* * *

Ruha Benjamin
Race After Technology: Abolitionist Tools for the New Jim Code. Cambridge, Polity, 2019, pp. 172

María Menéndez-Blanco *University of Copenhagen / Free University of Bozen-Bolzano*

Race after Technology is aligned with a growing body of work on critical data studies that seek to unpack forms of social injustice embedded in algorithms and data practices. To that purpose, the book "integrates the tools of science and technology studies (STS) and critical race studies" (p. 34) within the framework of *race critical code studies.* At the core of this framework is the STS-inspired metaphor of the "black box". In the book, this metaphor helps situate algorithms and data practices as kinds of sociotechnical systems with well-known external effects and opaque internal functions. Interestingly, the book does not focus opening the "black box" of algorithms and data practices, understood as in providing an account of their internal mechanisms. Instead, the focus seems to be on unpacking the external effects, and their relationships, which are not only well-known and visible but also oftentimes discriminating and socially unjust.

Methodologically, the focus on unpacking external effects and their relationships is approached by drawing upon "thin description as a method for reading surfaces" (p. 45). As described in the introduction, "thinness" is considered an approach to knowledge production that allows for analytic flexibility by tracing links between surfaces. This approach emphasizes exposing relationships rather than deepening in their underlying phenomena. Indeed, the book is an incredibly rich source of examples that illustrate how systemic forms of racism, sexism, and classism produce and are reproduced in technologies. However, this richness can be at times overwhelming. The focus on illustrating connections rather than on elaborating comparisons helps construct a large mesh of examples. In this way, this approach succeeds in conveying the interwoven complexity of the concerns at stake; however, it can be easy to get lost in all the ramifications and relationships.

As the examples of systemic forms of racism, sexism, and classism unfold, the book makes a solid case for the need to hold public accountability of automated data products. These products being job placement processes, refugee placement algorithms, or loan risk predictions. These contemporary examples are often referred to as the "New Jim Code", meaning forms of systemic bias embedded into technologies that monitor and measure people differently based on race, class, or gender. This neologism is inspired by the Jim Crow Laws, which created legal separations by race in 26 states of the United States of America from 1881 to 1964. Even

though these laws were formally abolished more than 50 years ago, the book shows how their legacy is still very present. In the book, these laws serve as lenses that help reveal how technologies produce, reproduce, and amplify separations in ways that sometimes are invisible and normalised. Similar to the inspiration for the "New Jim Code", most of the examples, terms, policies, and historical events in the book are situated in the United States of America. Indeed, while reading this book together with some of my colleagues at the Confronting Data Co-Lab of the University of Copenhagen, many of the questions we posed ourselves were related to which theories, laws, or empirical evidences would set the ground for a *race critical code studies* from a European perspective.

Interestingly, an example of the European movement of the Luddites helps illustrate what for me it is the main argument of the book. The Luddites were a group of English textile workers who revolted against manufacturers who used machines in nineteenth-century England. Nowadays, the term is still used to describe those who oppose technology. However, the actual meaning of their protest was not the technology in itself but the "social cost" of developing these technologies. Similarly, this book denounces the societal costs of automated data products by exposing relationships, opening up ways to engage with data technologies, and inciting to imagine more socially just alternatives. In my interpretation, this approach is aligned with an anti-essentialist perspective on Luddism (Woolgar 1997). From this perspective, the new technical artefacts that originated the opposition by the Luddites did not have fixed attributes; instead, the artefacts became part of an existing network of actants with a distribution of power. The key question for the workers (Luddites and non- Luddites), entrepreneurs, and other actors involved was "whether and what effect and for whom could the new machinery be enrolled as allies?" (Woolgar 1997, 54). Similarly, the key questions posed in this book tackle matters of power, how new (digital) technologies can preserve or challenge the status quo, and who is represented in imagining new (digital) futures.

Zooming into the actual structure of the book, the first four chapters discuss how technologies help produce social inequality, starting with the most obvious ways of engineered inequality to more subtle forms of systemic bias such as technological benevolence. The last chapter takes a slightly different angle, as it focuses on design practices and imagining futures. Explicit illustrations of the systemic biases embedded into technologies are described in Chapter 1. These examples range from the first even Beauty AI contest to a myriad of types of social credits. A particularly interesting insight is that these technologies are usually described in terms of innovation and forward-thinking, which impact the way they are represented publicly. More concretely, current innovation narratives tend to package AI-based systems in a mystical aura that makes their decisions magically more neutral, fair, and objective than their human counterparts.

