it reminds me also, speaking of the Big Tech platforms, the social media platforms, the way data about us is collected. There were these claims being made, and Zuboff's Surveillance Capitalism also talks about this, about how Facebook has 200 or 2000 of your likes, and then they supposedly know us better than our partner does or our parent does or even ourselves. Better than we know ourselves, which is such a claim to make. It's a lot of data for sure, but just to say that...*

RB: It knows us.

CH: *That it knows us better than our most intimate friends and family or partners seems ridiculous to me actually. Of course, not to say it's okay to have so much data. It does say a lot about us, but it's a very specific slice of us and I think we almost grant them too much power. And I find this kind of worrisome.*

RB: Agreed. I think we have to be able to critique and name things without granting them too much. When we name something, we give it power. And so that's why I've become such an evangelist for naming the alternatives. As much as we're trying to critique platform capitalism, the New Jim Code, the algorithms of oppression, etcetera, what do we want instead?

CH: *So speaking of technologies and emerging technologies. Something I find quite interesting is that, even though the supposed neutrality of technology has long been contested within STS, over the four to five decades since the field emerged it has nonetheless shifted from what were sometimes described as politically "neutral" approaches – I'm thinking of the symmetry principle, Sociology of Scientific Knowledge, the Strong Programme, and the recurring debates about how relativist we are – toward a more explicit critique of research agendas, technological developments, and narratives of innovation. And of course, AI is maybe the prime example of this, or at least the most recent one. But there's also a bit of a tension there. And I wondered how you grapple with the tension between this social constructivist approach that seeks to examine ongoing practices and negotiations and so on, with the much more critical and activist approach that really seeks to intervene earlier, much more forcefully in techno-scientific developments.*

RB: This is hard. I don't quite know how to diagnose the shift or why that sort of tension persists. I think one factor may be the kinds of people with different experiences and backgrounds that get drawn into the field. If we look at who is behind the papers, the books, etcetera, perhaps the demographics are shifting, becoming more representative of the wide array of human experience. And where you're coming from, say, an Indigenous community in South America, and you see what mining has done to your community. And so you're not going to study mining from a purely neutral "both sides" or detached perspective. And taking situated knowledge seriously, the luxury of holding everything at arm's length says something about what your own life experience has been up to the point of becoming a student of or a scholar of a particular industry or scientific field. So that's perhaps one factor.

The other thing is, just in terms of public awareness about tech-mediated harms, I experienced in my short career a very palpable shift. From the time I started writing *Race After Technology* in 2016 to the time when it was published in 2019, in those few years so much happened that many more people were aware of, whether it was Cambridge Analytica or Trump's election and Facebook's role in that, or the Snowden files. When I started writing, I thought, when I publish this critique of emerging technologies, I'm going to have to really convince people that technology is not neutral and we have a responsibility to question everything about it. But things shifted so fast, that by the time the book came out, most people came to the conversation with a sense of "Yeah, yeah, we get it! But now what do we do about it?". The everyday awareness about tech-mediated harms had grown, what some have called a "techlash", that is, backlash against Big Tech. So people came to the book wanting something more actionable. "Okay, you're telling us what we know. You're giving us language. Thanks. But now what?". And so that pushed me with the next two books to address that question even more, because I found people didn't need as much handholding when it comes to what we would call "opening the black box". They were saying, "We're living in the black box. We get it. Now how do we get out?".

CH: *Especially the students. They're very aware. Yeah. It's often crystal clear to them.*

RB: Even those coming from computer science! So it's not even just a humanities thing. Many times the computer science students will be even more aware, because they've been inside of it, so they come to it with a sense of like, okay, what do we do?

CH: *I very much recognize this, and I'm somewhat surprised by this among my Master's students and PhD students, and particularly, as you said, the computer science students and engineers. But then I also wonder about something else, to follow up on the previous question, about the shift in STS as a field. I get the impression that some people think that the technology has also changed and I wonder about the nature of technology in that sense. And of course, if we're thinking about the 1970s, we can think of nuclear energy, for example, or biotech that's then coming up and concerns about the first sort of genomic interventions and so on. And then there was the 1990-2000s, GMOs and nanotechnology and so on. And yet, it's this sort of, I don't want to say crisis again, but the sort of sense of crisis maybe, at least around, what one could call connected technologies, artificial intelligence, algorithms. And the terms have also shifted over time. But there seems to be this sense that a qualitative shift has happened in the technology. Is that true?*

RB: Hmm. I like how...

CH: *Because I was trained as a historian originally...*

RB: I know, so you're like, "No, there's continuity!".

CH: *I guess I'm just sceptical of the claim that it's necessarily new.*

RB: I like how you put it – a *sense* of it being new – because I think that's even more important than whether, objectively or empirically, it is. Even if it's not, if there's a sense of it, that has its own effects, right? So I like that way of framing it, because it's a reminder that subjective experience has power on its own. And so, part of this is what you were describing, the social media, the data collection, and the fact that we are a part, an essential part of these technologies. It's not just something happening in a lab, far removed from us, with downstream effects. We are a part of it. And perhaps it's that more close-up, intimate experience that raises the awareness. One of the shorthands I often use is "what we have access to has access to us". The idea that if we're all users, then we get used. I think there's now a much more palpable sense that we are being used even as we're getting access to all these conveniences. That creates an opening for people to have their critique grow out of firsthand experience. You don't have to read a paper about nanotech or genomics or rely on scholars or journalists to tell you X, Y, or Z is happening. Instead, you are seeing firsthand how the algorithm manipulates you. That kind of experience might be more galvanizing, or at least it's what we experience in the classroom. Students coming in already having started forming a critique.

CH: *That's a powerful reminder actually. Everyone already knows this on some level, but that you as data build the technology is a crucial thing to remember. Although it does also feel a bit impotent or powerless. I mean, you have the awareness, but then what? This also makes me think about terminology. I've had this two- or three-year, maybe longer, frustration with some of the terms we use in STS, which are often the same terms as those used by tech companies. You mentioned the word user, and you nicely drew out how "using" also means "being used", but nonetheless our conceptual vocabulary often mirrors that of the industry. And it's very easily co-opted. And this also reminds us again – I'm not necessarily arguing for constantly coining neologisms, which can be an annoying academic habit – that sometimes even our own words and concepts need to be denaturalized. And this is one of the most difficult things I guess, especially as an early-career scholar, because who are you to propose new terms? But I find this quite an important issue.*

RB: Absolutely.

CH: *I really liked what you said about AI, people, and companies, and how it reminds us that we're part of this. And maybe that's part of why we're so preoccupied with these "new" technologies. But what about the change in business practices? Is there something more structural, in terms of how these companies operate or are able to exert power? I'm wondering if you*

have any thoughts on how that might have shifted over the past fifty years or so? And that STS has not only changed because generational changes have happened or because the field has become more diverse, also in terms of disciplines and people, or the technology that has changed, but maybe more because the world has also changed?

RB: Yeah, absolutely. I wouldn't describe it, again, necessarily as "new" but as intensified. The experience is much more intense in terms of how we are the product. And the idea of attention, our attention, being such an important determinant of whether any new technology is successful. That it holds our attention, that it's constantly drawing our attention, and how that then has these ripple effects on so many other aspects of our lives. The things that we're not doing because we're scrolling.

CH: *Or imagining.*

RB: Exactly! So the idea that then we're living inside their imagination of what we should be doing. And I think that – "infect" is my go-to word – is important just to make clear the normative dimensions of how it infects all areas of our life. If we think about just the last year and a half, how the rolling out of generative AI has completely thrown education into a free-for-all in terms of people who could have spent probably their whole lives not caring about AI who are now forced to deal with it on some level. And hearing about people retiring because they just don't want to or can't deal with this. I think that's one example where we can see how it's not simply about you choosing to buy a product or not. This thing is now completely shifting the expectations, the norms, the interactions in your profession, whether or not you've chosen it or not. I think we're seeing this infection, more people becoming aware of it even if we don't know what to do at this moment.

CH: *Yeah. I've also been surprised by the way I've seen colleagues take up generative AI. And I must say also seeing it appear in my students' work, of course. Well, I should also admit I'm sort of a slow person. I would say I'm not that fast in forming an opinion about things, which is sometimes embarrassing but also sometimes maybe healthy. I'm also not quick to take up things such as ChatGPT. I briefly played around with it a bit but was really bored. I found it fundamentally uninteresting. Impressive what it could do in many ways, but also completely baffling. Why would I want something else to write for me? Not that I enjoy writing so much, like I said earlier, but I nonetheless value it because it forces you to iron out your own thoughts and so on. And I just didn't care that much about ChatGPT in that sense.*

But now I am also wondering about the art of asking questions. I guess they're called prompts, in terms of interacting with a chatbot, but I wonder if in doing that there is also a kind of creative act. In some ways this forces you to interpret the interface and the technology in order to be able to work with it. And I've come to realize that some of my students also seem to treat it like that. And perhaps it's closer to a search engine, and that it's maybe not quite taking away as much creativity and thinking from students as I assumed. It's not really a question to ask of you specifically, I got sidetracked, but maybe you have some thoughts.

RB: No, I appreciate those reflections, but I think you're right. The whole idea of an entirely new field or capacity of prompt engineering, the art of asking questions. Then it becomes what we do with the responses, or whether we take the responses to be facts or do we understand that there is fabrication on that end too. I think we're just in the early days, and so I understand people's strong reactions, but it's worth thinking specifically about the point that it's not simply the technology that we need to be concerned about but also the entire ecology in which it operates. Even if, let's say, students are being creative in their question asking, if the responses are predicated on the theft of the work of writers in terms of the copyrighted books that are used to train it, or the theft of the work of artists, all that has to be part of the frame of our assessment. And even if it still requires some creativity on our part to elicit those responses, what's happening on the backend in terms of the training and the development of those models? I always want us to go backstage and think about the bigger picture.

CH: *Yeah, that's absolutely fundamental, also the environmental backstory as well is important to remember.*

I have one final question for you, but it's a big one and perhaps also the most personal one. You've not shied away from taking strong positions on what some might call controversial, or what I would call pressing topics, such as genocide in Gaza, for example, or on some of the limitations of certain versions of identity politics. And you have done so in a very public manner. There is a, to me, terrifying public dimension to this. I'm quite an introverted person myself. But an example would be the convocation speech you gave at your alma mater, I believe, Spelman College in 2024, which went viral on social media[6]. These sorts of public acts are often portrayed as courageous and brave, one of the keynote discussants yesterday called it "resilient". Some of this language sits quite uncomfortably with me, because it almost suggests that it's just something that happens, that is extraordinary to speak out. And to some extent it is extraordinary, but also it shouldn't be. And this pattern of being outspoken, there's a long tradition of this of course. I mentioned Toni Morrison and Edward Said in my email to you before, how they very much tried to speak truth to power. Being a public intellectual of this kind involves a certain level of, well, risk, essentially. This can be professional, it can be personal, and it can have legal repercussions. We see this increasingly in Europe, for example, but also in the US we're seeing huge changes in this regard. In the case of genocide, this topic has been taken up by students first and foremost – not just in the US but also in Europe and especially here in Italy – rather than tenured faculty. Here at the Politecnico di Milano, yesterday, some tenured faculty have finally started saying something. And this is 18 months after students started speaking up. What are your thoughts on this apparent retreat into conservatism and self-preservation that afflicts so many academics?

RB: I agree. That is a huge, huge question. There are so many things that come to mind. For example, the Spelman convocation speech, I wrote it very quickly over the weekend, right before the day. I had no idea that it was going to hit a nerve. And even now I'm still surprised. If I knew that it was going to circulate so widely, I would have put more time into it! I would have given it a little more thought!

Another part of it is that I don't think I've ever stopped being a student. When I, for example, was applying to graduate school, my professors were really surprised that I wanted

to get a PhD because I was always a troublemaker. I was always much more on the activist side than the scholar side of the hyphen. And so, even now, with my own students, I feel a kinship with them and I feel constantly emboldened by them. In almost every historical rupture and movement, we've seen students in the vanguard. In terms of the civil rights movement, I've heard stories of civil rights activists, who when they were young, their parents were very opposed to them doing things even though they too would ultimately benefit in terms of laws changing and so on. The parents and the adults around them were always more conservative. That's a long-standing thing. They say, "Don't take the risks, protect yourself, think of your career". That dynamic is pretty predictable. So in the context of the university, I identify much more with the students than the administrators. When it came time, for example, for my students to take risks, they knew they could come to me. And it was a no brainer. And I was put on probation for supporting them.

But on the topic of courage, going back to the bigger question, I don't think courage is simply an individual attribute. Whether we are able to be courageous or not or take risks or not, I think a lot of this has to do with what our support system is and whether we think people have our backs or not. So, for example, before I stepped into that role of walking into a building occupation with the students, I contacted trusted people to say "Okay, if I get fired, can I come work there for a year while I figure things out?". We need to know that people have our back. Taking risks is not a commentary on our individual virtue but on whether we are supporting each other, catching each other when we step over the ledge.

CH: *Yeah. That's such a beautiful way of putting it. A very human way also. Because besides the individual, we very much would like to get away from this being an attribute of only certain specific groups or people. This "Oh they are more activist" or "They are more courageous". Because it's also about solidarity across these groups.*

RB: Exaaactly.

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Notes

[1] The interview transcript below has been lightly edited for clarity and readability.

[2] This quote is from Fredric Jameson's 2003 article *Future City* published in the New Left Review:

> Someone once said that it is easier to imagine the end of the world than to imagine the end of capitalism. We can now revise that and witness the attempt to imagine capitalism by way of imagining the end of the world.

[3] Housed in Princeton University's Department of African American Studies, the IDA B. WELLS Just Data Lab brings together students, educators, activists, and artists to develop a critical and creative approach to how data are conceived, produced, and circulated. The lab seeks to rethink and retool the relationship between stories and statistics, power and technology, data and justice.

[4] The "New Jim Code", coined by Ruha Benjamin, names how ostensibly neutral algorithms and data systems automate racial inequality, thus renewing Jim Crow-style control under a veneer of objectivity.

[5] Platform Cooperativism Consortium (PCC) is a network that promotes the development of digital platforms based on cooperative principles – worker- and user-ownership, democratic governance, and shared value – offering an alternative to extractive "platform capitalism".

[6] The full convocation speech can be viewed here: https://www.youtube.com/watch?v=j_12_E3LAeg.

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Technology and Labour for "Good"

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Abstract

Inspired by the "labour for good" roundtable at the 10th STS Italia Conference, this *Crossing Boundaries* section brings together leading scholars on the relationship between technology and labour, with a focus on the role of digital platforms in shaping the negotiation dynamics, the forms of resistance, and even the very redefinition of labour and work practices, beside the power relationship between platforms and workers. This section aims also to provide a forum for STS to engage with and open up to kindred currents and fields of research such as labour studies, political economy and cultural studies, thereby fostering a cross-fertilization of frameworks and empirical results to better understand what and how we, as scholars and researchers, can mobilize STS for the "good" of workers and labour institutions, within but especially beyond the thresholds of academia.

Keywords

labour; technology; platforms; STS; labour studies; cultural studies.

Navigating Platform Labour through STS and Kindred Currents

Paolo Bory, Francesco Bonifacio

Science and Technology Studies have been leading important theoretical and empirical reflection on how digitalization processes have reshaped the organization of social life as well as the production and circulation of scientific knowledge. Despite this widespread interest, however, the STS voice has remained surprisingly marginal within the field of digital labour. This marginality mirrors, at least in part, a long-standing lack of sustained engagement with work-related issues. Indeed, as pointed out by Attila Bruni in this journal, while work has historically been "at the core of STS", it has "progressively dropped out [...] from the STS debate" (Bruni 2024, 9).

Quite ironically, questions about work have lost their centrality within STS at a historical moment when technologies have gained increasing visibility – and popularity – among labour scholars.

Building on these considerations, the latest STS Italia Conference has convened in a roundtable some of the most influential voices in the debate on digital labour, with the aim of building conceptual and empirical bridges between STS and adjacent fields, such as labour studies, digital sociology and cultural studies. In line with the conference's overarching theme, *Technoscience for good*, the roundtable was conceived as a collective reflection on the meaning of *good* in relation to the intricate entanglements of labour and digital technologies. Recasting this intent into an interrogative form, the guiding question that animated the discussion can be articulated as follows: *What does it mean to speak of "Technology for good" when the infrastructures that mediate work processes are contested objects, simultaneously celebrated as enablers of participation and condemned as new instruments of exploitation?*

Among the wide array of digital technologies currently reshaping the organisation of work – from artificial intelligence to robotics – the roundtable turned its attention to digital labour platforms. Platforms, in fact, are a pivotal example of contested socio-technical innovations. Initially celebrated as a "future of work" grounded in ideals of sharing and collaboration, they are now seen as the main expression of digital capitalism, driving new forms of value extraction, labour exploitation, and precarity. At the same time, it is almost impossible to comprehensively address the relationship between labour and technology without mentioning platforms. In the last two decades, they have become the most relevant infrastructures mediating not only communication practices but also the labour market and how workers, companies, and even regulatory institutions negotiate and exercise different forms of power (Plantin et al. 2018).

The three contributions that animated the roundtable addressed this issue from a shared perspective: rather than focusing on technologies *per se*, they examine how digital platforms acquire meaning and become arenas of negotiation and contestation through their enactment in situated contexts. This focus on actors and on processes carries both theoretical and political implications that resonate with some of the core tenets of STS. First, it requires abandoning the assumption that technologies possess an intrinsic or universal meaning, and instead recognising their fundamentally relational nature. This perspective foregrounds the interpretative flexibility inherent in any technological artefact (Pinch and Bijker 1984), opening up space for agency, negotiation and resistance. At the same time, it invites caution against assuming the outcomes of these processes as necessarily oriented toward any abstract or predefined notion of what is considered *good*. From a political standpoint, this means questioning the normative assumptions that scholars themselves may bring to the analysis of technological practices, and acknowledging the plurality of situated interpretations through which technologies acquire meaning(s) and value(s).

This tension is central to Kylie Jarrett's contribution, which challenges the universal claim according to which digital platforms have led to a generalised deterioration of working conditions. Jarrett shows that such claims rest upon a historically and geographically situated conception of "good work" – one that is deeply rooted in the industrial capitalist traditions of the Western world – and cannot be extended to the plurality of social identities and positions that coexist within the so-called platform economy. The very economic theories underpinning these claims, she observes, are themselves embedded in Western epistemic and institutional

frameworks. Evaluating whether digital labour can be considered a form of "bad" or "good work" thus requires closer attention to workers' identities and to the plurality of conditions shaping the experience of digitally mediated labour. Drawing on a wide range of studies, Jarrett seeks to "identify very specific sets of labour relations that govern whether or not platform work is experienced as, or can be interpreted as, good work". Her analysis, for instance, points to how platforms may broaden the employment landscape for certain social groups, such as undocumented migrants, or how the discourse of entrepreneurialism – often mobilised critically to describe the subjectification processes engendered by digital platforms – may take on different meanings when considered from the standpoint of workers themselves. Taken together, these reflections invite a critical problematization of normative assumptions regarding what counts as good or bad work in relation to digital platforms. More precisely, they highlight that the meaning of *good* is neither singular nor universally shared but rather co-constructed within historically and socially situated contexts.

This attention to the plurality of perspectives and to the situatedness of normative categories also informs Karen Gregory's contribution, which focuses on the method of *worker inquiry*, grounded in *operaismo* and feminist thinking, as a tool of emancipation. In the context of digital labour platforms, where employment relations remain insufficiently regulated due to the juridical misclassification of workers as independent contractors, and where algorithmic systems often operate beyond existing regulatory frameworks, Gregory argues that such a method acquires renewed urgency. Here, the co-construction of knowledge becomes an explicitly political practice, which marks what we may call an *alliance for good* between workers and researchers. Also in this case, however, this alliance does not rest upon any predetermined understanding of "good technology" or "good work". Instead, it arises from the recognition of workers' capacity to "take up the tools of research" in order to "document their own conditions, invert the gaze of platform metrics, and produce [...] data collected to contest dominant institutions and ideologies". Gregory's discussion carries important ethical and theoretical implications, which resonates with long-standing concerns in STS scholarship on the co-production of techno-scientific innovations (Arnaldi et al. 2023). Much like practices of public engagement or participatory design, the cases examined by Gregory foreground the situated knowledges and lived experiences of those traditionally excluded from innovation and decision-making processes. At the same time, the method of *inquiry* challenges extractive models of academic research – where data are gathered from workers, processed within universities, and circulated through inaccessible venues – by assuming co-production and reciprocity as defining dimensions of what may count as "good" research. Finally, the contested nature of digital platforms is explored in the contribution by Tiziano Bonini and Emiliano Treré, who call for a dialogue between STS and Cultural Studies to investigate the moral dimension of digital platforms. In this context, too, the interpretative flexibility of technologies constitutes the basic condition for the emergence of micro-resistance practices, which, as the authors show, can also acquire a collective dimension. Platforms are recognised as sites of contested meanings where material configurations intersect with social norms and imaginaries. While the material features of platforms delimit users' possible interactions within a set of constraints, these constraints can be tactically reinterpreted and transformed into cooperative affordances that subvert their underlying logics. The originality of Bonini and Treré's

account lies in how they frame such practices not as mere acts of technical workarounds that "de-script" (Akrich 1992) the courses of action inscribed in the platform. Rather, they propose an alternative moral order in tension with the competitive, quantified, and performative logics that underpin digital platforms. In doing so, their work illuminates how processes of technological appropriation can instantiate alternative visions of what counts as *good* in relation to work and technologies, thereby making visible the political stakes that emerge through situated practices that negotiate the platforms' normative logics. Moreover, Bonini and Treré offer a compelling example of how bridging different intellectual traditions can enrich our understanding of socio-technical phenomena, revealing that, despite using differing terminologies, they often share profound conceptual affinities.