The ways in which algorithms are, and become, represented in society have an impact on which qualities and attributes become normalized and accepted; as when social media claim to know what is most important to the public through algorithmically generated "trends" (Gillespie 2012). Therefore, the "politics of representation" (Gillespie 2012, 19) become especially relevant as algorithms are increasingly considered neutral, fair, and objective in estimating, assessing, and predicting societal matters. Relatedly, the book contains many reminders that algorithms are not better than the people that create them; indeed, they can potentially be more harmful because of their scope, recursive nature, and limited accountability. A related aspect to the innovation narrative is intentionality, meaning that these systems are created with the intention of creating better worlds. However, harmful decisions can be morally covered by a rhetoric based on good intentions. Some of the recent work in critical data studies is aligned with this line of thinking and proposes that moving toward more desirable futures entails revising the current focus on individual accountabilities by, e.g., considering ways to enact public reason (Binns 2018).

Moving towards more subtle ways of discriminations, Chapter 2 focuses on instances of unfair and unjust systems that pass off as a "minor problem" (p. 77). These issues usually remain unnoticed and sometimes become visible in technologies in use. The examples in this chapter illustrate how glitches in the system are not exceptions to faulty technologies but peepholes that allow looking into the assumptions and stereotypes that are seamlessly integrated in the development and production of algorithms and data practices. One of the examples is Google Street maps reading aloud Malcolm "ten" Boulevard instead of Malcolm "X" Boulevard. This supposed "glitch" in the text-to-speech system illustrates some of the design assumptions that eventually dispossess the street name from its original legacy. From a design perspective, these "glitches" are very interesting since they can be instrumental in making concerns about discrimination visible and therefore open opportunities to imagine different futures. Indeed, making things visible is a common argument for social justice and democracy; however, is visibility always desirable?

Chapter 3 unfolds the complexity of exposing race in and through technology, and how there are cases in which visibility can be a "trap". Visibility is discussed in many different forms, from literal examples of photo cameras designed to expose "whiteness" to concerns about how visibility is enacted to predict in which geographical areas crime is more likely to happen. Many of the examples illustrate ways in which combining visibility and predictive algorithms can be especially harmful and discriminatory. Algorithmic-based predictions rely on data to make their estimations. Thus, depending on the circumstances and consequences, it might be convenient to be visible while in other cases invisibility can be an asset. The extent to which people can decide whether to be visible or remain hidden relates to issues of power and perpetuation of existing dis-

criminatory systems. This points to the importance of explicitly standing up against the "datafication of injustice" meaning that "the hunt for more and more data is a barrier to acting on what we already know" (p. 116). The rigidity associated with data processes hinders possibilities of including different points of view and representations. In this regard, Seaver (2017) has proposed tactics to enact algorithms ethnographically, which help approach them as rich sociotechnical systems rather than constrained and procedural formulas. Relatedly, there are more and more initiatives that try to imagine different worlds in which data can help produce desirable futures; however, some of them can be quite problematic.

Examples of technologies that try to "fix" the system are described in Chapter 4. These include attempts to fixing diversity, race, and health, with interesting practical examples and reflections on how some technological narratives around diversity monetize differences. Something particularly interesting is how this chapter draws a line from the Jim Crow Laws, which sought to identify people's race to discriminate effectively, to the New Jim Code, which seeks to provide technical fixes to effectively meet everyone's needs on the bases of supposedly stable group identities. The line from the Jim Crow Laws to the New Jim Code is paved with tech design imagination. Well-intended technologies can be harmful and insidious, especially if presented as agents toward better futures. Therefore, as argued in the last chapter, it is important for tech design to be aware of how race and technology shape each other. Here the book refers to many different design-related notions and terms, such as design thinking, empathy, and design justice. It feels like the starting point of another book, rather than a closure. Also, some of the arguments seem to remain at the shiny surface of what sometimes is understood as design. However, there are other substantial forms of design that might be well-aligned with many of the issues raised in the book: for example, in the context of gender, tech, and design several projects and initiatives (such as fempower.tech and femtech.dk) are trying to move away from deficit approaches to issues of gender in computing. These projects seek to challenge stereotypes and assumptions that led to the systematic and structural mechanisms that make computing an exclusive field and discipline.

In summary, *Race after Technology* is an excellent read on why it is important to decode systemic bias embedded into technologies from a *race critical code studies* perspective. The book makes a timely contribution to a growing corpus of work on critical data studies, and it might be interesting to read it in conjunction with other contemporary books (e.g. D'Ignazio and Klein 2020; Eubanks 2018). Integrating the tools of STS into *race critical code studies*, this book makes a compelling case for how race is not only a social construction, but it also constructs realities where race and technology shape one another. Many of the arguments are probably very familiar to researchers in STS; however, the examples can be

instrumental in opening up important discussions among actors such as researchers, developers, designers, students, or policymakers. Indeed, the author's clear and down to earth writing style makes this book very engaging for anyone interested in how algorithms and data practices embed forms of social injustice and how these can be considered when imagining better futures.

References

Binns, R. (2018) *Algorithmic accountability and public reason*, in "Philosophy and Technology", 31 (4), pp. 543-556.

D'Ignazio, C. and Klein, L. F. (2020) *Data feminism*, Cambridge, MA, MIT Press.