Beyond the usual normative principles of value-freedom and symmetry, the current historical context – whether concerning digital labour or other sensitive fields such as digital warfare or digital health – demands STS to get their hands dirtier and to share their empirical and intellectual foundations with other fields and experiences. This openness and porosity have always been a key feature of STS scholarship. Keeping and implementing this exchange means also to take new risks, leading almost inevitably to a series of mistakes, missteps and misinterpretations across disciplines and their respective boundaries. But in pursuit of what the STS community recognizes as "good technoscience", and if we want to navigate together platform labour for the good of workers and institutions, STS have the responsibility to provide their ship to everyone. In brief, in mixing concepts and epistemologies, empirical practices, and research methodologies, the great challenge for STS is not so much losing the command of the boat, but rather navigating together and following the "good", or at least the "best" route.

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From Algorithms to AI: Why Worker Inquiry Matters

Karen Gregory

1. Solidarity

The central focus of this article is digital labour and the significance of workers' inquiry for improving working conditions in the platform economy. However, I would like to begin with an expression of solidarity toward scholars, educators, and students worldwide who are working under increasingly hostile conditions. Higher education is not an island of privilege, separate from the broader currents of political economy and power. Rather, universities themselves have become contested terrains. Across the globe, critical social science is under sustained attack. Authoritarian governments threaten academic freedom, neoliberal university management deepens precarity among staff and students alike, and research that challenges dominant economic and technological interests is systematically defunded or delegitimised (Giroux 2020). The rise of digital surveillance within universities, the use of data-driven monitoring of academic work, and the outsourcing of core university services to private technology vendors further demonstrate how higher education is being drawn into the same dynamics of privatisation, risk-shifting, and algorithmic governance that are transforming other sectors of society.

These attacks on higher education are not disconnected from the transformations we observe in the world of digital labour. The structural pressures are parallel: both involve the erosion of public institutions, the prioritisation of private profit over public good, and the delegitimisation of critical inquiry and worker knowledge. In this sense, the precarity faced by delivery workers on the streets of Edinburgh or London resonates with the precarity faced by early-career researchers on short-term contracts in universities. Both groups are navigating a world in which risk has been systematically redistributed downwards, and both face the challenge of working under opaque systems that measure, monitor, and evaluate their performance through digital platforms.

Digital technology companies, and particularly large platforms, play a central role in this wider political economy. Companies such as Uber, Deliveroo, Amazon, and Just Eat have not only reshaped the labour process in specific industries but also forged deep alliances with states. Platform corporations lobby aggressively against regulation, deploy sophisticated public relations campaigns that promote the rhetoric of "innovation" and "flexibility", and experiment with forms of algorithmic management that push the boundaries of legality (Srnicek 2017). At the same time, states often turn to these corporations for logistical and technological capacity (Wells et al. 2023).

The entanglement between platforms and states, therefore, requires us to think critically about the nature of power in the digital age. If platforms serve as both infrastructural providers and employers, they also act as regulators of everyday life, designing the conditions under which millions of people work and interact. These are not neutral tools or markets, but socio-technical systems, infused with political choices about whose interests are protected, whose risks are ignored, and whose knowledge is deemed legitimate. For researchers committed to understanding these systems, alliances with those most affected by them, including workers and their communities, are crucial.

In these comments, I take up this commitment by focusing on one specific site of digital labour: the on-demand delivery sector in the United Kingdom. Over the past several years, this sector has become emblematic of the promises and perils of the platform economy. While it has been heralded as the "future of work", celebrated for offering flexibility and opportunity to workers, the lived reality for many delivery workers is one of extreme precarity, physical danger, and exploitation (Gregory 2020). Delivery workers risk their lives on city streets to transport goods, often for wages that fall far below minimum standards, particularly once expenses and waiting time are considered, while facing constant surveillance through GPS tracking, performance metrics, and increasingly invasive forms of identity verification.

These workers face what we have called a "double regulatory gap" (Gregory and Gallagher 2024). Not only is the employment relationship itself insufficiently regulated, due to the misclassification of workers as "independent contractors", but the technologies that govern their labour – algorithms, metrics, and facial recognition tools – are also left largely outside existing regulatory frameworks. In this vacuum, platforms operate with extraordinary asymmetry of power, dictating the terms of work while evading accountability. However, workers are not passive in the face of these dynamics. Across the UK and internationally, platform workers have developed creative and insurgent forms of collective inquiry and resistance. Drawing on traditions of "worker inquiry" that stretch back to Marx's 1880 "Workers' Questionnaire" and have been revitalised by feminist, decolonial, and digital labour movements (Woodcock 2014; Irani and Silberman 2013), workers are taking up the tools of research themselves. They are documenting their own conditions, inverting the gaze of platform metrics, and producing what has been called "counterdata" (Olojo 2024) or data collected to contest dominant institutions and ideologies.

2. Labour On-Demand

The on-demand delivery sector in the United Kingdom provides a clear lens through which to examine the dynamics of platform capitalism. At first glance, food delivery work appears simple: riders or drivers log into an app, accept orders, and transport meals or groceries from restaurants and shops to customers. Yet beneath this seemingly straightforward process lies a highly complex socio-technical system, one that redistributes risk, reconfigures labour relations, and introduces new forms of algorithmic control. Platform-based delivery work is fundamentally risky. As I have observed in my research, workers literally risk their lives to deliver something as mundane as a cheeseburger. And the risks here are multiple. There are physical dangers, including traffic accidents, particularly in urban centres where riders navigate congested streets under time pressure. A recent research report (Mendonça et al. 2024) suggests that over 80% of riders surveyed feel unsafe at work. The same report notes that 90% of riders surveyed have experienced workplace abuse and harassment. Furthermore, there are financial risks as riders bear the costs of bicycles, motorbikes, fuel, and smartphones, as well as the expenses of maintaining and replacing these tools. In addition, riders face the risks of wage fluctuations and job insecurity, with income levels highly variable depending on demand, weather, and platform-specific algorithms.

These risks are not accidental but integral to the business models of platform companies. By classifying workers as "independent contractors", companies such as Uber Eats, Deliveroo, and Just Eat shift the responsibilities and costs of employment away from themselves and onto individual workers. As De Stefano (2016) has argued, this model represents a form of "demutualised risk", where the collective protections historically provided through employment law and social insurance are dismantled, leaving workers to bear the risks of doing business on their own. The romantic rhetoric of "being your own boss" obscures the reality that workers are, in effect, running small businesses without the protections or resources of traditional entrepreneurs. Paradoxically, while workers are framed as independent, they are also subject to highly intensive forms of control. Platform companies have pioneered data-driven management systems that monitor, evaluate, and discipline workers in real time. Riders' locations are tracked via GPS; their performance is measured through acceptance rates, completion rates, and customer ratings; and their access to work is mediated through algorithmic allocation systems that determine who receives orders and when.

These systems introduce new forms of opacity and asymmetry. Workers rarely understand how allocation algorithms function or how their data is being used to shape their opportunities for income and the apparent neutrality of algorithms masks deeply technical decisions about how performance is measured, and who has the power to challenge or appeal managerial decisions. Facial recognition technologies, in particular, represent a troubling frontier. Uber, for instance, has introduced "Real-Time ID Check", requiring drivers to periodically submit selfies to verify their identities. These systems, often built using third-party facial recognition APIs, have been shown to produce higher error rates for workers with darker skin tones, raising serious concerns about racial discrimination (Buolamwini and Gebru 2018). For many migrant workers, who constitute a significant proportion of the delivery workforce in the UK, such technologies can become instruments of exclusion and arbitrary dismissal.

It is within this context that the concept of the "double regulatory gap" becomes salient. On the one hand, platform labour itself exists in a grey zone of regulation. The classification of workers as independent contractors has been contested in courts across Europe and the UK, with varying outcomes. In February 2021, the UK Supreme Court ruled that Uber drivers should be classified as "workers" rather than independent contractors, granting them rights to minimum wage and holiday pay (UK Supreme Court 2021). Yet the implementation of this ruling has been slow and uneven, and other platforms have sought to differentiate themselves from Uber to avoid compliance. Thus, for many on-demand delivery workers, basic labour protections remain inaccessible.

On the other hand, the technologies that govern platform work – algorithms, data-driven decision-making systems, and biometric verification tools – operate in a largely unregulated domain. While data protection frameworks such as the GDPR provide some rights, such as access to personal data and information about automated decision-making, these are rarely enforced in practice and are not tailored to the specificities of labour relations. Regulators often lack the technical expertise to scrutinise algorithmic systems, and labour inspectors are not empowered to investigate data-driven management practices. As a result, platforms are able to use technologies of control with relatively little oversight or accountability.

The double regulatory gap is not unique to the UK. Similar dynamics have been observed across Europe, North America, and the Global South. In Spain, the 2021 "Riders' Law"

mandated that delivery workers be classified as employees, while also requiring companies to disclose the "algorithms" used in work allocation. This represents one of the first attempts to address both aspects of the double gap, though enforcement remains contested. In Italy, courts have ruled against platforms such as Foodinho/Glovo, finding a lack of safeguards to ensure algorithmic fairness and accuracy (Eurofund 2023). In California, the passage of Proposition 22 in 2020, heavily funded by Uber, Lyft, and DoorDash, carved out exemptions from employment law for gig platforms, illustrating the intense political struggles around regulation (Dubal 2021). In the Global South, where platform labour has expanded rapidly, regulatory gaps are often even wider. In countries such as India, Kenya, and Brazil, platforms operate in contexts of weak labour and data protection enforcements. As Anwar and Graham (2020) have shown, workers in these regions often experience a "race to the bottom", where global platforms exploit differences in national regulatory regimes to extract maximum profit. The double regulatory gap thus has a planetary dimension, reinforcing global inequalities in labour conditions and technological governance. Recognising this double regulatory gap is essential for developing effective responses to the challenges of platform work. Addressing only one side of the equation is insufficient. Strengthening labour rights without tackling algorithmic management risks leaving workers vulnerable to new forms of digital exploitation. Conversely, regulating data without securing employment protections risks reproducing precarity in different forms.

If the double regulatory gap describes the structural conditions under which platform workers labour, worker inquiry offers a methodological and political response. It is not only a way of gathering knowledge about working conditions but also a practice of solidarity, education, and struggle. To appreciate its relevance in the context of algorithmic management, it is worth tracing its intellectual roots and considering how it has been renewed in contemporary movements. The idea of worker inquiry is often traced to Karl Marx's 1880 *Workers' Inquiry*, a 101-question survey published in a French socialist newspaper (Marx 1997[1880]). Marx invited workers themselves to describe their wages, hours, housing, and health conditions. Although the questionnaire was never widely completed, its symbolic importance was profound. It reflected a conviction that workers possess privileged knowledge about exploitation, and that this knowledge is indispensable for critique and transformation.

Fast forward nearly a century, and worker inquiry re-emerged in postwar Italy through the operaismo (workerist) tradition of the 1960s and 1970s (Woodcock 2014). Faced with rapid industrialisation and labour unrest, Italian Marxists such as Raniero Panzieri and Mario Tronti argued that the factory floor should not only be studied but politicised. They conducted *inchiesta operaia* (workers' inquiries) in car factories and industrial plants, gathering testimonies about machine rhythms, foremen's discipline, and workers' everyday tactics of resistance. For operaismo, inquiry was not a neutral sociological exercise. It was a means of mapping capitalist command while simultaneously identifying points of resistance. It recognised workers as the "vanguard" of struggle precisely because their lived experiences of labour gave them insights into how capital operated and where it might be disrupted. The slogan "*conricerca*" (co-research) captured this ethos – research and struggle were inseparable, and workers were both the subjects and the theorists of inquiry.

Feminist movements in the 1970s extended worker inquiry beyond the factory gates (Fortunati 2013). Silvia Federici, Mariarosa Dalla Costa, and other thinkers in the Wages for

Housework campaign highlighted how reproductive labour – caring, cooking, cleaning – was essential to capitalism but systematically devalued. Feminist inquiry documented the hidden and unpaid work of women, challenging dominant categories of labour and exposing the ways in which exploitation extended into the home and community. These approaches broadened the scope of worker inquiry, demonstrating that the sites of labour and exploitation were not limited to factories or formal employment. By emphasising reproductive, affective, and care work, feminist inquiries also reshaped the politics of knowledge production: who counts as a worker, whose experiences are visible, and whose voices are heard.

3. Toward a Renewed Worker Inquiry

The platform economy, with its algorithmic opacity and fragmented workforce, has revived the importance of worker inquiry. Gig workers often labour alone, connected more to an app (or multiple apps) than to colleagues. Simultaneously, traditional unions have found it difficult to organise workers whose employment status is precarious and whose workplaces are dispersed across city streets. Under such conditions, inquiry becomes both a way of making sense of the organisation of work, as well as a collective organising strategy.

Inquiries use varied methods and take inspiration from workers own questions and their material circumstances. For example, inquiries might entail WhatsApp groups where riders share screenshots of their pay slips; grassroots surveys documenting experiences of harassment; data requests under the GDPR; and ethnographic projects where workers and academics co-design research questions. These practices allow workers to piece together fragmented experiences into collective knowledge. What appears as an individual misfortune – say, an unexplained account deactivation – can be reinterpreted as a systemic practice when documented across multiple testimonies. A central feature of contemporary worker inquiry is the production of what has been called "counterdata" – or information generated by workers to contest the dominant narratives and practices of platforms. If platforms rely on data to manage, rank, and discipline workers, workers can in turn produce their own data to expose exploitation, support legal challenges, or build solidarity. Turkopticon, created in 2008 by Lilly Irani and Six Silberman, is a classic example. By allowing Amazon Mechanical Turk workers to rate and review requesters, it flipped the asymmetry of surveillance – workers monitored those who hired them. Similarly, the Fairwork project has rated gig platforms according to principles of fairness, producing public benchmarks that can be mobilised by unions, policymakers, and the media (Graham et al. 2020). Counterdata, however, is not limited to quantitative metrics. Testimonies, ethnographies, and oral histories all form part of the collective archive of worker inquiry. The point is not to replicate corporate databases but to develop alternative ways of seeing and knowing the labour process – ways that foreground exploitation, injustice, and possibility. The inquiry process thus raises profound questions about who produces knowledge, who benefits from it, and how it circulates. Traditional academic research has often been extractive: data is taken from workers, analysed in universities, and published in journals that workers may never read. Inquiry challenges this model by insisting on co-production and mutual benefit. Knowledge should not simply

describe workers' conditions but also serve their struggles – whether by informing collective bargaining, shaping public policy, or building solidarity.

This requires reflexivity. It means recognising power imbalances in research relationships, being attentive to ethics, and ensuring that inquiry is accountable to those whose lives it seeks to illuminate. It also means acknowledging that inquiry is not just about producing reports or publications, but about creating infrastructures for ongoing dialogue, learning, and resistance. And, to my mind, the spirit of worker inquiry is finding tangible expression in contemporary projects that combine data, law, and participatory research to contest the power of platforms. Two such initiatives – Worker Info Exchange (WIE) in London and the Workers Observatory (WO) in Edinburgh – demonstrate complementary strategies for mobilising worker expertise in the platform economy. These case studies illuminate how workers can transform fragmented and precarious labour conditions into collective knowledge, legal leverage, and educational opportunity.

4. Worker Info Exchange (WIE): Litigation-Driven Counterdata

Founded in 2019, Worker Info Exchange (WIE) emerged in response to the growing influence of algorithmic management over gig work. WIE enables platform workers to access their personal platform data via the General Data Protection Regulation (GDPR) and uses these data to challenge unfair practices through legal action. The GDPR, implemented across the EU in 2018, provides rights that are highly relevant to platform workers. Article 15 ensures the right of access to personal data; Article 20 provides data portability; and Article 22 protects individuals from solely automated decisions with significant effects. WIE operationalises these rights through Subject Access Requests (SARs), which allow workers to obtain a copy of personal data collected by the platforms.

By aggregating these SARs in a collective data trust, WIE transforms individual requests into systemic insights. Information about pay calculations, account deactivations, performance scoring, and dynamic allocation systems reveals patterns that would otherwise remain opaque. In effect, the project is not merely collecting data but forging new social relations at the level of the database – worker data requests enable collective analysis. To date, WIE has processed over 500 SARs from workers across platforms including Amazon Flex, Bold, Deliveroo, Free, Just Eat, Ola, and Uber (Safak and Farrar 2021).

However, WIE's work goes beyond analysis. Legal interventions provide a crucial mechanism for translating counterdata into accountability. One landmark case involved four Uber drivers who had been effectively "robo-fired" without recourse. The Amsterdam Court of Appeal found that Uber's automated account deactivations were carried out with minimal human intervention, rendering the process arbitrary and opaque (*ibid.*). The ruling highlighted the insufficiency of supposed human oversight, emphasising that automated decisions cannot be legitimised by symbolic gestures. Beyond dismissals, WIE has successfully pursued transparency regarding algorithmic pay and task allocation. Courts have required Uber to disclose how worker profiles, dynamic pay, and task allocation systems are calculated and implemented. Such rulings not only benefit the workers directly involved but set legal precedents that can challenge broader corporate practices across the gig economy.

WIE is also contesting the use of facial recognition technologies, which have been linked to discriminatory deactivations. For instance, Uber's "Real-Time ID" system links selfies to location data to authenticate workers. Yet the system is known for high error rates among Black and ethnic minority workers, who constitute a majority of UK private hire workforce (*ibid.*). WIE is pursuing cases on behalf of affected workers, highlighting how technological innovations can reproduce and amplify systemic inequities.

Taken together, the work WIE is doing illustrates the potential of litigation-driven inquiry. By combining legal expertise, data analysis, and worker knowledge, it shows that platform workers can not only document exploitation but also actively intervene to change corporate practices. Importantly, WIE demonstrates that data are not a neutral commodity. When appropriated by workers, they can become instruments of solidarity and resistance.

5. Workers Observatory (WO): Participatory Inquiry and Local Solidarity

While WIE operates at a transnational legal level, the Workers Observatory (WO) in Edinburgh exemplifies participatory, locally grounded inquiry. Established in 2020 in collaboration with the Scottish Trade Union Congress and funded by the ESRC Digital Good Network, the WO focuses on the lived experiences of migrant delivery workers navigating algorithmic management in the city. The WO currently engages 25 on-demand delivery workers in Edinburgh to co-design research questions, methods, and analysis. Workers identify the issues most pressing to them – ranging from wage discrimination and harassment to e-bike theft and debt incurred to access work. Surveys, interviews, field observations are coupled with regular rider meetings, creating a hybrid methodology that integrates quantitative and qualitative approaches. For example, a survey of 70 riders in Edinburgh revealed systemic patterns of racial harassment, tips being withheld by platforms, and the widespread theft of bikes (Gallagher and Lieutaud 2024). These findings have been taken to local policymakers. Most recently, the Edinburgh City Council has taken steps to address worker concerns through their Fair Work Action Group. This includes the possibility of reinstating a Gig Workers Task Force, as well as working with local restaurants to develop a fair work manifesto for on-demand delivery, as well as developing ways to bring platform labour into the City's Fair Work Charter.

Beyond documenting working conditions, the WO fosters worker education. Participants express interest in understanding the data science principles underpinning the platforms that manage their labour. Through participatory inquiry, workers develop skills in survey design, data analysis, and critical interpretation. This blurs the boundary between research, activism, and education, transforming inquiry into a vehicle for upskilling and future mobility. The WO's participatory inquiry also cultivates social solidarity. Workers who initially lacked formal networks discover shared experiences and develop collective strategies. The WO exemplifies how inquiry can create new infrastructures for mutual support, offering a counterweight to the atomising effects of platform work. By situating workers as experts of their own conditions, the project foregrounds local knowledge as a political resource, reshaping both labour relations and civic engagement.

Together, WIE and WO represent two complementary strategies of worker inquiry: WIE leverages legal frameworks and aggregated data to contest corporate power at national

and transnational levels. WO emphasises participatory methods and local solidarity, generating knowledge that directly benefits workers in their daily lives.

Both approaches treat workers not as passive subjects but as co-producers of knowledge, capable of interpreting algorithmic systems and mobilising counterdata for collective action. Importantly, these strategies demonstrate that worker inquiry need not be confined to one form: litigation, data analysis, and participatory ethnography are mutually reinforcing methods that expand the possibilities for resistance.

The WIE and WO projects also point to broader implications for inquiry in the age of AI. Platforms increasingly deploy algorithmic management, predictive scheduling, and real-time performance monitoring, creating conditions of heightened precarity. Counterdata and participatory research reveal the human consequences of these systems, while also training workers to critically engage with the technologies shaping their labour.

The platform economy confronts us with profound questions: who controls the infrastructures of work? How are risks and rewards distributed in digital capitalism? What forms of knowledge and expertise matter in governing algorithmic systems?

The stories of Worker Info Exchange and The Workers Observatory offer partial but powerful answers. They show that workers – long cast as the objects of managerial control – are emerging as critical agents in the struggle for algorithmic accountability and data justice. Through participatory research, legal mobilisation, and grassroots organising, they are not only contesting exploitation but also inventing new models of solidarity, education, and co-production.

For STS scholars, these initiatives underscore an urgent task: to align our research with movements for technological justice, to amplify worker voices, and to imagine regulatory and infrastructural alternatives that prioritise human dignity over corporate profit. This is not simply a matter of academic interest; it is a matter of democratic survival in an age where the logics of automation and extraction threaten to hollow out the very conditions of collective life.

The 10th STS Italia conference, which inspired this contribution, provided an opportunity to share and advance this commitment – to solidarity, to inquiry, and to the co-creation of futures where technology serves the many rather than the few.

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Digital Labour for Good

Kylie Jarrett

The mediation of work by digital technologies – especially platform-mediated work – is often associated with reduced conditions, increased surveillance and micromanagement, and heightened exploitation. It is quite often, and quite legitimately, understood as anything but good work.

This paper, though, will take up the theme of the STS Italia Conference – Technoscience for Good – and accept the challenge of exploring how platform-mediated work may be approached, understood, or experienced as good work. This paper will first discuss rethinking precarity as the central critical paradigm for engaging with digital labour and platform work, drawing on intersectional approaches to ask questions about the subject at the centre of this critique. It will then explore a little of how some often criticised labour processes associated with digital platforms might be experienced positively by various kinds of workers, challenging blanket assumptions of this labour's inherently negative effect. Finally, it will explore how narratives of good work may be important shapers of both labour and struggle in the platform economy.

1. Whose Precarity?

One of the key features of various forms of digital labour – and especially platform work – has been how it upends the industrial model of secure, hourly-paid employment as the labour market, fracturing work into a series of gigs that people must piece together in order to generate a living. It does this, though, by decentring waged labour, coercing people into self-employment, through the return of proto-capitalist piece work remuneration and arguably, in some instances, a return to feudal dynamics. Some have claimed that designation as self-employed is a misclassification, arguing that many digital labourers are, in fact, employees of the platforms and companies to which they are ostensibly contracted. But in some ways, it doesn't matter whether being self-employed is an inaccurate representation. The reality is that many digital labourers in the global North are *structurally* in non-standard employment relations and or conditions of self-employment in some of their income-generating activity – a trend that began in the latter half of the 20th century as neoliberal economics and social policies diminished labour security.

The implications of this reorientation of the economy are pronounced. On one hand, these economic logics of digital labour emphasise the centrality of unpaid work to the economy. While unpaid labour, especially in the form of domestic work, has always been a feature of capitalist accounting – a point made by many Marxist feminists – social media and digital labour environments have industrialised the extraction of value from this kind of uncompensated activity. This is obviously the case when we look at the exploitation of user data in social media environments. But it is also the case in paid forms of digitally mediated labour such as platform-mediated work where conditions of self-employment mean that

workers absorb many of the labour costs related to, for instance, occupational health and safety or training that once might have been absorbed by an employer. One of the key lessons we have learned from the shift to non-standard employer/employee relations is the need to pay attention to the labour involved in the reproduction of workers and to map where, how, and by whom this is being undertaken.

But I most want to highlight how these conditions also indicate the contingency and non-universality of the industrial form of labour that Marx critiqued through the labour theory of value. The arrangements of work that he was describing during the birth of industrial capitalism, and which were entrenched with the 20th century Fordist factory, are seemingly in decline in the context of digital labour and especially platform work. Instead, we are in a context where unstable employment, unstable incomes, and unstable conditions are the norm; these are the conditions of precarity. Platform work – the emblematic form of digital labour – is leading in the normalising and furthering of these conditions.

This is a long-established position and a long-established lament. When it is articulated, there is always a sense of loss associated with it, viewing the conditions of the platform economy as a degradation of labour and working life. But my question is for whom do these new conditions represent a decline? For whom was the industrial compact of a job for life; secure income; waged labour with set conditions ever a reality?

It was certainly not always the case for women, especially women of colour, who were often excluded from industrial labour environments and economic stability, sometimes by capitalist logics, sometimes by unions and other trade organisations, and sometimes by heteropatriarchal and white supremacist culture and custom. While a promise that animated ambition or resentment, the security of industrial labour has not necessarily been an achievable reality for racialised others in industrial spaces as well as for migrants – documented or undocumented.

Perhaps more importantly, the conditions of the Fordist factory were never universal. For workers outside of the minority world, work has long been precarious and informal and functioning through various forms of self-employment. Piecing together different jobs in order to make a living is standard practice for many people around the world. The disguising of wage relations, and the harnessing of regimes of reproduction in the service of work is also a commonly experienced economic model – even by many people in the minority world or global North (Mezzadri 2020). The story of labour's decline then is very geographically and demographically specific. As Alessandra Mezzadri (*ibid.*, 156) puts it:

> [T]he very representation of the so-called Western labour trajectory has always been somewhat biased – over-representing the experience of a handful of core countries within the Western bloc and a (male) labour aristocracy within highly differentiated working classes. Ultimately, capitalism has only ever been "Golden" for a very few, in a very few places, and during a very few years.

In a provocative article about macrotask crowdwork in the African context, Elbanna and Idowu (2022) argue that we need to decentre the Western model of labour, including its default critique of growing precarity. The paradigm of precarity, they say, "assumes a society dominated and ruled by the formal economy, which contrasts with the domination of the informal

economy in developing countries" (*ibid.*, 130). It has no relevance in the contexts where they research, but the importance of this position extends far beyond. If the features associated with informal economies are becoming increasingly central across a wide range of employment contexts, both geographically and in terms of labour form, any model which centres formal, secure, waged employment as central and all else as deviance becomes increasingly untenable.

2. Recentring the Worker

Both Adam Arvidsson (2019) and Tressie McMillan Cottom (2020) typify this informal mode of working as hustle culture, with Arvidsson locating this mode of working in advanced pre-capitalist economies and the pre-industrial capitalist system, but also argues it has persisted in capitalist contexts. He says, even in the organized societies of industrial modernity, there has always been an "industrious economy" operating outside of regulated labour markets; as McMillan Cottom (2020) notes, this has also been a racialised space. What is novel today though, Arvidsson adds, is that those pushed to the economic margins and into entrepreneurial hustle, are "increasingly joined by middle-class university graduates, who historically used to prefer stable employment to the vagaries of entrepreneurship" (2019, 5).

This shifting of industriousness and hustle from the margins of the economy along with the emphasis on unpaid, reproductive work that digital labour has also highlighted (Jarrett 2016; Mezzadri 2020), work to decentre the experiences of the archetypal white factory worker in the industrial north as the central figure upon which pivot our base models of labour – and the ensuing critical paradigms that emerge from that labour experience. His reality of a secure, formally defined workplace defined by hourly paid income is no longer at the leading edge of economic change or even economic stability – and certainly not in digital labour contexts.

This decentring demands we engage more richly with that scholarship and those scholars and activists who have explored work outside of the global North and investigated the economic and labour practices of those on the margins of the economy. If we are to understand the nature of labour today, we need to move away from economic models and critiques rooted in the European/US historical context – exploitation through formally defined waged work and alienated labour via commodified labour-time – and embrace scholarship, economic thinking, and models of labour struggle and resistance that also emerge from outside of that context. This includes, as Mezzadri (2020) reminds us, feminist scholars who have argued for the importance of unpaid reproductive labour, but also – and especially – those scholars and scholarship from the Majority World that have long dealt with the politics and experiences of informal labour. Some of this work is being done in the field of digital labour studies but more is needed to extend our critiques beyond claims of precarisation.

3. Good Work

I propose this here in a discussion of platform work as good work not only because it challenges the omnipresent association of platform work, precarity, and bad work. I also

propose it because if we shift our lens from the experience of the normative white male cis-het- able-bodied industrial worker in the global North for a moment, and examine platform work in more diverse and specific contexts, we might see ways that good work is possible. Key is how digital platforms open up the employment landscape. For people with disabilities, undocumented migrants, those with limited educational experience, and indeed any other people located on the margins of the economy, platform work can provide a valuable mechanism for entering the labour market. For instance, for Iranian women who may be limited in working outside the home, especially in a context where economic sanctions have shrunk the economy, online creation and influencer labour can be an important space for engaging in legitimised economic activity (see Bahramitash and Esfahani 2014; Eslami 2021; Golzard 2020). By reducing entry requirements, including documentation, platforms have generated employment opportunities for refugees and migrants (see Hackl 2022; van Doorn et al. 2020; Webster and Zhang 2020). People with disabilities have also long taken advantage of the entrepreneurial opportunities available via various digital platforms to create economic opportunities (Hong 2024; Qu 2020). Workers may have ambivalent relationships to this kind of work – it may not always be safe, secure, or properly remunerated and sometimes may only be the least bad of the available options – but given it provides some kind of economic opportunity in the absence of others, it is perhaps too much of a stretch to describe all of platform work as irredeemably bad (e.g., Anwar and Graham 2020; Kashyap and Bhatia 2018; Wood et al. 2018b).

But is it not only economic opportunity that emerges because work is always more than work. At a recent training school on intersectional feminist approaches to platform work (part of the P-Will COST action) the participants re-approached their studies through an intersectional lens. In doing so, some recognised how their research subjects found forms of agency and some degree of economic or social autonomy not otherwise available to them in their platform work. For instance, Klaudia Khan (2025) explored how for Bangladeshi migrant men working as delivery riders in Poland, not only does the work enable them to earn an income. That income allowed them to send remittances home and, in doing so, rendered them able to perform the role of male provider and secure the sense of social and personal agency associated with this heteromasculine role. As problematic as this may be in terms of gender politics, for migrants who are often feminised and stripped of normative modes of power and dignity, platform work can become a valuable site for psychological and social agency (see also Hong 2024).

But we also need to think more about what might have been gained in the transition to digital labour and all that has entailed in terms of the re-organisation of labour. Here I turn to some of the qualities of the work that have been critiqued extensively in digital labour studies but might also be read as "good work": informal contractual obligations and the automated algorithmic management of platforms. I suggest there is great heterogeneity in how these features of platform work are experienced.

For instance, for some workers, such as women or others with care responsibilities, what might be described as the insecurity of work that comes from unfixed working times and informal labour contracts is often experienced as a benefit for it allows the flexibility for work to be organised, at least to a degree, around these other demands. In particular, workers compare

this provision for self-scheduling favourably against those offered by traditional employers and employment contracts, even though the reality of this opportunity is typically less than ideal (James 2024; Lehdonvirta 2018; Pesole et al. 2018; Piasna and Drahokoupil 2021). In an imperfect and unequal world, there are some positives in the less structured and formal labour arrangements that might be advantageous for some groups of people who aren't white, cis, het men seeking full-time employment (see also van Doorn et al. 2023).

It is also not the case that the machinic logic of platform management systems is also not always experienced negatively. For instance, Sai Amulya Komaraju (*forthcoming*) describes how for some platform careworkers the automation provided by algorithmic systems can actually professionalise and depersonalise their employment environment in ways that offer protection and security not available in their off-line labour environment. Not being hired directly by employers allows them to maintain the interpersonal distance needed to avoid common exploitation as "one of the family", for instance (see also Webster and Zhang 2020). Wood and colleagues (2018a) also describe the autonomy available within labour processes when algorithmic management resides only at the beginning and end of the working activity, and how this also enriched the labour experience for some workers.

My goal here is not to merely document a list of exceptions to the "platform work is inevitably bad" narrative but to emphasise that if we draw on intersectional approaches, and pay attention to the identity of workers and the specific conditions of oppression that differentially situate them, we can identify very specific sets of labour relations that govern whether or not platform work is experienced as, or can be interpreted as, good work. The decentring of the Fordist worker as the base of our understanding of labour demands that we bring this kind of lens to our research and use those positional dimensions as the launch point for our critiques rather than universalising and blanket arguments.

4. Imaginaries of Good Work

We might also describe platform work as good work because of its relationship to entrepreneurialism and its connection to disalienated work. In the *Digital Labour* book (Jarrett 2022a), I explore this idea by looking initially at the discourse of a millennial slashie creator – podcaster/author/artist – Emma Gannon who talked about how empowering she finds building her own career path through these unstable and uncertain roles. For her, the instability of digital labour is what allows her creative agency and autonomy.

Gannon is a particularly advantaged digital labourer – she was spruiking for Microsoft after all – and embracing autonomy is quite common in creative industries. But we see similar narratives about being your own boss and achieving autonomy and self-realisation throughout narratives by different kinds of digital workers. Certainly, platforms promote themselves to potential workers using appeals to the affective and cultural value of employment. Many specifically emphasise autonomy in work schedules and being your own boss, distinguishing themselves from boring office jobs.

But this is more than mere promotional guff. Various studies show that workers actually do experience and value these dimensions of their digital labour. We see elements of this in

Gray and Suri's (2019) study of clickworkers in India who, among other things, valued how the work provided opportunities for control over their working time, the chance to do work that was meaningful, and opportunities for self-improvement and self-determination. Brazilian platform drivers in a study by Marcia C. Vaclavik and Liana H. Pithan (2018, 13) placed importance on "control, autonomy, and self-efficacy" in their work. Similarly, a study by Ana Moritz (*forthcoming*), a PhD researcher in my School, has identified how some white collar data workers have a preference for working via platforms rather than formalised employment because of the autonomy that this kind of work affords them.

At play across all kinds of digital labour forms are the positively coded ideals of autonomy and creativity that we associate with entrepreneurialism. To be an entrepreneur is to be a self-made, innovative, self-reliant, risk-taker who possesses the freedom – and the free will – to invest in themselves and their dreams, rather than settle for the banality and tedium of wage slavery. It is arguably this imaginary that undergirds the platform economy as workers transform their talents, knowledges, and skills or their embodied identities into assets upon which to capitalise in the pursuit of a livelihood (Jarrett 2022b). We also see it as they exploit personal assets, such as houses, cars, or bicycles, turning them into income-maximising revenue sources. It is also structurally implicated in platform work where self-employment has supplanted hourly paid waged labour as the typical model of employment. People are rendered entrepreneurs – willingly or not – in this labour environment.

As I have argued in various places, entrepreneurialism is a wide-spread and privileged imaginary – a "sticky idea" as Szeman (2015) has it – connecting platform work and the particular dynamics of its precarious nature to positive cultural ideals. Being an entrepreneur, being self-employed, being your own boss has cachet and social value (Purcell and Brook 2020), which makes it compelling, reframing the narrative through which platform work is encountered.

We might dismiss this investment in entrepreneurialism as a false consciousness or as a "hoax" perpetrated by capitalism as Morgan and Nelligan (2018) suggest. But this would be to disempower workers' capacity to speak their own reality. If we approach the imaginaries of entrepreneurialism and autonomy on their own terms, we can see how platform work, as the emblematic form of digital labour, can be approached, experienced, and critiqued as good work.

In his discussion of hustle culture, Arvidsson (2019) argues that such work is undertaken with a view to generating meaning within work. Central to the cultural imaginary of entrepreneurialism of self-directed, self-employed work is conditions of disalienation – or at best reduced alienation. This labour context emerges as a response to what Boltanski and Chiapello (2005) described as the "artistic critique" of capital which focuses on problems of authenticity and alienation in work rather than the distribution of resources. They argue that the response to this criticism – which began in the mid-20th century – has been investment by both capital and worker alike in dimensions of work that provide meaning and autonomy. Digital labour, its regimes of entrepreneurial self-employment, and their associated autonomy and self-actualisation seems to realise this agenda. In the *Digital Labor* book, I go on to suggest that perhaps the kinds of entrepreneurial workers we find in the unstable and precarious employment environments of the digital economy are in fact Marx's children, mobilising alternate models of work to realise the goal of disalienated labour. Obviously, I was being provocative in this framing, and there are serious questions about just how much this work is disalienated in a structural sense.

But what the wide circulation of this narrative of emancipatory entrepreneurial work tells us is that there is much we need to unpack about how the relationship between capitalism and exploitation is being reworked in digital labour and its regimes of self-employment, not least because this reshaping changes people's relationships to work and to struggle. In regimes of self-employment, we can no longer rely solely on the experience of alienation as the key social, cultural, and psychic harm being manifested by capitalism. It thus may not be the only or even primary logic animating and propelling labour struggles. Because self-employment, the class-locations it articulates and the social imaginaries it draws from resist the logics of alienated wage labour, the good work of digital labour suggests we need a revised, re-calibrated, recovered, and maybe even entirely new set of critical, analytical concepts to wield in our analysis of the contemporary labour environment.

But we might also argue that by mobilising these narratives, capital is providing a tool for its own destruction – it is eating itself as the dialectic suggests. That platform work does not, and cannot, realise the ambitions of objectively good work at all times – especially as its typically invasive management processes delimit the promised autonomy – may in fact provide an impetus for resistance and struggle. This is something I am finding in my own developing research into the craft retail platform Etsy. Sellers on the platform went on strike in April 2022 but this was a struggle rooted in the failure of the platform to uphold its promise of autonomous, entrepreneurial work. As this example suggests, it is worth considering more the role promises of autonomy and "good work" might be playing in animating contemporary struggle and resistance, especially from unexpected quarters such as middle-class craft retailers.

Additionally, we might also consider how in deferring control to machines, platform work may be structurally facilitating forms of resistance. It has been argued that without face-to-face contact and in the competitive, individualising environments associated with digital platforms, workers were less likely to resist their exploitation in collective ways (see, for instance, Attoh et al. 2019). However, this has proved to be far from the case as there is much evidence of workers' collective organising via different digital and offline means. But it is also arguably the very nature of the labour conditions associated with platform labour that are leading to forms of worker resistance. Ya-Wen Lei (2021; see also Jarrett 2022a) describes how platform workers' self-employed status means that when unscrupulous or inequitable practices are experienced, they are difficult to resolve through existing labour courts and provisions, leaving collective action, protest, and industrial action as the key solution. Lei also contends that the distance between workers and management created by algorithmic environments further works against settling grievances. Without the affective work done by human managers to secure consent and to normalise changes in labour environments, hostility toward management may actually be increased, amplifying potential for resistance.

Thus, rather than necessarily shutting down opportunities for organisation and resistance, the automated systems of management and the omnipresent (unrealised) promise of autonomy in digital labour may, in fact, be opening them up and facilitating them. Of course, this only happens because platform work is experienced as not good work, but the point I am making here is that assumptions about the inevitable descent into irredeemable badness often associated with this labour needs to be given more granular detail and complexity.

5. Is Platform Work Good Work?

In the end, do I think platform work and digital labour is good work in any objective sense? Would Marx think it was good work? No. I am not convinced. The documented inequalities, iniquities, and intense exploitation associated with platformised labour in all its forms clearly suggest not. Platform labour's good work is also leading the race to the bottom rather than raising the remuneration and conditions for all workers, even though some experience it as a boost.

But I do think that if we want to make any kind of determination of the goodness or otherwise of digital labour we need to be certain about which normative frame we are using to determine good or bad. What is our baseline? Who lives there – and who doesn't? Especially those of us from the global North/minority world need to question our assumptions about the nature of economics and labour as we wield our critical interpretations. We also need to situate any analysis of the experience of platform work within the particular arrangements of power at play in the particular contexts in which specific workers exist, rather than universalising labour experiences.

I also suggest that we must remain mindful of the dialectic which will always render unstable the particular model of capitalism in play at any given time, and involves transforming bad into good – and sometimes back again – as workers exercise their agency and push back against systems. This is how socioeconomic change happens. Finding the places where platform work and digital labour allow workers to experience goodness is just as important as documenting all the ways it goes wrong, even if that good is not one our critical frameworks have historically valued.

So while I am not convinced digital labour is good work, I am keen to stay troubled by, and troubling of, that position and remain open to seeking out the good where it manifests for workers.

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The Moral Life of Platforms: Bridging STS and Cultural Studies to Understand the Contested Morality of Artifacts in the Algorithmic Society

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This contribution builds on our intervention during the closing plenary session at the recent 10th STS Italia 2025 Conference in Milan and seeks to synthesise, in a focused and accessible manner, some of the key insights from our ongoing research into the moral dimensions of digital technologies, particularly platform infrastructures and algorithms. It draws on two main sources: our collaborative fieldwork on gig economy platforms in Europe, Asia, and Latin America, and the conceptual reflections developed in our recent book *Algorithms of Resistance* (MIT Press, 2024). It also intersects with the arguments we unfold more systematically in our forthcoming article tentatively titled "Do Artifacts Have a Morality?". At the heart of our reflection lies a simple but important statement: technologies are not just tools or infrastructures, but sites of moral negotiation. To describe this interplay between design and use, we mobilize the concept of moral economy. Unlike normative ethics or philosophical debates about right and wrong, moral economy allows us to focus on how everyday expectations of fairness, legitimacy, and obligation are embedded in and negotiated through technological systems. Our use of the term draws inspiration from E. P. Thompson's classic work on eighteenth-century English food riots (Thompson 1966; 1971), where he argued

that working-class protests were animated not only by economic need, but by violations of shared expectations about justice and entitlement. This sense of moral order was not codified in law but lived and felt through collective experience.

This historically grounded approach to morality has since been adapted by several scholars to explore how moral claims are made within markets, media systems, and digital infrastructures. Andrew Sayer (1999), for instance, has emphasised how economic relations are always embedded in moral evaluations, even when those evaluations are implicit or contested. In media and technology studies, the concept has been taken up by Silverstone (1992) and others to explore how everyday media use is shaped by judgments of what is acceptable, excessive, exploitative, or trustworthy. We build on this lineage to argue that platforms are not just economic or technical systems, but moral landscapes where struggles over legitimacy, fairness, and responsibility take place. Understanding platforms through the lens of moral economy enables us to ask different kinds of questions. It shifts the focus from what technology does to what it legitimises, enables, and forecloses in practice. It also provides a language for grasping how users engage with platforms not only as consumers or workers, but as moral agents who evaluate, resist, and sometimes reconfigure the rules imposed on them. This focus on morality is not a theoretical embellishment or a philosophical detour. It is central to understanding how power operates through technological systems. Platforms do not only distribute labour, revenue, and visibility – they encode and enforce normative visions of what constitutes good behaviour, efficient performance, and responsible participation. These visions are rarely debated in public or made explicit in terms of ethics, but they are embedded in the default settings, feedback mechanisms, and terms of service that govern our digital life. By foregrounding moral economy, we bring into view the contested terrain of values, duties, and responsibilities that shape platform governance. This allows us to shift from asking what platforms do to asking what kind of social order they attempt to produce, and how that order is accepted, subverted, or remade by users. In an era of expanding algorithmic decision-making, this question is not only timely but politically urgent.

STS has long drawn attention to the politics of design: the assumptions, worldviews, and norms encoded into technological systems. Langdon Winner's provocation that artifacts have politics (Winner 1980) remains foundational, reminding us that infrastructures are never neutral. Building on this legacy, scholars like Madeleine Akrich and Bruno Latour (1992) have shown how technologies script particular behaviours and relationships, embedding moral expectations into their material form. Latour's famous example of the seatbelt – a nonhuman actor that enforces a legal and moral contract – illustrates how artifacts participate in shaping users' conduct. Akrich's notion (1992) of pre-scription highlights how designers anticipate, guide, and discipline users through built-in expectations. She argues that designers inscribe their worldviews into the technologies they build. These inscriptions take the form of "scripts" that regulate use, specifying how artifacts should interact with both humans and nonhumans. These scripts function as sets of instructions or normative guidelines, which Latour (1992, 232) describes as the "moral and ethical dimension of technological artifacts". These scripts, or *prescriptions*, are essentially the material expressions of what Akrich and Latour (1992) call the artifact's *program of action*, a set of expected behaviours that designers hope users will adopt. In Latour's terms, the designer's intention is encoded into the object,

which then translates this intention into specific material and symbolic prescriptions. The artifact, in this way, exerts a moral agency. Akrich makes this clear when she writes:

> If most of the choices made by designers take the form of decisions about what should be delegated to whom or what, this means that technical objects contain and produce a specific geography of responsibilities, or more generally, of causes. (Akrich 1992, 207)

Whereas STS tend to emphasize the values inscribed (or "pre-scribed" in the terminology of Akrich and Latour) into technologies by their creators, Cultural Studies focuses on how these prescriptions are received, adapted, or resisted by users who "de-scribe" and re-encode them with alternative moral meanings.

From Stuart Hall's encoding/decoding model (Hall 1980) to the domestication theory developed by Silverstone and colleagues (1992), this tradition has shown that audiences and users are never passive recipients of meaning or functionality. They actively negotiate, reinterpret, and often subvert the frameworks embedded in media and technological systems. Technologies, in this view, are not only infrastructures but also cultural texts that are domesticated and continuously re-read, re-encoded, and re-moralised through everyday use. Moral reasoning, within this tradition, is seen as socially situated, contextually emergent, and shaped by the symbolic struggles of everyday life. As Bengtsson and colleagues (2012) have argued, users constantly engage in informal judgments about what feels right or wrong, legitimate or excessive, when it comes to technology use.

These two traditions, STS and cultural studies, have too often spoken past each other. While STS has focused on the scripts and prescriptions built into technological systems, and cultural studies on how those scripts are interpreted or subverted, both fields are ultimately concerned with how power, meaning, and behaviour are mediated by non-human actors. What has often been missing in their dialogue is a shared vocabulary for addressing the normative dimensions of this mediation – that is, how technologies shape notions of what is good, fair, or appropriate, and how those notions are then contested by users in everyday life. We argue that the concept of moral economy can help bridge this gap by offering a framework that is attentive both to how norms are inscribed into digital platform infrastructures (Plantin et al. 2018) and to how they are reconfigured in use.

Scripts, in this view, are not merely functional templates for action. They carry moral weight. They anticipate and encourage certain kinds of users while deterring others. They distribute not only agency but also legitimacy, prescribing what kinds of conduct are rewarded, sanctioned, or silenced. Likewise, the interpretive work of users is not just about decoding meaning but it represents a form of moral negotiation that can affirm, reject, or creatively reimagine the values embedded in design. By integrating these insights, we can move beyond binary oppositions between designer intention and user reception and begin to trace the dynamic processes through which technological artifacts become morally charged in practice. To illustrate this framework, we draw on our AlgoRes project and the multi-sited ethnographic fieldwork carried out with food delivery workers across five countries: Italy, Spain, Mexico, India, and China between 2020 and 2022. We conducted 68 interviews with food delivery workers and engaged in participant observation during their work shifts. This was complemented by a digital ethnography of dozens of private WhatsApp groups created and used by the workers themselves

(Bonini and Treré 2024; Bonini et al. 2023). These contexts differ in terms of labour law, urban infrastructure, and platform penetration, but they reveal striking continuities in how platform morality is operationalised. Gig economy platforms such as Deliveroo, Glovo, Meituan, Uber Eats, and others encode a distinctive moral economy that challenges the values of their corporate designers which is based on competition, individual performance, quantification, and the extraction of behavioural data as a proxy for value. This moral order is not only written into public-facing branding or user agreements but becomes tangible in the structure of the apps themselves. This is evident in the way affordances are designed to constrain interaction. The absence of peer-to-peer messaging, for instance, is not a technical limitation but a normative decision. It prevents workers from coordinating, comparing pay, or forming alliances. The gamification of productivity – through rankings, badges, or performance scores – encourages workers to compete against one another and accept precarity as the price of flexibility. Opaque algorithmic evaluations determine who gets better time slots, higher-paying orders, or access to shift-swapping, yet the criteria for these decisions are rarely disclosed. These features are not morally neutral. They reward silence, speed, and obedience while discouraging forms of cooperation that might challenge the logic of individualised productivity.

Yet this moral framework is not uncontested. Workers do not simply absorb the normative codes embedded in platform infrastructures. Instead, they actively reinterpret, negotiate, and resist them in everyday ways. Through grassroots digital practices, they construct what we call cooperative affordances: informal, improvised infrastructures of solidarity and mutual support that arise in response to the isolating and competitive logic encoded in platform design (Bonini et al. 2023). These affordances materialise in the gaps left by the platform's architecture where interaction is restricted, communication discouraged, and collective agency rendered invisible. Cooperative affordances take diverse forms, depending on local context, infrastructure, and risk. In some settings, workers create and maintain WhatsApp or Telegram groups to share real-time information about bonuses, traffic blocks, or unsafe areas. They exchange screenshots, coordinate informal shift swaps, and flag sudden changes in app behaviour or delivery rules. These communication channels compensate for the opaque, one-way nature of the platform's informational flow. In contexts with high turnover or low regulatory protection, such as in parts of Mexico and India, they also serve as informal training hubs, where more experienced riders help newcomers interpret ambiguous rules or avoid costly mistakes. In other cases, workers establish unwritten moral codes: discouraging queue-jumping, warning against selfish behaviour, and offering emotional support during difficult shifts. These practices often occupy legal and contractual grey zones, but they reflect a coherent moral logic grounded in reciprocity, shared risk, and collective survival. Platforms may treat riders as atomised inputs, but riders actively produce forms of connection that reassert the social and moral dimensions of labour.

More specifically, these cooperative affordances give rise to three distinct but interconnected forms of moral reconfiguration that challenge the platform's normative order:

1. **Mutual learning**. In the absence of transparency from platforms, workers rely on each other to decode the algorithmic logic that shapes their conditions of work. They share tactics to avoid penalties, maximise bonuses, or understand subtle changes in dispatch

patterns. This collective knowledge production fills the vacuum left by the platform's refusal to explain its own decision-making systems. It also fosters a culture of informal pedagogy and mutual dependence, which directly contradicts the platform's celebration of self-reliance, gamified competition, and entrepreneurial individualism.

2. **Everyday resistance**. While not always formally organised or openly confrontational, workers engage in dispersed acts of tactical disruption. Riders may collectively log off to reduce delivery capacity, refuse undesirable orders, or experiment with hacks and workarounds that soften the algorithm's grip. These actions are rarely articulated in the language of protest, but they are meaningful forms of resistance. They reclaim space for negotiation within rigid systems and highlight the possibility of tactical agency under conditions of constraint. In some cases, such practices build toward coordinated actions; in others, they remain fleeting but significant interruptions of extractive routines.

3. **Solidarity and care**. Perhaps most overlooked, yet arguably most vital, is the emotional and relational infrastructure that workers create to support one another. Messaging groups become spaces not only for logistics, but for humour, empathy, and recognition. Workers check in on each other during dangerous weather, help colleagues replace broken gear, or share surplus orders when someone's income drops. These are not residual or sentimental gestures. They constitute a counter-moral economy based on mutual care, a human ethic that reasserts dignity in a system optimised for silence and speed. In contexts where burnout, isolation, or accidents are common, these solidarities become lifelines.

Together, these practices do more than alleviate the hardships of platform labour. They actively remoralise digital infrastructures, embedding values of cooperation, interdependence, and collective agency into spaces that were explicitly designed to minimise them. In doing so, workers reveal not only the exclusions built into platform morality, but also the possibility of alternative moral orders, grounded in everyday practice rather than top-down design.

These practices also invite us to rethink how we conceptualise moral agency in technological systems. If morality is not an abstract property inscribed once and for all, but an ongoing negotiation between multiple actors – designers, users, algorithms, infrastructures – then agency itself must be understood as distributed and contingent. Platforms do not possess morality on their own, just as users do not operate in a vacuum of pure choice. Instead, moral meanings emerge through the dynamic interplay of scripted behaviours, affordance limitations, contextual constraints, and creative reinterpretation. From STS, we draw the insight that artifacts delegate and prescribe actions. From cultural studies, we learn that users decode, disrupt, and re-signify those prescriptions according to their moral economy. It is in this push and pull, this constant dance between constraint and improvisation, between control and care, that technologies take on their moral texture. By placing design and use into the same analytical frame, we can better understand how moral economies are constructed, contested, and sometimes transformed.

In conclusion, we advocate for a relational and contested view of platform morality. Platforms are not passive tools, nor are they stable moral subjects. They are terrains of struggle,

shaped by conflicting scripts, uneven affordances, and divergent visions of justice. By bridging STS and cultural studies, we can better capture how these struggles unfold, not only in boardrooms and design labs, but also in the streets, phones, and chat groups where users reconfigure technologies through everyday practice. This approach also helps to move beyond deterministic accounts of technology that view power as either top-down or bottom-up. Instead, it foregrounds the moral life of platforms as something that is constantly negotiated, reimagined, and embedded in the micro-practices of labour, resistance, and solidarity. Understanding platforms in this way allows us to grasp not only how control operates, but also how alternatives are enacted, however fragile or temporary they may be. We offer this reflection not as a finished theory, but as an invitation. It is a call to think with and across disciplines, and to trace how the moral contours of the algorithmic society are shaped in action, conflict, and care.

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Decolonizing Science and Technology Studies?

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Abstract

This *Scenario* analyzes the relationships between STS, postcolonial studies, the decolonial approach, and other frameworks that address planetary issues and the heterogeneous positioning of social studies of science and technology. First, it defines STS as a "*Science of the North*", not only because it has been largely produced within the Euro-Atlantic area, but also because its conceptual apparatus presents itself as universal, even though it originated in a limited region of the world. Next, after outlining the main postcolonial and decolonial approaches, the article explores the openings that have emerged – especially in recent years – toward a fruitful hybridization between the two perspectives, both methodologically and theoretically. In particular, it highlights the encounters between non-Western and Western epistemic practices and the questioning of taken-for-granted roles within STS methodological practices themselves. Finally, the richness that STS can contribute to postcolonial studies is identified in its focus on materiality and planetary concerns, and thus in the fact that it does not restrict analysis solely to the discursive, semiotic, or representational dimensions of coloniality, as often happens in classical postcolonial studies.

Keywords

STS; postcolonial studies; decolonial approach; hybridity; local knowledge.

1. Introduction

Science is rooted in styles of thought within which are embedded assumptions about the taken-for-granted. In this way, it becomes an authority for the classification of what exists, the setting of priorities, and the quantification. Moreover, technology incorporates within itself – rendering them invisible, ubiquitous, and powerful – priorities, alliances, information, and knowledge; in other words, it functions as a social glue (Star 1991; see also Fleck 1979, 99, 142). Among these elements are colonial, neocolonial, and imperial elements, included in the process of meaning-making and knowledge production through entangled relationships, and in-between of them. This *Scenario* analyzes how these dimensions constitute both a foundation in the construction of STS and their object of study, and, at the same time, a removal.

Technology and science are global and planetary phenomena. Can the same be said of STS? If not, in what ways does this reflection challenge the field? Conversely, what do STS contribute to postcolonial or decolonial thought? Or should we rather consider them a *science of the North*? If that were the case, how could STS be meaningfully practiced across most of the world, and what would be their relevance for scholars from the South or from the margins of the West? What kind of reflexivity should we demand from those who lead this field? And what creative contribution can we make to its further development? The cognitive process we call STS compels us – by virtue of its own theoretical and methodological foundations – to adopt a critical and reflexive stance toward itself.

2. Science and Technology Studies as a "Science of the North"

Within STS, the overlap between the "global" and the Western is almost complete, even though the number of contributions from non-English-speaking countries has increased. Studies from other regions remain marginal, and even STS practiced in marginal areas rarely succeeds in translating itself to a global level. As Alexandra Hofmänner pointed out, two thirds of the contributions to *The Handbook of Science and Technology Studies* (Felt et al. 2017) came from the USA or the UK, and 90% from the USA and Europe. Approaching STS still means, for the most part, being trained in a mere history of ideas rather than engaging in a reflexive reconstruction of a knowledge trajectory and of the conditions within which this tradition emerged. As a cognitive process, STS produces collectives, excludes themes such as colonialism, defines priorities, and generates aspirations among those who enter the field (Dumoulin et al. 2017, 424; Hofmänner 2021, 17, 22, 31). The STS conceptual apparatus was developed on the basis of research conducted in "advanced" countries, yet it carries universalistic claims. Its origins are traced back to the SSK in England and Scotland, within prestigious academic institutions, and to the work of heroic entrepreneurs of heterogeneity – like any other intellectual enterprise conventionally narrated. Too many foundational contributions have been erased, among them those of Ludwik Fleck, the Soviet school of Boris Hessen, and the critique of the political role and non-neutral character of scientific knowledge developed in Italy during the 1970s, initially by physicists (Graham 1993; Hofmänner 2021, 22-33; Ienna 2023; Löwy 2016, 510-515; Mongili 1998).

The knowledge produced by STS itself cannot be detached from those who produce it, from where it is produced, in what language, and from its epistemic relationship to the phenomena studied (Strathern 2018). That STS constitutes a *science of the North* appears beyond doubt. Since the 1980s, STS have experienced a spectacular rise in the West, thanks to the ethnographic turn, laboratory studies, and controversy studies investigating science "*in the making*". A total agnosticism toward epistemological problems was adopted, focusing instead on the hybrid process through which epistemic qualities are attributed to scientific facts. Subsequently, attention shifted to technological development and its entanglement with science within a single, indistinguishable field of practice – technoscience (Collins 1985; Knorr-Cetina 1981; Latour 1987; Latour and Woolgar 1986; Pickering 1993). STS, particularly with Latour, deconstructed dichotomic models, even undermining the idea of Othering, so constitutive of Western supremacist visions. If there are assemblages of heterogeneous entities, there is no "Other" opposed to

a "We". STS scholars subsequently developed research on innovation, science policy, medicine, embodiment, practices, and sociomaterial aspects (Latour 1987; Mol 2002; Pickering 1993) – remaining agnostic toward science while increasingly engaged with the reassembling of the social and the political on a planetary, technoscientific background (Chakrabarty 2021; Latour 2005). For STS, everything that belongs to a sociotechnical collective must be considered according to its shared agency – nothing can be read as "other". All entities involved in sociotechnical processes are taken into account. This principle of methodological symmetry opened vast possibilities for investigating technoscientific processes, although it has mostly been applied only to two kinds of knowledge: *rejected* and *accepted*. Many elements once deemed irrelevant for analyzing technoscience are now included in STS analyses (Hofmänner 2021, 254; Latour 1992; Prasad 2023). However, many scholars have excluded coloniality *in-between* from the count of entities forming sociotechnical collectives. Latour himself (1999), in his work on the translation of Amazonian soils and flora, illustrates a chain of heterogeneous elements; yet, although the study was conducted partly in the Amazon, local or Indigenous knowledges never appear. Similarly, in De Laet and Mol's famous research on the *bushpump* (2000), colonial Rhodesia is completely effaced. John Law's celebrated study (1984) on long-distance control in Portuguese navigation rests on an Orientalist imaginative geography (Prasad 2023, 124-139). Alexandra Hofmänner has questioned how Thomas Hughes's monumental study of Large Technological Systems could have overlooked Johannesburg's gigantic electrical system, which programmatically excluded most of the population for colonial reasons (Hofmänner 2021, 19-20).

The desire to free STS from ideological burdens is legitimate, yet offering a partial framework that denies the entanglement of technoscience and politics impoverishes the knowledge process itself (Prasad 2023; Hofmänner 2021, 222). This had already been noticed by Ludwik Fleck, whose experience as a Jewish scholar in structurally antisemitic societies shaped his thought and who explicitly warned us about the political misuse of science and technology (Löwy 2016, 521). Technoscience acts politically insofar as it is "a source of changing power relations among actors, which may leave some in better situations but marginalize or harm others" (Pfotenhauer and Juhl 2017, 86). It is also an object of politics and embodies political constraints in its design and uses. The link between technoscience and politics is thus recursive (Callon et al. 2009; Mol 2002; Star 1991; Star 1999; Winner 1986). Considering the colonial may appear a return to the dominance of *passe-partout* categories saturated with ideology (Latour 2004, 245-246), yet it actually leads to a more complete rendering of processes directed by Western elites who manage complex technologies according to exogenous organizational models (Anderson 2002, 644). Its omission poses a greater danger than its overemphasis. The reflexivity principle of the *Strong Programme* (Bloor 1976) urged us to adopt a causal, impartial, and symmetrical approach to the kind of knowledge we produce. In the end, however, STS themselves appear as a universalized form of knowledge – while remaining a science of the North.

3. Postcolonial, Decolonial, and Beyond

What happens within STS also happens across technoscience as a whole. It presents itself as a universal phenomenon, and the uniformity of many standardized procedures can obscure

the variety of actual situations. Its existence, however, is constrained by institutional relations, infrastructures, and materials that condition diverse practices (Haraway 1988; Timmermans and Berg 1997, 275). Outside the boundaries of advanced countries, technoscience is often viewed as a replica, and its colonial context is ignored, trivialized, or devalued – according to an asymmetry of intellectual labor that has produced the situation in which "theory is made in the metropolis, while data are collected in the colonies". The Western tradition is thus seen as the only one capable of accurately understanding nature, social relations, and causal paths, and of producing theoretical and analytical categories with universal validity (Dumoulin et al. 2017, 434-436; Harding 2011, 6; McNeil 2005; Prasad 2023). The idea that science and technology develop similarly everywhere and possess universal value leads to a conception of the world as reducible to what John Law (2015) has called a *One-World World* – a world that denies legitimacy to the existence of other "worlds" and alternative epistemic processes. To understand this dimension, it is necessary to engage with other theoretical traditions, starting with dependency theories developed in the 1960s, and later with the "New Humanities" and postcolonial studies of the 1990s, where the topological relations between knowledge and power were examined.

Dependency theories were based on the observation of limited integration and the differentiated institutionalization of science between North and South, considering the former as the center and the latter as the periphery (Amin 1976; Dumoulin et al. 2017, 427-428). They took modernization as an inevitable evolutionary path for all countries, mirroring development policies (Basalla 1967; Eisenstadt 2000; Rostow 1960). The use of science to demarcate the difference between the *West and the Rest* parallels the traditional dichotomy between "development" and "underdevelopment" (Escobar 1995; Prasad 2023, 17; Rajão and Duque 2014). This approach was later challenged by the field of postcolonial studies, which refers both to the impact and legacy of historical imperialism and colonialism and to contemporary forms of neocolonialism. These studies include a territorial reference to colonial spaces and a critical reference to the West. Within them, postcolonial STS have focused on the relationships between North Atlantic technoscience, colonial subjugation policies, non-Western forms of knowledge, and the failure of "development" and "innovation" policies in regions marked by colonial relations (McNeil 2005, 106-107). Gayatri Chakravorty Spivak's *Can the Subaltern Speak?* (1988), together with the work of Homi Bhabha and Stuart Hall, fueled a critical debate that led to the reevaluation of Frantz Fanon (Chakrabarty 2021, 17). The introduction of *subalternity* as a category in research on the non-West has been foundational, and must be traced back to the theoretical work of Antonio Gramsci. According to the Sardinian thinker, subalterns represent disaggregated, fragmented social segments – workers, peasants, women, religious minorities, ethnic and racialized groups – who suffer the initiative of the dominant class and exist in a state of self-defense. They are often reduced to folklore or pop culture due to nature of the domination exercised through cultural hegemony (Gramsci 2011; Fresu 2023).

Edward Said (1979) and Gayatri Spivak (1988) emphasized the importance of rendering subalterns visible and giving them voice in historical and cultural processes. Spivak notes that subjects from most of the world, as represented in Western discourse, are recognized only insofar as they resemble a Westernized middle class (Spivak 1988, 271, 282). However, the use of the subaltern concept raises significant challenges in postcolonial studies, as it risks shifting attention away from the materiality of domination toward purely semiotic,

discursive, or representational issues (Mbembe 2001, 5; M'charek 2014a). Dipesh Chakrabarty has summarized these concerns through a critique of the Subaltern Studies' neglect of Dalit invisibility and caste hierarchies. In line with Fanon's theory of the "black body", he raises the problem of bodies marked by exclusion and disgust, urging us to move beyond philosophical abstractions that privilege the "anonymous" body, so as to overcome the lack of a theory of materiality (Chakrabarty 2021, 124-125; Fanon 1959; Mbembe 2001, 9). Frantz Fanon critiqued how medicine and psychiatry served as tools to legitimize domination, adopting Manichaean dichotomies between "modern" and "savage" peoples and supporting colonial practices of alienation. This produces a *colonial trauma* acting within the psychic states of colonized peoples, making bodies a privileged site of analysis (Fanon 1959). Edward Said (1979; 1993) analyzed how peoples in the Levant internalized essentialist prejudices crafted by Western discourse on the "Orient". It explains the Levant through the essentialist character of its civilization. This dichotomy creates a "historicism without history" in which the real history of the "Non-West" (or Not-Quite-West) becomes irrelevant or is marked by perpetual "lack" (Anderson 2002, 646). Through their colonial relations, hegemonic countries developed a self-definition in supremacist terms. Homi Bhabha (1990; 1994) likewise analyzed colonial discourse as an apparatus that translates racial, cultural, and historical differences into a knowledge form representing the colonized as degenerate. Recognition of difference thus becomes a means to deny the colonized full contemporaneity. The colonial subject is driven toward mimicry, concealment, or passing, while Western identity consolidates through self-exaltation. The colonized identity is often reduced to natural inferiority, particularly in racial terms. Bhabha identifies *hybridity* as a way out – a transformative postcolonial space capable of destabilizing colonial binarism (Bhabha 1994). In postcolonial contexts, inequality and cultural oppression can thus be overcome (Shepherd 2005, 131). Hybrids and hybridity immediately resonate with STS, and the need to describe agency in hybrid terms. The idea of the *entanglement* between material and human agency – and the radically hybrid character of modes of existence – is perhaps the most distinctive feature of STS (Callon 1984; Latour 1993, 11; Pickering 1993, 577; Prasad 2023, 144). Naturally, in postcolonial theory, the issue is not one of human versus nonhuman, since it remains grounded in discourse and sociohistorical action. Yet hybridity offers a way to think about forms of knowing and acting that escape binary or hierarchical logics (Bhabha 1994). Dipesh Chakrabarty pointed out that the West, starting from its own history, has removed the colonial fact and allowed itself to forge theoretical categories of universal validity, including historical periodizations. A North-Atlantic historiographical canon thus serves as a reference for most of the world. While European or North American historians can ignore most of the world's history without diminishing their scholarly status, "we cannot even afford a... symmetry of ignorance... without appearing outdated or unfashionable" (Chakrabarty 1992, 2). The rest of humanity is thereby reduced to an anthropological "Other", whose history becomes mere empirical material for data collection – relegated to a "waiting room of history" characterized by constant delay (*ibid.*, 2-3). More recently, Chakrabarty has criticized postcolonial studies for their indifference toward environmental crisis and planetary issues. Failing to relate geological time and human history, as postcolonial studies often do, is untenable when the gap between the two calendars is disappearing (Chakrabarty 2021, 17-38).

Decolonial hypotheses, by contrast, take the subaltern position as the epistemic and political foundation of their enterprise. They aim to overturn hegemonic European epistemologies and replace them with a new, revolutionary – though unified – framework. Peruvian sociologist Aníbal Quijano developed the concept of *coloniality* to describe a colonial condition not necessarily tied to formal colonial rule. Coloniality manifests as the dominance of a discourse in which anything opposing a Eurocentric worldview is deemed dangerous, inferior, or marginal. Upon this base rises a Eurocentric hierarchical system and an epistemology that excludes knowledge from the Global South. Coloniality thus appears as a Eurocentric structure of power that has ruled the world since the "discovery" of the Americas (Quijano 2000). In this sense, colonial experience is subsumed into the Latin American one, through which the birth of Western modernity too is explained. This view considers the colonial Other as both "ontologically given" and "historically constituted". Yet decolonial thought rarely considers European colonialism outside the Americas, nor other forms such as Japanese, Tsarist, Soviet, or Chinese colonialism (Chen 2010, 66-68; Harding 2016, 1066-1076; Mignolo 2011; Prasad 2023, 113). Epistemologically, decolonial thought proposes the emergence of an *epistemology of the South* leading not only to decolonization but to final liberation (Anderson 2020; Grosfoguel 2003; Quijano 2000; de Sousa Santos 2014). In this respect, it contrasts with the dominant STS approach, which grounds objectivity in limited location and situated knowledge (Haraway 1988). Decolonial theory reinstates a revolutionary objectivity founded on the separation between subject and object, far removed from STS agnosticism (Anderson 2020, 430-438).

A possible point of convergence with STS lies in the shared interest in the processes that construct a naturalized basis for race or biological classifications (M'charek et al. 2014a; 2014b; Schwartz Cowan 2008; Seth 2009). Decolonial approaches identify racialization as the abyssal form of marginalization that renders nonwhite populations inferior or subhuman (de Sousa Santos 2014). STS scholars examine practices of constructing naturalized differences between populations as both epistemically and materially embedded in technoscientific devices. Racism operates in the formation of classificatory systems incorporated into such devices and their operational use in border controls and registration systems. In an often invisible but ostensibly objective entanglement, technoscience and racism generate *technologies of belonging* that produce hetero-directed identification through databases, lists, maps, genetic tests, and naming practices. Databases on DNA, genome, and biological and biometric characteristics reveal how technology constitutes and classifies populations according to biological and genetic criteria, resulting in the "absent presence" of racism (M'charek et al. 2014b, 469).

Taking East Asia as a vantage point, Kuan-hsing Chen (2010) and other Far Eastern scholars developed the *Asia as a Method* hypothesis, which reflects the need to take into account the heterogeneity and plurality of colonial experiences in Asia, Africa, Oceania, and elsewhere, as well as the diverse epistemological encounters and clashes that differ greatly from Euro-American experiences. Its object is not so much the historical form of colonialism as *neocolonial imperialism*, even more dynamic and, though less reliant on military intervention, producing devastating inequalities, marginalization, economic and financial concentration, global division of labor, and environmental degradation (Anderson 2012;

2020; Chen 2010, 18-22). *Asia as a Method* urges us to "provincialize" not only Europe but also the Americas – without replacing them with an "Asia", seen as a unity, but as a heterogeneous site of conceptual production and theoretical transformation (Chen 2010, 217-222). This method involves:

a. deconstructing otherness, recognizing that "the West" is not a unified entity and may not even be the "Other" of anyone;
b. *regionalizing* rather than simply provincializing the West, dismantling it into multiple expressions; and
c. rejecting the formula "*The West and the Rest*", which overstates the West as the universal point of opposition (Hall 1992; Said 1979).

The heterogeneous, plural, and ambiguous nature of Asian colonial experience reveals how imperial countries could become colonized – and, after decolonization, again pursue imperial policies. *Decolonization* does not necessarily rhyme with *anticolonialism*; rather, under Cold War conditions, decolonization became entangled with modernization and knowledge production processes, often through imported technologies and externally directed development projects, which frequently failed and deepened dependency (Chen 2010, xii–xiv, 66, 211; Escobar 1995; Lu and Qiu 2023, 273).

Isabelle Stengers placed at the core of her concept of *cosmopolitics* the centrality of practices, understood as a constraint on agency shaped by the temporal dialectic of resistance and accommodation (Pickering 1993). Returning technoscience to its practices allows it to be compared, hybridized, and understood as an ordinary form of knowing. For Stengers, technoscience must also be thought in relation to those who bear its consequences – both human and nonhuman worlds (κοσμοί) marginalized by hegemonic epistemic processes, as in colonization. This may lead to "civilize the way scientists think of themselves, that is, to separate them from hegemonic-order words such as rationality, objectivity, and universality" (Stengers 2018, 87). Cosmopolitics should promote, through deliberation, the overcoming of divergences between dominant and dominated – both human and nonhuman – including the victims of colonization (*ibid.*, 94-95). Her proposal may be the one that most effectively hybridizes STS and postcolonial studies, by fully recognizing humans as collective geological and biological planetary agents, and by attempting to transcend the analytical divide between human history and geological or climatic change. Focusing on the disastrous planetary situation, summarized in the Anthropocenic hypothesis, means including in analysis every relevant dimension – from embodiment to inequality, from colonialism to extractivism. For this reason, as Chakrabarty argues, we must abandon the rhetoric of "globalization", since "the globe [...] is a humanocentric construction; the planet, or the Earth system, decenters the humans". Chakrabarty highlights the anthropocentric link between globalization and the long trajectory of modernizations. Countries marked by colonial histories have often chosen extractive models of political development and territorial exploitation. This is how the Anthropocene manifests itself across most of the world (de la Cadena and Blaser 2018, 2; Chakrabarty 2021, 4, 207-217).

4. A Post-Colonial Moment in STS: New Symmetrical Approaches

> We are the ones who have done the invisible work of creating a unity of action in the face of a multiplicity of selves, *as well as*, and at the same time, the *invisible work* of lending unity to the face of the torturer or of the executive. We have usually been the delegated to, the disciplined. [...]. This experience is about multivocality or heterogeneity, but not only that.
> – Star 1991, 29

The inclusion of the colonial in STS analyses is a recent achievement, which provides another layer to the argument about situatedness and construction of scientific knowledge – the imbrication of science(s) within colonial discourses and practices and its continued impact in postcolonial contexts (Prasad 2023, 32). Since the early stages of the Social Studies of Scientific Knowledge (SSK), it has been clear that sciences and societies co-constitute each other at particular times and places, and that beliefs must be analyzed symmetrically. Subsequently, ANT extended analytical symmetry to the human–nonhuman pair (Latour 2005; Harding 2016, 1064; Law and Lin 2017, 213-214). STS have emphasized that linear and asymmetric representations of technoscience are not only too simple, but also "detrimental to understand its development" (Bijker 1992, 75). They exclude what are considered marginal dimensions – that is, all moments other than design and conception. Actor-Network Theory has considered technoscientific phenomena as sets with open borders, continuously changing and hybrid. As hybrids, they are not different from phenomena concerning so-called traditional societies (Latour 1993). ANT has encouraged us to take into account everything that is part of sociotechnical processes, not only design, invention, or stabilization. Although these principles are clear, in research practice their application is often removed – except maybe in studies conducted in the Far East, where STS have had to confront intersections between Western science and other forms of knowledge (Lin 2017, 406). Analyses of the modes of existence of technoscience beyond design, the engineering of the heterogeneous, and the teleology implicit in the emphasis on the stabilization of scientific facts and technological artifacts have helped to confront the erasure of the colonial. Increasing attention has been paid to articulation, to the role of users and maintenance or repair technicians, and to critiques of the master's narrative (Mongili 2008). As Leigh Star (2015, 151) wrote, "A system becomes a system in design and use, not the one without the other". Steven Jackson reverses the idyllic vision of the existing by proposing that we consider as regular what is usually thought of as exceptional – namely instability, decay, and disorder – through his powerful concept of *broken world thinking* (Jackson 2014). This is a very useful concept for understanding phenomena typical of places marked by coloniality, such as the obsession with developing massive material infrastructures. The idea is that by designing and building them, one automatically enters "development".

Infrastructures correspond to relations among materiality, institutions, politics, knowledge practices, and entities located at different scales. They bring about not only new transformations, but also new topologies and politics, directly implicating colonialism (Anand et al. 2018, 10-18). Infrastructure interventions can be divided into two types. The first often

follows a military logic or aims at the segregation of native populations, who are confined or excluded from the development of road networks, military installations, food distribution systems, or energy grids. These infrastructural policies frequently produce diseases or are used to facilitate massacres and the extermination of Indigenous peoples (Harvey 2018, 83; Hofmänner 2021, 227-230; Mbembe 2003; von Schnitzel 2018, 137-140). The second type includes projects responding to demands for mobility, connection, or access to technologically updated services, often used by local authorities as tools of political consensus due to their association with promised development – but also as mechanisms to channel public funds to private speculators and to maintain clientelism and corruption. Very often, due to the absence of maintenance structures, they decay, are abandoned, or remain incomplete. From a developmental standpoint, they are chimeras (Anand et al. 2018; Appel 2018, 58; Larkin 2018, 175-176). The study of infrastructures and large technical systems has, however, largely avoided addressing, within conventional STS, the problem of their development as devices of centralization, ordering, infrastructural exclusion, and as weapons against populations (Hofmänner 2021, 49-50; Hughes 1987).

STS were born to investigate the continuous movement of translation across manifest disciplinary and territorial boundaries within which technoscience exists (Morita and Mohácsi 2013, 7). It exists as a relational phenomenon: connected, infrastructured, and circulating across different worlds. It has a structural link to design and to the corporations but is not reducible to them. Hence, it is constitutively tied to power asymmetries and the strategic formation of hegemony – something particularly evident in the digital, platform, and algorithmic era, which "also mirroring back to users calculated snapshots of themselves as members of taste publics or participatory communities" (Gillespie 2014, 14). Forms of use, maintenance, repair, the variety of device interpretations, their placement within a context and its transformation, and their spatiotemporal variations all constitute their multiplicity. Within this multiplicity, technologies can exist between what is situated and what "attempts to represent information across localities". Technologies themselves appear as *means of translation* for the collective activities performed by heterogeneous entities (Star 2015, 150-156). The information and data enabling the circulation of technologies are not neutral; they carry with them categories, conventions, standards, hierarchies of priority, exclusions, and invisibilities, and they express a particular *knowledge logic*. The technical data of devices remain unaltered and constitute an infrastructure present in every set. They assign essentialist forms to phenomena, assume their categorizations as the only plausible ones, and become operational through the technologies that incorporate these categorizations in the structuring of data (Bowker and Star 1999; Gillespie 2014).

However, the fragility and variability of forms of use prevent us from explaining sociotechnical phenomena solely from the standpoint of design or the data embedded within (Denis and Pontille 2025; Jackson 2014). The multiplicity of ontological forms corresponding to the different *enactments* of devices is another element that allows us to analyze the translatability of these forms beyond Western technoscience and vice versa – as in the well-known example of the translatability of Yoruba calculation practices into Western ones, presented in Verran's *Science and an African Logic* (2001). It is nevertheless difficult to escape the hegemonic thought that defines an "ordered and immanent law-determined one World" (Cech

et al. 2017; Law 2015). Three main critical claims summarize the limits of this hegemonic thinking: "(1) realities are enacted in practice; (2) since there are different practices, there are different enacted realities; (3) these practices and realities overlap and weave together to generate ontological multiplicity" (Law and Joks 2019, 425).

It follows that, according to an extended symmetrical principle, knowledge practices and realities judged by the mainstream as irrational or unfounded should not be excluded from inquiry. Different practices create different realities – not only through the meanings attributed to devices but also in relation to their situated *enactments* (Anderson 2020; Law 2015, 127; Mol 1999, 75). The goal is to clarify how realities are enacted, not what their essence is. For this reason, it is necessary to adopt a "politics of how" (Law and Joks 2019, 440), which considers knowledge, practices, enactment, and multiple realities symmetrically. John Law and Solveig Joks (2019, 440) summarized the theoretical shift accomplished by STS beyond conventional social sciences as the move from the "politics of who" – concerning only social relations, individual and collective rights and duties, and social actors' performances – to the "politics of what", concerning people and things, and thus the *enactment* of nonhumans. This is the fundamental shift from the analysis of the solely social to the inclusion of *assemblages* and hybrid *agencements* between humans and nonhumans, produced by practices (Mol 2002; Pickering 1993). To integrate phenomena such as colonialism and planetary issues, it is necessary to adopt a "politics of how" (Law and Joks 2019, 440), which symmetrically considers knowledge, practices, *enactments*, and multiple realities. Unfortunately, the theoretical efforts undertaken so far within STS – which remains a field of study centered on Anglo-Saxon cultural hegemony – continue to face the risk of being unable to see the Other except as an ontological given, rather than as the product of historical and social processes (Prasad 2023, 112-113).

It remains difficult to confront the question of *cui bono* in technoscientific processes: to whose advantage – and excluding whom – do they take shape? Too often, subalternity is confused with poverty or backwardness. Colonial history, understood as a duration acting in the present rather than a distant origin, is still difficult to assume. For instance, the role of colonialism has been erased from studies of the Scientific Revolution, seen as "embodiment of Eurocentric historicism without history" (Prasad 2023, 10, 87; Said 1979). The entanglement between technoscience and power has always posed a problem concerning both practices and their ideological uses. It involves principles of classification, standards, hierarchies of priority, communication forms, quantification modes, and data cultures (Bowker 2005, 184; Bowker and Star 1999). These are key elements of legitimation and consensus, particularly affecting marginalized, minority, and so-called "backward" or peripheral groups (Star 1991). Hence, they also concern the colonial, even though marginality and coloniality cannot be overlapped.

As Nicola Manghi has shown, Latour was well aware of the need to analyze why the Ivorians he studied in Abidjan in 1974 were deprived of the right to speak within a "modern" and "developmental" context – because they had to mirror themselves in a discourse that portrayed them as lacking competence. Drawing on concepts developed by Deleuze and Guattari in *Anti-Oedipus*, Latour showed how individuals involved in the same collective agency are simultaneously classified as modern and backward, competent and incompetent, educated and ignorant. The position of anyone identified as incompetent and backward – because

"native" or "indigenous" – is outside civil society, that of a shadow or a labourer. Thus, it is the relation of domination itself that assigns people, competences, status, and their relation to materiality and machines (Manghi 2021).

The possibility of addressing issues of technoscience in peripheral areas has been significantly enhanced by these theoretical advances. It has been crucial to abandon a taxonomic vision of culture and to adopt a generative one, in which culture is understood not as a repertoire but as a production or reproduction that takes place when people encounter the world. Today, as in the past, anyone can participate in multiple cultures, ethnicities, nationalities, classes, genders, kinships, and histories (Barad 2003; Kavita et al. 2012, 15). However, for this to be possible, the social sciences must critically analyze the role of the ideologies of development and modernity as powerful actors in the creation of subalternity and marginalization of places and groups – even through technoscience. This could recreate a virtuous circle so that "the subalterns may speak", supporting groups seeking to transform subaltern realities through their collective political practice (Escobar 1995, 17).

5. Local Knowledge and Postcolonial Topology

In STS there are several openings toward different knowledge traditions. Diversities and ontological multiplicities are problematized rather than excluded as a deviation (Morita 2014, 311; Star 1999, 384). The greatest danger – one that I myself personally experience – is the instinctive tendency to adhere to a classification in which a form of Western knowledge exists on one side, and "non-Western knowledges" on the other. This is a schematic framework that is extremely difficult to abandon, yet necessary to overcome, because it takes for granted boundaries that do not actually exist and renders the two highlighted poles internally coherent phenomena, which they are far from being. However, dominant epistemologies tend to deny the existence of different knowledge traditions, if not prohibit or delegitimize them, by associating other modes of knowing with superstition, irrationality, or ignorance (Cech et al. 2017, 750-754; Ma and Lynch 2014, 655). So, non-Western knowledge are translated into Western problems. They appear as cognitive forms destined to conflict, since only one form of knowledge is considered suitable to explain natural phenomena, while others are regarded as beliefs or mistaken projections. Within them, moreover, the very division between nature and culture is rarely relevant. Their devaluation is also linked to their exploitation. They are extracted from their contexts of production and traditional uses, without any reciprocal circulation of concepts or practices with the originating populations, as shown, among others, by Cory Hayden's research on the use of active principles derived from plants known in Mexican popular culture as medicinal and redirected toward value production in the pharmaceutical industry (Hayden 2004).

The conciliatory idea of a postcolonial encounter becomes possible only if science can be defined not with reference to an immutable methodological essence, but on the basis of the extraction of elements to be mobilized, accumulated, combined, and displayed, using the right tools for the job – that is, according to epistemic practices (Knorr-Cetina 1999; Latour 1987; Clarke and Fukimura 1992). To avoid confrontation, one must identify elements of

sameness on which differences can be negotiated. These can be found in practices, which the ANT approach places at the core of knowledge processes. The principle by which the future acquisition of Western science is promised in exchange for the present recognition of Western superiority and one's own epistemic subalternity – of colonial origin – can be pragmatically overcome (Lin and Law 2014, 3; Mongili 2021; Seth 2009, 377; Verran 2002, 730-731, 752-754). For example, in the diagnostic practice studied by Wen-yuan Lin and John Law in Taiwan, the set of elements taken into account is correlated with place. Its rooting in a place is often asserted, sometimes even generating nativist theories of knowledge. In traditional knowledge systems, *place* is not synonymous with *limited*, since they often consider existence holistically – as an interconnected whole (Candea 2010, 60; Cech et al. 2017, 748; Kuhn 2020, 66; Lin and Law 2014, 9). The concept of *space* is not understood as a point equivalent to any other on a map but derives its meaning from the unique presences that characterize it. The spatial aspect of the concept of *practice* refers to the fact that every practice is situated, in the sense that it occurs in a specific place. At the same time, each practice is fluid and relational – it takes place in situations and is a collective phenomenon (Anzaldúa 1987; Haraway 1988; Harding 2016, 1078).

Non-hegemonic forms of knowledge are important for scholars not because they are true or useful, but for their use and agency (Cech et al. 2017, 745-746). Helen Verran (2002) analyzed the encounter between Aboriginal and Western knowledges in Australia, describing how Western fire management researchers sought to learn from Indigenous expertise by following training offered by Aboriginal elders. In fire management among the Yolŋgu people, ritual takes the place of the text. Yolŋgu epistemic practices were incommensurable with Western scientific ones. Verran observed that these Aboriginal forms were tied to clan belonging and its link with a specific spatial portion – a hybrid for which the Yolŋgu language uses the term *wanga*. In Western science, a formal relationship is established between what happens locally and its generality elsewhere. In this Aboriginal forms of knowledge, the land is not an inert topographical space but a process of creation, whose existence cannot be detached from the ritual activities that enact it (Law 2015, 126-127; Verran 2002, 749). The epistemic encounter/clash between scientists and Aboriginal knowledge holders was characterized by the *disconcertment* of Western researchers. According to Verran, disconcertment arises from the diversity of modes of knowledge production and the absence of long chains of translation in Aboriginal knowledge. Collective memory, elaborated in musical, choreutic, graphic, and narrative forms, becomes knowledge at the moment when these forms are expressed in spaces defined by specific communities. This symmetry is eliminated in dominant Western epistemologies, beginning with that between body and mind. Western conceptualization proceeds through a regime of translations, from the isolation of the scientific fact to its inscription in papers and graphs, and the use of images that then circulate within the scientific community. The regimes of generalization in the two modes of knowledge reflect different immanent ideals and metaphysics (Verran 2002, 752-754; Law and Lin 2017, 215-217).

Translations of participants' conceptualizations can also become productive within STS, through a traffic of concepts or translational movement that is not limited to the narratives of informants, understood only as partners. It must also extend to their theoretical constructions, which offer relevant forms of conceptualization. Atsuro Morita and Gergely

Mohácsi call this hybrid-rooted theoretical form *lateral conceptualization*. They promote the contribution of participants to conceptual development that hybridizes the theoretical forms encountered in fieldwork with academic conceptual apparatuses. Their analyses stem from Morita's research among mechanics in northern Thailand working with Japanese second-hand harvesting machines (Morita 2014). In this case, the problems of technological transfer were not mechanically attributed to the "backward" features of the recipient culture, but explored through a translational movement across disciplinary, national, and ontological boundaries. Rather than interpreting informants' practices and accounts, a lateral conceptualization proceeds by creating parallel lists of words and concepts – one attributable to the ethnographer and their culture, the other to the participants. Each item of the two lists is used to performatively destabilize the other, intertwining them to create something new, based on fruitful conceptual traffic (Morita and Mohácsi 2013, 13). The goal is to favor translation (and dialogue) rather than extraction. We can thus "multiply reality" rather than merely negotiate hybrids. The study of category formation in non-hegemonic forms of knowledge has become part of contemporary reflection (Dumoulin et al. 2017; de la Cadena and Blaser 2018). As Morita and Mohácsi (2013) point out, Melanesian conceptions of *person* and *collective* oppose the Western notions of *individual* and *society*, while Amerindian cosmologies contrast the binary concepts of *body* and *spirit* with the hegemonic *nature/culture* scheme. From these considerations derives the important idea of postulating *multinaturalism* as a more adequate theoretical form than multiculturalism:

> Whereas multiculturalism assumes a universally shared bodily constitution – single nature – and diverse and often incommensurable mental worlds – multiple cultures, Amerindians conceive that humans and non-humans, jaguars and ghosts, for example, share the same spiritual quality while their different bodies bring to each species vastly different perspectives. Viveiros de Castro characterizes this as multinaturalism. (Morita and Mohácsi 2013, 10)

The realities touched by these situations are extremely diverse. In the cases of traditional Korean and Chinese medicine, one witnesses the negotiation of a role in the public sphere that usually results in institutionalization in a secondary position and in a subordinated hybridity. In research conducted in South Korea, Eunjeong Ma and Michael Lynch analyzed the difficulty of accepting computer tomography as a valid diagnostic practice within traditional Korean medicine. Their analysis shows the resistance to hybridizing forms of knowledge in a postcolonial context, particularly among the local modernizing élite (Ma and Lynch 2014). The negotiation of hybrids here is conditioned by the need to hierarchize local knowledge forms with respect to those of Western origin. In other contexts, as in studies on Chinese medicine, it has been observed that traditional medical concepts such as meridians (*jīng luò*, 經絡), vital energy (*qì*, 氣), *yīn-yáng* (陰陽), and the five phases (*wǔ xíng*, 五行) have been reformulated – during institutionalization – in terms of biomedical anatomy, or redefined in discrete and ontologizing ways (Lin 2017, 409). These heterogeneous and hybrid negotiated outcomes, however, do not seem to prevail over the erasure of local knowledge, which advances as a "hegemonic machine" that recognizes no other worlds but its own (Stengers 2018, 86).

Indeed, the devaluation of technoscience and knowledge processes occurring outside "advanced" countries remains a persistent bias. Amit Prasad has shown that even recently, the successful containment of Covid in many African countries was entirely silenced in the West (Prasad 2023, 47). In technology as well, the lack of recognition of innovations originating from the margins is evident. This concerns both innovations emerging from processes not conventionally acknowledged as innovative and successful cases perceived as "exceptions" or "miracles". This gap deepens as the imaginary of a place becomes more tightly linked to subalternity (Jackson 2014; Mongili 2021; Prasad 2023, 47). It involves "invisible technicians" in laboratories, experts in so-called *traditional knowledge* labeled as "indigenous", aged or "unsuitable" users, and inhabitants of places considered "backward" (Godin and Vinck 2017; Shapin 1989). It is a phenomenon present everywhere, with a topological diffusion that grows alongside power asymmetries and the pervasive presence of coloniality in various societies. The inability to recognize the coevalness of all, even within STS, coincides with the misunderstanding of segregation and marginalization of the "backward".

In the training of scholars from marginal areas, this process is observable in forms of reverse selection. As shown by studies by Erin Cech, Anneke Metz and colleagues on the curricula of Native American students in Science, Engineering, and Health Studies (Cech et al. 2017, 748-760), they are required to adhere to the radical delegitimization of indigenous, local, and alternative epistemologies, and thus to exclude the possibility to enact locally different realities. These forms of knowledge are excluded from curricula and burdened with derogatory stereotypes – not only in scientific and technological studies but also in ecological sciences, the humanities, and the socio-anthropological disciplines. Students interested in such knowledge forms are marginalized, making credentials in alternative epistemologies impossible. Similar phenomena have been observed in other marginal areas, such as the scandalized reception of Tracey Heatherington's studies in Sardinia by local scholars accustomed to taking for granted the association of all things Italian with civilization and all things Sardinian with backwardness (Heatherington 2013), or the exclusion of Sámi cultural knowledge from academic curricula in the Sápmi region (Kuhn 2020, 120, 130). Toward the erasure of epistemologies treated as waste has also worked the hegemonic preservationist culture, culminating in that strand of environmentalism that dreams of returning to a wilderness freed from humans – and especially from Indigenous people (Denis and Pontille 2025, 292; Heatherington 2010; Merchant 2003).

6. Conclusion

Across much of the world, technoscience operates in continuity with colonialism – through the extraction of minerals, the construction of massive infrastructures, and the violent reshaping of landscapes, territories, waters, forests, and air. These processes are accompanied by the localization of intensive practices of cultivation, industrial pollution, energy production, and the extraction of rare metals (de la Cadena and Blaser 2018, 2). The encounter between distinct epistemologies and metaphysical frameworks, within contexts marked by power asymmetries and colonial domination, confronts STS with the task of examining how different elements participate in these processes and the directions they take. Such elements can be

positioned differently in relation to power, scale, projects, and uses. Yet the performances of a single device – and the infrastructures that operate across multiple scales – often converge on specific courses of action, aligning heterogeneous elements within unique situations (Clarke et al. 2015; Star 2010). Their analysis is made difficult precisely because they are more *liminal* than *ontological*. As Michel Serres (2009, 109-110) observed, these processes no longer unfold within the same metric, nor according to new forms of measurable distance. What has changed is the very space in which they occur: a topological space, without fixed distance or scale, where temporal relations cannot be determined through stable metrics. In geometry, topology refers to *homeomorphism* – the way relations can take on analogous forms across different times and places, without necessarily belonging to the same structure or system. Adopting a topological approach therefore stands in fundamental tension with the rigid typologies and classificatory schemes that have long structured Western systems of knowledge (Bowker and Star 1999, 116-117, 191; Gromme and Rupert 2020, 241-245; Mongili 2015, 23). The value of such an approach can be illustrated by the topological analysis of the distributed nature of race, which resists reducing race to a single dimension – be it skin color, DNA, or ethnicity – and instead highlights how it is variously constructed across times and places. It also allows us to trace how "elements that are distant in time and space can become proximate and relevant in the here and now", helping us understand "how technologies that seem indifferent to racial differences contribute to the enactment of race" (M'charek et al. 2014b, 471-472).

As with any political question, coloniality also operates within the world of technology – through classificatory structures, systems of data organization and formation, standards, and algorithms. Without following this analytical path, and without engaging with the complexity such research entails, there is a risk of getting lost in the haze of ideology.

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Ecological Reparation: Repair, Remediation and Resurgence in Social and Environmental Conflict

by Dimitris Papadopoulos, Maria Puig de la Bellacasa and Maddalena Tacchetti (eds.) (2023) Bristol, Bristol University Press, 462 pp.

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"There is a crack in everything. That's how the light gets in". With this quote from a Leonard Cohen song, Jackson (2014) began his investigation into repair. The world seems to be crumbling, yet on this damaged planet, we can still find a path toward cohabitation. Speaking of repair implies recognizing the inherent fragility of the world and establishing practices of care that dismantle rigid hierarchical systems, colonial forms of thought, and aggressive modes of appropriating Earth's resources. Repair is fundamentally a mode of caring, and we could expect nothing less from Maria Puig de la Bellacasa who, together with Dimitris Papadopoulos and Maddalena Tacchetti, is one of the three editors of the book reviewed here.

Ecological Reparation is an entangled system of layers of practices, methods of transformation, and conceptual frameworks that deliver a broader idea of what we define as ecology – an "unstable" term, always placed under tension, and capable of generating, through different narratives, a new approach to the planet.

Published by Bristol University Press in 2023, *Ecological Reparation* is a stimulating collection of contributions from scholars and practitioners in fields such as STS, anthropology, environmental humanities, cultural geography, design, and more. The volume addresses the critical question of how to respond to the harm inflicted upon the Earth in the era of extractive capitalism, colonialism, and systemic racism. The authors conceive "ecological reparation" as a process deeply intertwined with social justice, rather than merely a form of technical restoration. In this perspective, Donna Haraway's notion of "Staying with the Trouble" (2016) resonates strongly, becoming a guiding principle: to co-inhabit a precarious planet by acknowledging and confronting systemic inequities.

In *Ecological Reparation*, the editors explicitly aim to juxtapose the concepts of *ecology* and *reparation*, putting them into tension rather than treating them as separate domains. This approach draws attention to the fact that ecological priorities and reparative claims do not necessarily coincide, and that efforts to advance one may complicate or reshape the other. This deliberate approach questions the idea that "repairing the environment" can be separated from profound social, racial, and economic inequalities. Like an archive, an ecosystem preserves

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the layered histories of past exploitation, forced migrations, or chemical contaminations. Through reparation, the authors of the volume argue that mending ecosystems also means rewriting the narratives embedded in these environments, revising modes of knowledge production, and restructuring the institutions that have contributed to causing the damage.

Ecological dynamics can be fruitfully considered as archives, where complex narratives of environmental transformations, harms, and repair processes are stratified. This perspective moves away from static views of nature, interpreting environments instead as living repositories of relationships, material histories, and ongoing exchanges. To conceive ecology as an archive involves adopting an *irreductionist* method – following Latour's vision – as a theoretical foundation, thus rejecting simplified categorizations and embracing the multiplicity of interdependencies that characterize ecological systems. What might at first appear as a mere stratification of soil, in fact, reveals an active record of human and non-human interactions, shaped over time by cooperation, competition, adaptation, and external shocks.

Ecological archives contain traces of symbiosis and disruptions caused by climate change, pollution, and industrial agriculture. These often-disturbed ecologies record layered histories of collaboration and conflict among organisms, elements, and habitats. Such archives directly influence present and future relational configurations: for instance, the chemical composition of soil determines which species can flourish, while the presence of persistent pollutants shapes ecosystems for generations. This view of ecology transforms environmental inquiry into a practice of repair – an intentional commitment to recovering, mending, and sustaining the complex web of life forms on a deeply compromised planet.

When repair is understood as a method, it implies a practical and ethical commitment to recognizing ecological damage, whatever its cause. This method frames repair as more than a matter of technological solutions: it foregrounds everyday acts of care and maintenance as central epistemic and political practices. Care here is not merely an individual or *therapeutic* act, but a relational modality extending beyond single subjects, embracing ecologies of care encompassing environment, memory, infrastructures, and social relations. This approach resonates with Mol's (2008) work on care as a situated and embodied practice, requiring continuous adjustments rather than definitive decisions. In particular, *Ecological Reparation* aligns with Mol's perspective by conceiving care as a series of material and affective acts. Furthermore, just as Mol studies medicine and care as practices carried out through material configurations (tools, protocols, bodies, institutions), this volume explores ecological repair as a practice engaging material entities, damaged bodies and environments, and necessitating forms of attention, maintenance, and repair. Another concept shared by *Ecological Reparation* and Mol's work is fragility as an intrinsic condition of care: the book does not treat ecological reparation as a process of return to a previous state (an illusion of complete restoration), but rather as a way of navigating fragility and uncertainty.

The book is structured around eight conceptual pairs, each centered on a tension: Depletion<>Resurgence, Deskilling<>Experimenting, Contaminating<>Cohabiting, Enclosing<>Reclaiming Land, Loss<>Recollecting, Representing<>Self-Governing, Isolating<>Embodying, and Growth<>Flourishing. The various sections are presented as pairs of concepts in tension, highlighting how the work of repair occurs in frictional zones – spaces where forms of global power and local initiatives conflict, or where environmental recovery goals collide with historical vulnerabilities. Below is a brief overview of the complex structure of the chapters.

Depletion<>Resurgence examines severely degraded ecosystems and their potential for renewal. In El Salvador, agroecological farmers use composting to regenerate impoverished soils. Elsewhere, Indigenous communities in Chile defend wetlands based on spiritual connections and memories of dispossession. These experiences reveal that regeneration is not only a technical process but also involves moral and political dimensions.

Deskilling<>Experimenting focuses on recovering or creating competencies neglected by industrialization. One chapter describes how British farmers rotate cattle across different pastures, weaving practical experimentation with a deep awareness of the interdependence among soil, animals, and human communities. Another chapter, dedicated to Japanese "Fab Labs", illustrates how high-tech tools merge with vernacular artisanal skills, reducing dependence on large-scale industrial processes. These examples resonate strongly with Tsing and colleagues' (2017) emphasis on "collaborative survival", in which informal alliances among multiple actors initiate processes of repair.

Contaminating<>Cohabiting addresses toxicity, highlighting how pollutants and pathogens become part of ecological archives, determining which futures are possible. Efforts at "rewilding" the microbiome or creatively visualizing air pollution in Seoul show that we cannot simply isolate contaminants; rather, the responsibility to coexist with them becomes crucial, echoing Latour's (2017) call for "Facing Gaia", acknowledging mutual vulnerabilities.

Enclosing<>Reclaiming Land emphasizes territorial politics, showing that environmental repair must challenge racial and colonial inequalities in land distribution. One contribution describes the UK-based collective "Land in Our Names", which analyzes the historical exclusion of communities of color from agricultural land. Another chapter addresses Ireland's industrially exploited peat bogs, from which post-fossil experimentation movements have emerged. These cases underscore that repair involves not only ecological restoration but also a reconfiguration of territorial sovereignty.

Loss<>Recollecting highlights mourning and memory, asserting that repair cannot be limited to reducing environmental damage. It must also consider immaterial losses: cultures, species, and objects that shape a community's identity. This is evident in chapters discussing street memorials in post-conflict Colombia or the repair of public benches in the context of austerity in the UK. Such small gestures reveal that mending applies not only to infrastructures but also creates new connections with histories and objects otherwise at risk of being lost.

Representing<>Self-Governing demonstrates how communities can create autonomous forms of governance to repair their environments. "Civic hubs" on the outskirts of Paris or an occupied factory in Italy illustrate local collaborative practices that surpass conventional authorities, reshaping the management of resources and infrastructures. Here, environmental repair merges with political reclamation, aligning with Latour's (1991) invitation to include non-human actors in democratic processes.

Isolating<>Embodying brings attention to the embodied and artisanal dimension of ecological care. From textile weaving as reworking grief to removing graffiti from urban structures, these examples show that repair emerges from manual and sensory knowledge of precariously balanced systems. This connects to Mol's (2008) perspective, which sees care as a situated and continuous activity capable of transforming both subjects and their environments.

Growth<>Flourishing closes the volume by reconsidering ecological development beyond capitalist logics of unlimited growth. Post-extractivist transitions, practices of algorithmic food justice, and new maps of Colombian *páramos* show how partial alliances can support multi-species well-being, recalling Tsing and colleagues' (2017) idea that even severely damaged landscapes can host unexpected forms of collaborative life.

One of the main strengths of *Ecological Reparation* lies in its integration of diverse methodological and disciplinary perspectives. Ethnographic studies, design interventions, interviews, theoretical provocations, and visual elements converge to convey the complexity of repair on the ground. The use of conceptual pairs in tension clarifies that no single model applies universally; rather, local transformations emerge through ongoing, conflictual negotiations. Another merit is the explicit linkage between ecology and reparation, revealing how environments, understood as archives of past violence, can inspire innovative modes of care. Finally, the anthology proposes a coherent framework: repair requires acknowledging accumulated harms and creating small yet meaningful practices that reshape relations between humans and nonhumans, discovering new ways of cohabitation.

Ecological Reparation engages in dialogue with Haraway's (2016) approach, which invites us to stay immersed in problems to respond constructively, and with Latour's (2017) proposals on how to include nonhuman agents in decision-making processes. It also resonates with Tsing and colleagues' (2017) "Arts of Living on a Damaged Planet", paying attention to how local experimentation can help communities navigate environmental ruins.

Finally, Mol's (2008) "logic of care" provides a foundation for understanding knowledge as emerging from action and moral responsibility.

In summary, *Ecological Reparation: Repair, Remediation and Resurgence in Social and Environmental Conflict* offers a valuable interdisciplinary contribution on how to repair worlds marked by centuries of dispossession and environmental devastation. Placing ecology and reparation in tension demonstrates that no purely technical or apolitical solution can address complex crises. Instead, readers encounter a multifaceted set of methodologies in which everyday care, rethinking democracy for nonhuman entities, and an archival understanding of ecological histories are intertwined. Considering ecology as an archive highlights how soils, wetlands, and other landscapes retain layered traces of contested pasts, actively influencing future possibilities in real-time.

This volume invites readers to conceive repair not as a definitive goal, but as ongoing work that builds alliances across differences. Examples and analyses illustrate the modest yet tangible ways in which communities can reorganize their relationships with land, water, infrastructures, and each other, particularly when memories of past violence are neither hidden nor minimized. For scholars, activists, and policymakers seeking creative pathways to address ecological degradation, *Ecological Reparation* serves as a significant conceptual and practical reference, offering novel perspectives on recognizing and contesting harms, and weaving new forms of collective flourishing. We live in difficult times, and perhaps it is no coincidence that this book closes with an essay by Steven J. Jackson titled "Ordinary Hope", pointing precisely towards hope. Let us conclude, therefore, with his words: *Now let us get to work*.

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Algoritmi, Strutture e Agire Sociale

by Riccardo Pronzato (2024) Milano, Franco Angeli, 142 pp.

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Algorithms are pervasive entities in the structuring of contemporary social life. From unlocking one's phone, to perform financial transactions through platforms, up to the reliance on software to predict one's likelihood to commit crimes, algorithms dominate the ways in which daily tasks are performed and have important social impacts that must be considered. But what does it exactly mean to live through them? It means to experience the world not merely with algorithmic assistance or under algorithmic governance, but rather to have our own ways of interaction, existence, and perception mediated and structured through algorithmic processes. Algorithms can shape what can be known, how it is experienced, and who we become. For example, dating apps do not simply facilitate romantic encounters but they restructure the horizon of romantic possibilities; users' intimate needs become algorithmically curated and dependent. In recent years, algorithms have not only infiltrated the fabric of social life, raising urgent questions about authority, agency, and structure, but they also shape the possibilities of action and performance in daily contexts. Everyday social action is entangled in socio-technical architectures that oversee the boundaries and opportunities of self-representation, performance, and practices. For example, consider the construction and presentation of oneself on social media, or the reliance on software (such as Microsoft Teams, Excel, ChatGPT) for professional settings. In these and other cases, algorithms dominate how society functions. Thinking through the ordinariness of algorithms unlocks a series of interrogatives regarding their nature, functions, and power. Individuals are embedded in a system of constant surveillance that affords them possibilities (and constraints) of self-expression, while manipulating their perception of reality.

In sum, algorithms have social consequences, and Riccardo Pronzato's book offers important insights and tools to better understand them. The topics addressed by the book are of extreme social relevance, not only to further the understanding of algorithmic architectures, but also to decipher the forms of social power they enact. The author does so by investigating the ramification of algorithmic action on regular users such as university students and medical experts. The nature of algorithms has long been a subject of scholarly debate, with broad consensus around their inherently multiple and heterogeneous nature (Bucher 2018); subsequent scholarship has further examined their entanglement with social, cultural, and

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economic structures, analysing how they mediate visibility, representation, and inequality in everyday life (Noble 2018; Aiello and Parry 2020). Due to their heterogeneity, algorithms can perform across different contexts – from education to the legal and medical fields etc. – while also retaining their dominance in mediating and structuring experiences. Within this multiplicity, there is a dialectical relation between agency and structure that allows individuals to appropriate and manipulate algorithmic constraints. Algorithmic agency can be deciphered as the ways in which algorithms can authorise, allow, encourage, influence, suggest, block, and prohibit users' experiences on digital platforms; whereas user agency is understood as the individuals' freedom to shape their reality. Algorithms are also growing subjects of interest for governmental agencies, such as the European Centre for Algorithmic Transparency (ECAT) which operates under the Digital Service Act (DSA) initiative. Its focus is set on making algorithms safe, transparent, and accountable, treating them as full social actors in the network. Agency and accountability are fundamental pillars in the author's work, advancing debates on the social implications and role of algorithms within current societies.

One of the main goals of *Algoritmi, Strutture e Agire Sociale* is to understand the intricate relation between users and algorithms. It does so by tracing spaces of fluid performance within which users are both incentivised to act and strictly monitored – closely linked to the concept of "constrained empowerment" proposed by Aiello and Parry (2020) in which social media users are afforded the possibility to express themselves only if said expression is in agreement with the platform's guidelines. Furthermore, the book explores the daily interactions that users entertain with algorithmic media as a sociological entity, understood through the lens of agency and structure. Agency and structure are defined as a conceptual dichotomy between society's influence on the individual (*structure*) and the individual's freedom to mould society (*agency*). Pronzato considers these two elements under a fluid and symbiotic perspective while being cognisant of the asymmetries of power caused by algorithmic action.

Chapter 1 is interested in carefully dissecting the myth of neutrality. Algorithms are by-products of human action; their nature is inherently biased by those humans who worked on them, the datasets used to train them, and their overall architecture. The author views them as both cultural artefacts and social agents, advocating for a contiguous and dialectical approach between the two in the study of algorithmic media. The widespread perception of algorithms as passive and neutral objects has important implications; therefore, recognising them as active subjects allows to further contextualise their action. Within this complex algorithmic ecosystem there are at play distributed processes of agency between human and non-human actors, underlying the need for a dialectical approach in analysing algorithmic environments. The author does so wonderfully by proposing a dynamic view of algorithms that understands both their relevance as pieces of culture and their importance as social actors embedded in a more complex net of relations.

The ordinariness of algorithmic processes is discussed in Chapter 2, largely focusing on their structural dimension. Firstly, the author addresses the datafication of social processes, underlying how data collection is inherently biased; the ways in which data is extracted and manipulated align with the infrastructure's needs, producing partial representations of reality. Code, both in its production and applications, is embedded within social, political, and aesthetic frameworks (Aiello and Parry 2020) that need to be understood to consciously

navigate current media environments. The author further highlights the inextricable nature of algorithmic media with concepts such as surveillance capitalism, data colonialism, and algorithmic identity, providing a thorough overview on the dimensions and ramifications of social action through algorithms. Digital platforms can shape and manipulate reality through implicit and explicit inputs, reproducing the same biases used to either train or build them. Moving away from the structural analysis of platforms, Chapter 3 focuses on the agency of both users and algorithmic media. Digital environments afford users possibilities of folkloristic algorithmic resistance, contributing to the awareness of one's agency and action within those spaces. Users are "not just puppets [...] but individuals able to interpret and subvert the proposed logics" (Pronzato 2024, 49). Algorithms also possess agency and manifest it both through affordances and Terms of Service (*ToS*). Algorithmic agency is never neutral; it enacts a form of power by structuring specific opportunities and limits. Interaction in algorithmically mediated environment constitutes a complex socio-technical assemblage in which outcomes are continuously negotiated. Recognising this mutuality in the analysis of algorithmic interactions allows to consider both the constraints and opportunities embedded in those environments while treating all social subjects – algorithms included – as relevant actors in the network, raising important questions on the extent of asymmetries of power in those spaces.

Chapter 4 investigates two empirical studies. Firstly, the author tried to grasp the relation of students with algorithmic media in their daily interactions, analysing 40 auto-ethnographical diaries from university students. Many relevant points have emerged from the analysis, highlighting not only the pervasiveness of digital platforms in the construction of social life, but also the reactions that algorithms might generate. Intensive reliance on algorithmic media can contribute to a lack of temporal and spatial awareness as the "use of digital platforms is experienced as a seamless space-time continuum" (p. 62) where endless feeds and constant connectivity blur boundaries rendering users perpetually online; others view their relation with platforms as a form of intimacy, especially since "processes of datafication are experienced as opportunities for expression and identity formation" (p. 64), raising emotional ambiguity over the relationship users maintain with algorithms. "Algorithmic mismatch" (Bucher 2018) represents a form of friction that can foster critical spaces for developing discussions around the functioning of digital platforms and favour processes of agency in rebellion of algorithmic limitations. Secondly, Pronzato's focus on medical experts highlights the "*housewifisation*" of personal and professional settings. Algorithms are naturalised as essential practices of professional development – whether it means e-learning, online video-consultations etc. – and workers are expected to be always on. "Turning on a computer and using digital platforms can at times be an emotionally charged act, as it is perceived as a continuation of the work experience" (p. 83). This broadens the scope of inquiry into how algorithms function in everyday life, highlighting not only their pervasiveness but also the psychological implications these platforms have on social practices. Algorithms shape the rhythms of daily tasks through their own forms of agency and emerge as key actors in the structuring of social life. The final chapter illustrates how the case studies further support the idea of algorithms as both cultural artefacts and social actors by deploying a hegemonic framework of analysis *à la* Gramsci. Naturalisation, routinisation, and construction of social narratives are all byproducts of absorption of algorithmic rhythms into daily standards, creating an environment in

which platforms' hegemony is learned at a young age. Although pervasive, platforms afford users the possibility to cut out spaces of self-representation and algorithmic resistance, allowing different levels of agency to exist within its contours.

Algoritmi, Strutture e Agire Sociale offers a compelling contribution to the study of algorithmic media. Its major strength lies in the dual approach in dissecting algorithms, viewed as both sociotechnical actors and cultural artefacts. That means the author understands them not only as participants in the complex net of social relations able to shape and influence society, but also as byproducts of cultures that reflect specific biases, priorities, and assumptions inherent to their action. The author demonstrates meticulous attention to the cultural processes that underpin both the production and operation of algorithmic media, consistently foregrounding the asymmetries of power embedded within them. The rich data collected strongly support the theoretical claims laid out in the initial chapters; the case studies do not only empirically ground the theoretical framework presented but also highlight how algorithms actively shape social life through situated practices. *Algoritmi, Strutture e Agire Sociale* strongly contributes to the growing scholarship interrogating the sociotechnical and cultural dimensions of algorithmic systems, sitting at the convergence of Science and Technology Studies (STS) and Media Studies. Instead of treating algorithms as opaque black boxes or neutral tools, Pronzato foregrounds them as both technologies of governance and cultural artifacts encoded with assumptions and biases about the social world. Pronzato's approach particularly resonates with Bucher's (2018) call to critically examine the programmed sociality of platforms, while extending this analysis to include the mutual shaping of users and algorithms. In doing so, the book unpacks how action and surveillance in algorithmic environments is deeply entangled with structures of power and design intentions – what Aiello and Parry (2020) have described as constrained empowerment, wherein user's agency is neither fully enabled nor repressed, but rather filtered through algorithmic governance. Importantly, the book does not isolate algorithms as mere technical entities but situates them within a broader sociocultural discussion. This attention to context enables Pronzato to draw out the ways in which algorithms not only operate within digital environments but also actively structure social practices as they "help us know what there is to know and how to know it" (Gillespie 2014, 168). Furthermore, the author addresses how commercial imperatives often drive algorithmic design in ways that prioritise profitability over inclusivity, thus reinforcing patterns of marginalisation, especially towards minoritarian groups. In line with Noble's (2018) critique of algorithmic oppression, Pronzato dissects the ideological and political infrastructures of algorithmic systems, dismantling the myth of neutrality and gathering attention towards their material consequences in terms of representation and structuring of social life. By bridging the empirical analysis of interactions with and through platforms with theoretical insight into the socio-cultural effects of algorithmic mediation, Pronzato shows the importance of both STS and Media Studies in the understanding of what algorithms do and how they do it. The book not only dialogues with but also meaningfully advances interdisciplinary debates on algorithmic power. Its close engagement with both infrastructures and imageries of algorithmic media makes it particularly relevant for scholars interested in the cultural and scientific politics of technology. Notwithstanding, the analysis would have benefited from

a broader geopolitical approach. While it is true that many algorithmic infrastructures are birthed in the West, overlooking the development of eastern platforms (think about TikTok, TaoBao, Temu etc.) risks limiting the applicability of the proposed framework. A more global comparative perspective would have enriched the book's critical scope and further contextualised its otherwise rigorous insights. Despite this limitation, it remains a valuable resource for scholars interested in algorithmic action, identity, and environments.

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Collaborative Research in the Datafied Society

by Mirko Tobias Schäfer, Karin van Es and Tracey P. Lauriault (eds.) (2024) Amsterdam, Amsterdam University Press, 306 pp.

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Collaborative Research in the Datafied Society proposes an urgent reorientation of both scholarly practice and academic imagination. It is not a catalogue of techniques or a fashionable plea for "engagement"; it compels readers to reckon with what it means to do research with and through others, in contexts where data is not merely a topic but the medium of social and institutional life.

What distinguishes the book is its refusal to treat "collaboration" as a managerial fix, bureaucratic imposition, or neutral method. Instead, collaboration is framed as a profound epistemological and political pivot – a way of resisting the fragmentation of knowledge, the isolation of disciplinary expertise, and academia's self-referential enclosures. The book urges research that is dialogic, open to outside voices, and socially engaged. It repositions the researcher from distant observer or "expert" to engaged interlocutor and co-producer of knowledge, weaving research with practices across public, civic, and technical domains. Collaboration thereby becomes a working space where power, justice, care, and responsibility intersect.

This shift is not merely procedural; it challenges foundational academic assumptions and demands humility (Jasanoff 2003) – a willingness to cede authority, question "excellence" metrics, and engage in collectively negotiated and provisional problems, outcomes, and ownership. In this way, *Collaborative Research in the Datafied Society* situates itself as both a critical contribution and a call for new forms of scholarly responsibility. The book resonates with STS critiques of scientific authority (Haraway 1988) and recent calls in critical data studies for care and co-production (D'Ignazio and Klein 2020), while insisting that, in a world whose infrastructures are increasingly algorithmic, dynamic, and contested, such scholarly responsibility is not optional but urgent.

A first transversal theme is the centrality of power, with accountability built into the politics of knowledge production. The book follows how claims are negotiated, disputed, and made actionable in data-saturated settings, and it keeps asking whose interests data work serves. This extends long-running STS debates on expertise, publics, and participation – from expert-lay relations (Collins and Evans 2002) to democratising science (Guston 2004; Fischer 2009) and concerns about asymmetries in ostensibly "open" science (Fox et al. 2021). Contributors

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show how collaborative projects navigate – and at times reconfigure – uneven distributions of resources, tools, and decision rights across institutional positions and social locations.

Here, the book's reflexivity is especially valuable: rather than romanticising collaboration, contributors foreground the conflicts, frictions, and failures that frequently arise: the challenge of transforming "insider" access into genuinely transformative outcomes (Chapter 2 "Performing Critical Data Studies from the Inside" by Rob Kitchin), tensions between academic and activist priorities, the difficulties of maintaining "reflexive neutrality" (Chapter 3 "Confronting Politicized Research" by René König, Payal Arora and Usha Raman), the complexities of addressing diverse subjectivities in participatory research (Chapter 6 "The Challenge of Addressing Subjectivities through Participatory Action Research on Datafication" by Katherine Reilly and Maria Julia Morales), the practical challenges of coordinating diverse stakeholders across government departments with different mandates and resources (Chapter 7 "Community Responses to Family Violence Policy" by Anthony McCosker, Jane Farmer, and Arezou Soltani Panah), or the risk of researcher "assimilation" that can compromise critical distance (Chapter 15 "You Will Be Assimilated" by Daan Kolkman). These narratives expose the double bind of collaboration in the datafied society: it is necessary, but never easy; indispensable, but always contingent.

A second transversal theme is the commitment to situated knowledge. The book resists universalizing claims, foregrounding instead the partiality and context-dependency of research, especially those entangled in messy, real-world settings. Projects such as "Data Against Feminicide" (Chapter 8 "Data Against Feminicide" by Helena Suárez Val, Catherine D'Ignazio and Silvana Fumega) – where Latin American activists and feminist data scientists co-design digital tools to document and make visible systemic violence – or the "Fairwork Project" tackling exploitative platform labour (Chapter 9 "The Fairwork Project" by Tatiana López, Funda Ustek-Spilda, Patrick Feuerstein, Fabian Ferrari and Mark Graham), ground the book's theorizing in thick, situated practices. Through initiatives like the "DataWorkplace" (Chapter 14 "The DataWorkplace" by Krista Ettlinger, Mirko Tobias Schäfer, Albert Meijer and Martiene Branderhorst) where researchers, local governments, and civil servants negotiate data literacy and institutional change, the book models what it means to "stay with the trouble", to borrow Donna Haraway's phrase (2016), refusing easy abstraction or closure.

This orientation aligns the volume with the traditions of feminist STS and participatory action research, even as it innovates by demonstrating how such commitments must be reworked for the age of platform capitalism and algorithmic governance. The recurring language of "data work", "co-design", and related notions forms a living vocabulary for contemporary collaborative inquiry. The book's chapters collectively push back against the temptations of solutionism and universalism, arguing instead for research grounded in real, often fraught, relationships.

One of the book's most provocative insights concerns the transformation not just of research practice, but of the university itself. The editors and several contributors are blunt in their critique: universities remain structurally misaligned with the demands of collaborative, socially engaged, and interdisciplinary research. As the editors argue in their opening chapter, traditional academic incentives primarily benefit individual researchers and fail to recognize the challenging work of building networks, engaging in interdisciplinary collaboration, or developing innovative educational formats for practitioners (Chapter 1 "Making a Difference"

by Mirko Tobias Schäfer, Karin van Es and Tracey P. Lauriault). Reward systems still privilege publications and grants over co-produced datasets, relationship-building, or innovative applied research (Chapter 5 "Open Government Partnership" by Mary Francoli and Daniel J. Paré). Support structures are often ill-equipped for the administrative and legal complexity of cross-sectoral partnerships. The entrepreneurial research approach (Chapter 4 "Inside Datafication" by Mirko Tobias Schäfer) reveals a double edge for collaboration. It widens networks through privileged access and co-created work, while also overloading them with time, integrity, and recognition challenges that effectively split the researcher's role in two; signs of institutional openness exist, yet reforms are still patchy.

Perhaps the book's greatest strength – and what sets it apart from less critically engaged calls for "co-design" or "transdisciplinarity" – is its candor about failure, ambiguity, and incompleteness. There is a consistent acknowledgment that collaboration does not automatically dissolve inequalities of expertise, resources, or recognition; nor does it guarantee that marginalized voices will be genuinely empowered in the process. Several contributors recount projects that did not fully succeed or exposed new dilemmas, such as Chapter 13 "Speculative Data Infrastructures" by Jonathan W. Y. Gray, where collective learning sometimes stumbles on institutional resistance or data opacity. The persistent theme of "unacknowledged labor" (Chapter 1 "Making a Difference" by Mirko Tobias Schäfer, Karin van Es and Tracey P. Lauriault) – the emotional, logistical, and relational work that sustains collaboration, often invisibilized by academic metrics – recurs in essays and empirical cases alike.

Yet, by maintaining this reflexive, self-critical mode, the book models the very collaborative ethos it advocates. The question is not simply how to do collaborative research in the datafied society, but whether the structures and cultures of knowledge production can be meaningfully reshaped to support it. The editors and contributors do not claim to have settled this question; instead, they invite the field to continue experimenting, reflecting, and pushing against institutional inertia. In so doing, the book situates itself not as a final word but as a node in an ongoing, necessarily collective process of learning and reconfiguration.

For all its richness, *Collaborative Research in the Datafied Society* sometimes left this reader wanting more – perhaps because it succeeds so well at raising the stakes and outlining the terrain. The book makes meaningful efforts to include cases from different regions to the world, including significant cases from Latin America (Chapter 8 "Data Against Feminicide" by Helena Suárez Val, Catherine D'Ignazio and Silvana Fumega), Brazil (Chapter 12 "Empowering Citizenship Through Academic Practices" by Acilon H. Baptista Cavalcante and Ana Claudia Duarte Cardoso), and explores transnational contexts spanning multiple countries including South Africa (for example, Chapter 9 "The Fairwork Project" by Tatiana López, Funda Ustek-Spilda, Patrick Feuerstein, Fabian Ferrari and Mark Graham). However, the empirical heart of the volume – featuring Irish government partnerships (Chapter 2 "Performing Critical Data Studies from the Inside" by Rob Kitchin), the Utrecht Data School (Chapter 4 "Inside Datafication" by Mirko Tobias Schäfer), Equity Ottawa (Chapter 10 "Advancing Equity through Data Practices" by Muna Osman and Hindia Mohamoud), the eQuality Project in Canada (Chapter 16 "Lessons Learned from The eQuality Project" by Valerie Steeves) and similar settings – tends to rest on the infrastructures and resources of the Global North.

That said, the inclusion of chapters centered on the Global South or transnational labor solidarity is more than tokenistic. These contributions powerfully illustrate how collaborative research can be mobilized to contest systemic violence, empower marginalized communities, and experiment with alternative data futures. They enrich the book and point to a horizon where such work might expand even further: toward more resource-constrained, politically unstable, or highly surveilled environments – settings where both the stakes and the risks of collaboration are amplified. A future volume could take up this challenge even more centrally, foregrounding voices and experiments from the Global South or "peripheries" of datafication.

Similarly, the institutional critique, while clear-eyed, sometimes stops short of imagining what truly radical reorganization would require. What would it mean to design university structures that reward not only publication and grants, but also care, patience, listening, and collective risk-taking? How can collaborative research avoid being absorbed by "impact" agendas that prioritize metrics over meaning? These are questions the book raises but cannot fully resolve – perhaps because they demand ongoing, collective experimentation. One might also wish for an even more sustained engagement with the emotional and affective dimensions of collaboration: the disappointments, exhaustion, and joys that shape such scholarship, and the transformative encounters that academic prose often leaves in the background. In this sense, the book points to the limits of what a single volume can capture about the lived realities of collaborative research in an era defined by uncertainty.

Collaborative Research in the Datafied Society is not a handbook of best practices; it is a reflexive, hopeful manifesto for research in a digital, datafied world. By foregrounding collaboration's politics, the democratisation of expertise, the centrality of situated data work, and the need for institutional transformation, the volume sets a benchmark for engaged scholarship. Its contributions are concrete and portable across settings – a methodological repertoire for co-design and reflexive neutrality; practical guidance for building partnerships that acknowledge unequal capacities and still deliver shared outcomes; pedagogical tools for critical data literacy that travel from classrooms to city halls; and an infrastructural sensibility that treats datasets, protocols, and interfaces as sites of accountability rather than neutral pipes. For researchers, practitioners, and students, the book is both an invitation and a challenge to build work that is exacting and humble, inclusive and attentive to power, oriented toward justice and capable of institutional change. The experiment is not finished; the most vital questions – about knowledge, power, and justice – remain open, which is precisely why this volume deserves to be read, debated, and enacted.

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The Eye of the Master: A Social History of Artificial Intelligence

by Matteo Pasquinelli (2023) London and New York, Verso, 272 pp.

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AI is at the centre of a vast body of research that spans STS, critical theory, cultural studies, philosophy, computer science, engineering, and beyond. Although it may appear as a fashionable and accessible topic, it is in reality hard to tackle, especially because of the number of studies and the diversity of perspectives it generates.

The Eye of the Master situates AI within a robust post-Marxist tradition, employing historical epistemology as its principal analytical framework. It conceptualizes AI as the (provisional) point of arrival of a long historical development of automation technologies. The book is written by Matteo Pasquinelli, professor at the Department of Philosophy and Cultural Heritage at Ca' Foscari, University of Venice. In using historical epistemology, he explicitly challenges the social construction of technology framework, eschewing its standardised concepts of users and relevant social groups, interpretative flexibility, etc. In this regard, the book represents a valuable invitation to integrate with new stimuli or overcome one of the most important frameworks for STS scholars.

Knowledge-making constitutes the book's central object of analysis, described as «a historical and often conflicting process» (p. 234). Pasquinelli explores how knowledge is shaped through labour, and how technological innovations were historically dependent on political drives for fostering the division of labour, as an extraction of collective knowledge. AI is thus positioned within this dialectic of knowledge and labour «as the primary source of the very "intelligence" that AI comes to extract, encode, and commodify» (p. 12). The book is therefore a valid contribution to critical AI studies. The idea of algorithms and AI as socially derived has been extensively explored, particularly in the intersection of algorithms and racism (Benjamin 2020). Another wide range of studies has also examined the role of algorithms in surveillance practices in the capitalist system (following the pivotal book of Zuboff 2019), as well as their capacity for emotional extractivism (Padios 2017). Pasquinelli's contribution to this field lies in his analysis of the epistemic structure of AI, which he links to the techno-economic imperatives driving labour automation.

The book is divided into two parts: the first one is dedicated to the industrial age, the second to the information age. Before those two parts, there is a "stand-alone" first chapter dedicated to the origins of algorithms. Here, Pasquinelli focuses more on sciences rather than

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technology (as in the rest of the book). This may represent a potential limitation of the overall framework: the distinct division of the analysis between the scientific and mathematical dimensions of algorithms and their technological implementation within AI. Nonetheless, Pasquinelli's account of algorithms as both forms of mathematical reasoning and historical constructs aligns well with his broader theoretical approach.

In this first chapter, algorithms are treated as cultural techniques, highlighting in this way the role of material practices in the making of symbols. Referencing works such as those of Peter Damerow and Wolfgang Lefèvre, Pasquinelli states that all abstractions operate within material constraints: «speculative process starts with labour that invents tools and technologies which, subsequently, project new ontological dimensions and scientific fields» (p. 39). After this first clarification of the nature of numerical abstractions, the use and development of algorithms follow a classical Marxist interpretation. Started with Hindu numerals around 825 CE, algorithms spread in Europe in the Middle Ages as the best tool to answer calculus needs in mercantilist Europe, until they evolved into nowadays machine learning algorithms. In this large period, we see then two breakthroughs. The first one has been driven by mercantilism and its calculus revolution, from abacus to algorithms, while the second one by industrial capitalism and data analytics techniques. In this latter breakthrough, data from passive information becomes active information: «algorithms for data analytics become dynamic and change their rigid inferential structure to adapt properties of data – usually logical and spatial relations» (p. 47).

As previously noted, the first part of the book is dedicated to the industrial age. Here, the author lays the theoretical foundations of his framework, critically engaging with figures such as Charles Babbage, Adam Smith, and Ada Lovelace. The techno-economic objectives underlying industrial automation are criticized drawing together the Engines inventions and Smith's theories. This is well described referencing Charles Babbage's *On the Economy of Machinery and Manufactures* (1832). While Smith canonised the division of labour to produce profits, Babbage applied it to design machines and (most importantly) to compute the cost of production: dividing production processes into small tasks would make evident the quantity of labour necessary, thereby facilitating the extraction of surplus value from that labour. On the other hand, turning to early socialist authors, the detailed perusal of William Thompson and Thomas Hodgskin's *knowledge theory of labour* is used by Pasquinelli to historically place a long strand of studies about immaterial labour. He demonstrates that already at the start of the XIX century, those two authors affirmed that the most important component of labour, and therefore machines – if we see them as mimicry of labour – is not energy and motion, but knowledge and intelligence. Pasquinelli then reaffirms the notion that knowledge itself is a productive and economic force. While this is nothing new in Marxist and post-Marxist analysis, Pasquinelli's strongest argument is linking XIX century mechanical automation to today's AI. The industrial age marked the beginning of the separation of knowledge from labour, transferring it into machines. Hodgskin's writings had already emphasized that all labour is, at its core, mental labour: the division between hand and thought is more of a construct. For example, to automate driving cars today, a driver has a series of mental operations that need to be broken down to transfer them to algorithms. While the Engines automated hand calculation, artificial networks for pattern recognition did the same for perception and supervision. For Pasquinelli, knowledge is collectively produced and shared, and this collective

knowledge constitutes the core of capital, together with machinery and infrastructures. In this light, automation should always be understood as a capitalisation of collective knowledge, in the hands of those who create the machines: «it is a systematic mechanisation and capitalisation of collective knowledge into new apparatuses, into the datasets, algorithms, and statistical models of machine learning, among other techniques» (p. 94).

The second part of the book is probably of greater interest to STS scholars, as it unfolds the processes he described to nowadays developments in AI and neural networks. It is therefore here that the historical epistemology can be better seen as an overall framework, starting from a point of view already familiar within STS: «machine as a social relation, not a thing» (p. 119). Pasquinelli addresses the notions of autonomy and automation as two opposing political visions in the mid-XX century. According to his account, autonomy was imbued with political and social objectives, as theorized by some of the countercultural and leftist movements of the 1960s and 1970s. Aspirations that were, to some extent, taken up by the field of computer science. Automation, by contrast, is rooted in the theme of self-organization: a conceptual lens used to study both organisms and society across various disciplines from the 1940s, ranging from biology to economics. While this opposition of autonomy/automation is conceptually intriguing, it is only briefly outlined in the book. A broader analysis would be necessary to avoid deterministic interpretations of this duality, as well as a reductionist portrayal of the 1960s-1970s movements – that cannot be enclosed into a single political vision.

The perspective of self-organization in relation to automation receives broader attention in the book, demonstrating its transversality across disciplines. In this regard, Pasquinelli engages in a critical analysis of Hayek's *The Use of Knowledge in Society* (1945) and *The Sensory Order* (1952). In dealing with knowledge, rationality, and mental order, Hayek builds the foundations of his neoliberal theory. In his view, tacit knowledge operates at a supra-conscious level and is therefore superior to the conscious mind. He defined the mind as a creator of models and classifications, and he also speculated about the possibility of translating classification into machines. Still, for him, the model of the physical world could only be distorted and dispersed in translation. The market is conceived as a spontaneous form of self-organisation, where the main problem lies in the use of knowledge as possessed by no one (therefore not negotiable or regulated by the State). Hayek was the first to describe the market as a form of computation – or more precisely, a system of telecommunication, given that computers were not yet a common technology. However, he argued that the complexity of the market would surpass the computational limits of any conceivable calculating apparatus, plus it would be harmful to market autonomy. Ironically, the neoliberal theorist failed to anticipate how capitalism and neoliberal ideologies would make use of artificial neural networks in capitalist economies.

Many of Hayek's arguments are grounded in Gestalt and cybernetics connectionist theories developed during the 1940s and 1950s. The Gestalt and cybernetics controversy is the core of Pasquinelli's analysis of the epistemological roots of neural networks and AI, mainly referring to the battle between connectionist AI over symbolic AI. This controversy can be summarized by the debate around the transformation of an image into a logical construct: when does the image get processed? Directly in the eye "perception", or in the brain "reasoning"? The 1959 paper *What the Frog's Eye Tells the Frog's Brain* put an end to the controversy, setting the basis of today's AI image and pattern recognition within the eye "intelligence". But, as Pasquinelli

elegantly puts it, «they [the cybernetics who won the controversy] projected onto nature forms of self-organisation that were already part of the division of labour and technical organisation of their surrounding society» (p. 154), without understanding the situated knowledge and cultural values of reasoning needed for the image manipulation. As Pasquinelli notes when talking about Rosenblatt's Perceptron, one of the first *classifiers* of images in today's ML taxonomy, it «record *external rules* – that is, social conventions» (p. 234). Image recognition needs to follow societal classifications: the cultural heritage of a given context (our own taxonomies are rooted into our ideas of dichotomies, objects, ideas, etc.). As Simon Schaffer already noted, «[c]laims that certain systems can mimic, or even exhibit, intelligence are sustained by social hierarchies of head and hand. Minds are known because these social conventions are known» (1999). *The Eye of the Master* accounts lie within this path. Information algorithms – Pasquinelli affirms – were designed following the Perceptron logic of self-organisation that derived from connectionism: modelling the brain in solving the paradigm of learning through statistical reasoning.

Connectionism implied the mind «as an intuitive statistician» (p. 229). This concept arose in the aftermath of World War II, and found a good ally in the psychometrics. For Pasquinelli psychometrics aimed to classify "normal" and "abnormal" behaviours. In the midst of the rebellious 1960s and 1970s management and the establishment sought ways to tame the growing wave of workers' struggles. In this account, AI emerged not as a tool for understanding intelligence, but as a tool relying on brute-force approximation and mathematical optimisation for imposing standards and propagating social hierarchies. All of this paved the way for the normalisation of today's statistical view of the world, in which algorithmic governance is the primary tool for capitalist cultures.

Pasquinelli concludes the book with a strong description of algorithmic governance, that may resonate very well with STS readership. This readership is likely to be interested in how the book unfolds the embedded ideas of knowledge and techno-economic interests underlying work automation. Historical epistemology may be a useful framework for giving more depth to political understandings of technology. The book, though, may appear too quick in describing some important aspects of political history and not giving enough space to the complexity of the workers' movements and practices. Practices are, in a way, left outside in framing a picture that stands very well within its own theoretic borders. It would be interesting in seeing if, going into the everyday histories of usages and mediations, that theory would yet stand still.

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Resurrecting the Black Body: Race and the Digital Afterlife

by Tonia Sutherland (2023) Oakland, University of California Press, 232 pp.

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The "Black body" has long been seen as a monolith, with harmful stereotypes and mythologies being projected onto individual Black bodies. Examples of such harmful images are the "strong and/or angry Black woman" and the "violent, dangerous Black brute" (p. 4). Over centuries, both images have been weaponised in the service of structural racism. At the same time, these mythical images serve to commodify the Black body in the form of various visual and digital archival records, echoing the physical exploitation of enslaved Black people.

In *Resurrecting the Black Body: Race and the Digital Afterlife*, Tonia Sutherland, a scholar of Information Studies at the University of California, Los Angeles, examines the way that through digital afterlives, Black people's lives are extended, continuing the historical lack of agency, commodification, and exploitation during historical slavery. *Resurrecting the Black Body* offers a critical analysis of how understandings of death in the past impact understandings of death in the present, especially for marginalised populations.

Throughout *Resurrecting the Black Body*, Sutherland uses ideas from critical race theory, performance studies, archival studies, digital culture studies, and media studies, as well as theoretical and empirical research. She situates her work in digital culture studies, which makes it a worthy basis for future scholars of science and technology studies (STS), especially those looking to further explore the intersections of race, identity, and digital technologies. While Sutherland explains that this was "the best kind of coincidence" (p. 162), the title of *Resurrecting the Black Body* can be juxtaposed with Dorothy Robert's (1998) book titled *Killing the Black Body* in which Roberts scrutinises the systemic abuse of Black women's bodies, justified by negative images of their fertility.

Sutherland uses Harvey Young's (2010) discussion of how Western societal ideas about the Black body are projected onto human Black bodies, resulting in their dehumanisation, to highlight how negative stereotypes are reified and reproduced in various forms of digital technology. Using the work of dancer-anthropologist Katherine Dunham (1941), viewing her Dunham Technique as a form of Black memory technology, Sutherland makes a brilliant connection between archival records, digital culture, and embodied movement.

Discussed thematically (Records, Resurrection, Rights), the case studies in the six chapters jump across time and geographies, making a strong argument for the persistence and

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prevalence of White supremacy. In taking a race-critical look at visual archival records of Black bodies, Sutherland carefully brings to life several slavery-era photographs that capture Black trauma in the first chapter: Gordon, whose photograph has been archived in the form of a postcard titled "The Scourged Back"; the father and daughter Renty and Delia Taylor, and a crying Afro-Caribbean child written about by art historian Temi Odumosu.

The second chapter analyses the creation and circulation of the visual records of Black men murdered a century apart: Jesse Washington who was lynched in 1916, and Trayvon Martin and George Floyd who were killed in 2012 and 2020 respectively. These cases show how racial violence continues across generations. The digital space not only facilitates the dehumanisation of Black bodies, but tech companies also actively profit from the circulation of their graphic photos and videos. These case studies of relatively well-known figures certainly help readers connect theory with their everyday lives.

In exploring the ethical complexities of biomedical research, Sutherland's elaboration of the second theme of Resurrection in the third chapter provides extensive contextualisation to the life of Henrietta Lacks. Her cancerous cervical cells were sampled without her consent and were developed into the HeLa cell line and used in biomedical research. Some contradictions arise: the unrecompensed use of her cells, the unconsented existence of a biomedical afterlife, and the perception of her cells as both "universal human cells" and yet with potential for "contamination" and "malignancy" (p. 72). The widespread extent to which HeLa cells have been and continue to be used in biomedical research raises questions about biological life and death in medicine, which Sutherland deals with in a nuanced and sensitive way.

The fourth chapter analyses the digital resurrection of North American rapper and actor Tupac Shakur in the form of a holographic projection, for the profit and "satisfaction of the spectacular white gaze" (p. 88). This case study highlights the complexity inherent in digital resurrection technologies. While some may view these positively as a way to "extend life and liberate humanity" from death, Sutherland views it as a "carceral" (p. 98) technology, forcing the dead to perform for the pleasure of the living. The ambivalent responses around both the grief of Shakur's death and the joy from his artistic work emphasise that there is no clear "right" or "wrong" in such technologies; rather, their values reflect those of the living using them.

The fifth and sixth chapters explain the theme of Rights, particularly the right to be forgotten and/or remembered. In the fifth chapter, Sutherland argues that artificial intelligence technologies facilitate new ways of commodifying Black bodies. Taking a closer look at digital remains and digital afterlife technologies, Sutherland engages with the tension between memorialisation and data sovereignty (p. 108), especially where data brokers like social media companies and commercial search engines are involved. Engaging with Black liberation epistemology, Sutherland advocates for critical refusal as a form of resistance and disengagement from harmful data practices. An example of critical refusal is the decision to "stop collecting data that does not support the rights of communities to represent themselves" (p. 126) or disengage from social media platforms that exploit their data.

Alongside such refusal is the need for ways of remembrance. The sixth chapter uses the case study of dancer-anthropologist Katherine Dunham to make a brilliant, interdisciplinary argument for "reparative memory work" (p. 239) and the creation of corrective pedagogies.

This chapter exquisitely illustrates her interdisciplinary methodology. However, the posthumous scepticism of Dunham's decision to allow her work to be "open for research" or open access to "the same internet that wantonly circulates images of Black death for profit" (p. 144) leans rather heavily into pessimism. This undermines Sutherland's nuanced acknowledgment that while Western archives should consult "Black memory workers", the latter is not a monolith and there may very well be many situations where Black people will decide "different access", "different times, for different communities" (p. 145).

In the conclusion, Sutherland draws from Black mourning and deathcare practices to imagine Black memory work that can "honour Black people's right to be remembered" using technology in ways that "embrace care and are respectful of our dead" (p. 151). Recognising that this is a complex and collective work, one can imagine that a heterogenous Black community must struggle with the very human experiences of "love and care and pain" (p. 160), which can manifest in different ways depending on individual histories, practices, and emotional responses to loss. This struggle includes reconciling different perspectives on mourning and memory, as community members may differ on how they wish to honour their loved ones while also addressing the collective trauma of systemic racism.

For a book mentioning so many visual records, some readers may wonder why there are no images included of the subjects discussed, especially those unfamiliar with this topic and the various people mentioned therein. In fact, Sutherland begins the book by explaining her choice to not reproduce these contested images in the book to avoid the "ongoing commodification of Black people and their bodies" (p. *ix*) as these subjects can no longer provide consent to their visual reproduction – a thoughtful intervention and response. Furthermore, most of the visual records mentioned are in the public domain and easily accessible with a Google search.

In *Resurrecting the Black Body*, Sutherland gives a perspective of digital technology as perpetuating pre-existing racial discrimination and thus not only continuing but creating new ways of oppression and abuse against marginalised communities. Intentionally thinking alongside Black thinkers like Harvey Young, Katherine Dunham, Saidiya Hartman (2022), Christina Sharpe (2016) and Temi Odumosu (2020), Sutherland elevates marginalised voices of Black scholars and activists. However, this may unintentionally suggest that these scholars' voices are distinct from other critical perspectives in the field. Yet, they could be enriched by non-Black voices and case studies like for example, Michelle Caswell's (2014) work on archives as "liberatory memory work" in Cambodia, Katherine Hayles' (2012) exploration of the influence of digital media on cognition and culture, or most recently Yasmin Ibrahim's (2023) similar decolonial approach to digital technologies as both tools of surveillance and platforms for resistance. Nevertheless, this focus on Black discourses is a vital contribution for STS researchers to critically examine how technologies are deeply intertwined with social injustices and power dynamics.

The links between historical and contemporary examples is a major strength of the book, giving crucial context for the study of race-critical digital culture and helping readers make linkages between the past and the present state of discrimination. The book's greatest asset lies in Sutherland's use of distinct examples from different time periods, geographies, and disciplines, which challenge the notion of records as neutral and equitable, thereby making White racial hegemony impossible to overlook.

This book is particularly useful for an STS audience because its analysis lies at the intersection between technology with critical race theory, focusing on how digital systems are not merely technical tools but are also deeply embedded in power relations. By examining how data and racism shape each other, Sutherland provides STS researchers with insights into the ethical implications of technology in contemporary society, making it a vital resource for researchers interested in the social dimensions of science and technology. *Resurrecting the Black Body* sits among other books pioneering race-critical technology studies, such as Safiya Noble's (2018) *Algorithms of Oppression*, Ruha Benjamin's (2019) *Race after Technology*, and Yasmin Ibrahim's (2023) *Digital Racial*. Sutherland's use of the phrase "the right to be remembered" in juxtaposition to "the right to be forgotten" is a concise, useful way to think about the possibilities of life and remembrance in the fight against erasure.

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Les morts à l'oeuvre

by Vinciane Despret (2023) Paris, Les Empêcheurs de Penser en Rond/La Découverte, 176 pp.

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Vinciane Despret's latest book, *Les morts à l'oeuvre*, once again tackles the theme of how the dead continue their existence through the lives of those left behind, a topic the author has already dedicated a book-length investigation to in *Au bonheur des morts/Our Grateful Dead* (2015/2021b). Although the Belgian philosopher is more widely known for her many forays into animal worlds – where she employs a unique methodological combination of speculative-pragmatic philosophy, Science and Technology Studies, History of Science, and Environmental Studies – her work on the agency of the dead is equally thought provoking. *Les morts à l'oeuvre* is an important book for researchers seeking to make sense of the relationships between the living and the dead, and the many shapes they can take both on a personal and on a public, political level.

There exists, of course, vast literature in multiple disciplines about the dead. Anthropology, Sociology, Archaeology, History, and other fields, all have recorded and analyzed the ways different peoples across the world grieve, worship, remember, erase, and deal with their deceased and their remains. STS has often brought to bear its specific competencies to this subject with studies ranging from how disciplinary memory, and who is remembered, is sociotechnologically mediated (Bowker 2005) to large surveys about "perceived interactions with the dead" (Cerulo 2023). *Les morts à l'oeuvre*, as we will see, calls forth its own research partners, both from within and without the canon of STS.

The book presents its readers with a meaningful and often touching inquiry into how the living make place for the dead in their lives and become able to transform their history into something to be shared in common. The book is structured in five chapters, each analyzing one work of art produced in the context of the *Les Nouveaux Commanditaires* ("The New Patrons") project. According to the New Patrons' website, their mission is to allow every person in civil society to commission an artwork from an artist. As a non-profit association, The New Patrons act as mediators, connecting commissioners, artists, funding sources, and local governments and institutions (see Debaise et al. 2013 for a very thorough presentation of the project and its potentials). Despret focuses on works of art which were commissioned on behalf of someone that had already passed, either as homage, remembrance, or other less evident purposes. Despret analyzes the works themselves, but she is more interested in what the person(s) commissioning

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these were aiming to achieve by doing so. Therefore, she interviews different parties involved in each of these commissions in order to show us how in each of these situations the dead act through the living, giving their lives (and deaths) new meanings, and, through a relay effect, affecting others that are often much beyond what was the immediate circle of these people.

The reader will not find a chapter describing in detail the methodology for the interviews or for the analyses presented; these will remain implicit throughout the text. This does not mean, however, the lack of a strong thesis or direction to the book, which its introduction makes very clear. In Despret's prologue, she rejects the usual script of the "work of mourning" approach to assess how people are dealing with loss. In Sigmund Freud's classic 1917 essay, *Mourning and Melancholia*, he describes melancholia as a failure to recognize the loss of an object possibly leading to a pathological attachment, and he defends rather the necessity of engaging with the work of mourning, that is, untangling the ego's attachments to what/who was lost. The desirable healthy outcome would be that the living cease their emotional investment in the deceased, redirecting their libido towards their new reality. What she finds in her inquiry – an *enquête*, as she calls her works and way of working – is that those that were left behind in this case do not wish to "let go" of those they have lost not because of a failure to recognize their death nor due to an unhealthy attachment leading to melancholia, but because together with their dead they can go farther, do more, become something else, while, in the same gesture, making space for their dead, extending their lives.

The chapters that follow the prologue are philosophical inquiries into the nature of the agency of the dead, but they are also five stories to be told in a style befitting them, employing Despret's literary talents already shown in many of her books, especially *Autobiographie d'un poulpe* (2021a). Thus, the book is perhaps more properly described as a collection of five stories where we learn from those left behind how someone important to them mattered, and how they may come to matter differently for others. In these stories, the author often invites the reader to consider that there could be many different beginnings to the tales told. In what could easily be reduced to five tragedies, we find instead hopeful tales that, although unavoidably marked by sadness, show us that the departed can keep acting in our world long after they are gone, expanding the existence of their living ones.

The textual effect is quite remarkable. We are told stories in Despret's unique style of scientific-literary fables or fabulations – a poetics developed in her many texts concerning animals – stories that make us feel and think differently, but in this case they foreground the persistence of the departed, weaving together snippets of the conversations of the people commissioning the works with words from members of the Nouveaux Commanditaires, and quotations from thinkers such as Bruno Latour, Isabelle Stengers, and William James. The most important feature of this style is how deeply it values the experience of the commissioners of the works, and the way in which they narrate these experiences. Those directly affected are the key thinkers of what has happened. It is not a matter of explaining to them what happened through external concepts, because what matters is how their own capacity to connect things, people, and ideas was and keeps being reshaped through their connection to the deceased. Despret cares about how the words being used "keep the dead alive", "maintain the living presence" of the singular characters and personal projects of the departed. Because of these choices in style and methodology, it is helpful to go over some of these tales, to understand

what matters in them to Despret and how her analyses emerge from the act of storytelling.

The first story told by Despret, in Chapter 1, concerns the Van Uystel family. Martine and Eddy lost their daughter Annick in April 2007. She was only 18 years old and her death shook not only her family but also her community in the small city of Diest, in Belgium. At its starting point, this is a more personal story, a familial tragedy. However, Despret shows us how Annick's parents continue to engage with the promise of Annick's life. The work of art resulting from the Van Uystel's commission is *The Ever-Blossoming Garden*, by the Italian artist Mario Airó. As the name suggests, it is a garden with a combination of flowers that make it bloom all year. The goal was to create a place that invited quiet reflection and mourning, where one could be at peace. Per Airó's suggestion, a fountain resembling a brook was also added to this garden, to stimulate a contemplative feeling. This addition is not without a deeper meaning. Annick Van Uystel's body was finally found in water, on May 3, 2007, in the Canal Albert. By adding this element with running water, Airó helps in creating what Despret calls a benign inversion. The water is now associated with the blooming garden, with Annick at peace. Despret tells us of another such shift in the meaning of water that had happened before. One year after Annick's death, Eddy, her father, was presented by his company with the opportunity to go to Kenya to do voluntary work. He hesitated, but his wife encouraged him to go, because that was one of Annick's wishes. There, he felt her with him, as he helped dig for new wells that would give people access to drinking water. In the book, per Annick's parents' wishes, Despret shares ways for the readers to contribute to the endeavors of digging wells and donating sewing machines – another of the parents' initiatives motivated by their daughter's projects – further relaying and giving new shapes to Annick's goals.

The last story told in the book, in Chapter 5, is about Stéphane Albertini's family. He was a victim of the Bataclan terrorist attack that took place in Paris on November 13, 2015. His mother, Louise Albertini, and stepfather wanted a way not only to memorialize Stéphane's death, but also to honor the other victims and to make a statement about the horrors of terrorism. The personal tragedy is evident, but the political and public tragedies are also at the forefront. Two years after his death, Louise was inspired by the history behind Picasso's *Guernica* to ask for the creation of a work of art that, like the famous painting, would depict the horror of violence, the insanity of war, and the pain of those involved. After many attempts to get this project off the ground, Louise learned of the existence of the New Patrons, where she finally found someone willing to make it real. Going over the idea with others made it take the form of a musical piece by the French-Lebanese composer Bechara El Khoury. The result was the symphonic poem *Il fait novembre en mon âme* ("It is November in my Soul"). Building upon Louise's own reflections on this outcome, Despret shows how, instead of cutting ties in order to move on from the loss of a loved one, it is possible to find meaning in creating even more attachments: Stéphane's own love of music was one of the deciding factors. Instead of an explicit denouncing of terror, the musical piece offered an oblique counter attack: music, interrupted at the Bataclan that night, will not cease, and beauty will not surrender in the face of violence.

In *Les morts à l'oeuvre*, Vinciane Despret's style of philosophical inquiry, her *enquêtes*, provides many insights. However, its workings and methods cannot easily be reproduced, since much of the language and reasoning present in the text come from the interviewees and are carefully connected to the academic and literary authors she summons, paying attention to

not let disappear the words of those who were left behind. In this careful work, it is possible to see a kinship with the traditions of the Social Sciences and the Humanities that are deeply committed to taking their interlocutors or co-researchers seriously. Among her references, we can find well-known names in STS coming from Philosophy – such as Bruno Latour, Isabelle Stengers – or Anthropology – like Marisol de la Cadena, Mario Blaser, or Thom van Dooren. But we can also find philosophers that adhere more closely to their discipline, such as William James, Étienne Souriau, and David Lapoujade, and novelists like Ursula K. Le Guin or Michel Tournier, as well as authors coming from other backgrounds, such as Psychology. However, Félix Guattari's and, especially, Gilles Deleuze's ideas about works of art are possibly the strongest inspiration for this inquiry. The connection between art, resistance, fabulation, and a coming people made by Deleuze is not only often cited, but can also be felt throughout the work.

Les morts à l'oeuvre teaches us that there can be another work to be done by the living besides Freud's "work of mourning". In the Van Uystel's case, what started as a family tragedy became a common space for reflection, as well as voluntary work and donations, motivated by Annick's goals and dreams. Her unfulfilled wishes increased her parents' power to act and engage with the world. In Stéphane's case, his death was eminently political, but the resulting work of art avoided memorializing terror, offering instead beauty. In both cases, instead of detachment and reinvestment, the attachments of the living towards the departed were recrafted and multiplied, making space for the dead in the world of the living, and inviting others to inhabit these new commons that were created. *Les morts à l'oeuvre* resonates deeply with the field of STS, even if it is not completely situated in it. It redirects the methods and ideas developed by Despre t in her studies on animals – much more explicitly located in STS – in order to analyze the practices through which the living engage with their dead and death, devoting attention to discursive, artistic, and vernacular knowledge practices. Its unique approach to the subject opens avenues of investigation where Western interlocutors' relationship with the dead is not treated as a matter of personal beliefs, but as a complex of practices where this relationship is enacted through various technologies of knowing, being, and communicating.

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