Eubanks, V. (2018) *Automating inequality: How high-tech tools profile, police, and punish the poor*, New York, St. Martin's Press.

Gillespie, T. (2012) *Can an algorithm be wrong?*, in "Limn", 1 (2).

Seaver, N. (2017) *Algorithms as culture: Some tactics for the ethnography of algorithmic systems*, in "Big Data and Society", 4 (2), pp. 1-12.

Woolgar, S. (1997) *The Luddites: diablo ex machine*, in K. Grint and S. Woolgar *The Machine at Work: Technology, Work and Organization*, Cambridge, Polity Press.

* * *

Stefano Crabu

Dalla molecola al paziente. La biomedicina nella società contemporanea [From the Molecule to the Patient. Biomedicine in Contemporary Society], Bologna, Il Mulino, 2017, pp. 179

Lorenzo Beltrame *Università di Trento*

"From bench to bedside" is the motto of the emerging translational research in current biomedicine. In the biomedical literature, translational research is promoted as a strategic and efficient way to implement the novel discoveries of biological science in clinical practices, and to incorporate clinical observations back to laboratory science. In Science and Technology Studies (STS) and in social studies of biomedicine, translational research is addressed as a space of problematization instead, which invests important transformations in the articulation of clinical and experimental practices as well as discourses and epistemologies, the generation of novel biological entities and, finally, the making of subjectivities.

In *Dalla molecola al paziente*, Stefano Crabu introduces the Italian reader to the STS discussion on what is often called *precision* or *personalized* medicine. While in the biomedical literature "precision" and "personalized" neutrally refer to the application of genomic knowledge for the development of targeted, patient-specific therapies, in STS these terms are instead problematized. Crabu contributes to this effort of problematization, through an original ethnographical analysis in two strategic sites of translational medicine: an institute specialized in clinical research on cancer and a laboratory working in the emerging field of nanomedicine. Crabu shows how these sites are problematic spaces where the institutional boundaries of care and knowledge production are blurred. He thus explores the complex epistemological and pragmatic realignments of clinical and research practices that characterize translational medicine.

In the first chapter, Crabu sets the analytical framework by discussing the main theoretical approaches in the sociology of medicine, health, and illness and in the social studies of contemporary biomedicine. Here Crabu combines the STS understanding of laboratory practices with some central notions in the social studies of biomedicine, and in particular with the theory of *biomedicalization* developed by Adele Clarke and colleagues (2010). This move allows to grasp the complex transformations occurring in contemporary biomedicine, including what Clarke and colleagues called the "technoscientization" of biomedical knowledge production and clinical practice. Technoscientization is what enables the insertion of STS analysis of laboratory practices into the social studies of biomedicine, through another important analytical notion largely used in this literature, namely the concept of *biomedical platforms* developed by Keating and Cambrosio (2003). Covering semantically "natural and artificial entities, material artifacts and their blueprints, technical and political, material and symbolic referents", biomedical platforms are "way[s] of arranging things in both a material and a discursive sense… the basis for the organization of activities" (Keating and Cambrosio 2003, 345-6). The concept of biomedical platforms has been introduced to account for the growing importance of biology in current medicine and the clinics, as biology has become "the ultimate description and account of disease origins and mechanisms" (Keating and Cambrosio 2003, 354). It is therefore particularly apt to understand the institutional, pragmatic, and epistemological transformations characterizing the current biomedicine, especially in fields like translational research. In fact, the analytical framework developed by Crabu in this research is strongly indebted with the notion of biomedical platforms and in general to the work of Keating and Cambrosio on the intersection of the new genetics with cancer research and clinical treatment.

A third relevant concept largely adopted by Crabu, is that of *molecularization* (Rose 2007), namely the re-inscription of the biological into the mechanisms and dynamics of the molecular entities of the human ge-

nome. Molecularization, moreover, accounts also for the pervasive use of information technologies in contemporary biomedicine, as well as for the articulation of the molecular in informational terms, that enables the deployment of genomics and post-genomics knowledge in addressing health, illness, and therapies targeted on the patient's genetic specificities. Molecularization, finally, has important implications in the re-making of bodies as *biomedical objects* and of patients as *experimental subjects*. Referring to *biomedicalization*, *biomedical platforms*, and *molecularization*, Crabu investigates what translational medicine implies in terms of the emerging novel articulations and intersections of clinical and experimental practices. The theoretical reflection on these articulations is empirically grounded on the analysis of the practices situated in specific sites of treatment and research, where biomedicine is in the making.

The second chapter is thus devoted to an ethnographical analysis in an Italian medical institute specialized in cancer care and research. Here, by studying what he calls a "translational biomedical platform" (p. 74) in the making, Crabu explores the interconnection of care, clinical research, and experimental development. This valuable analysis is articulated along two interconnected axes. The first axis concerns the re-arrangement of care and clinical research practices in a translational framework. This means that the traditional routines in patients' treatments are reshaped according to the protocols for the research on molecular biomarkers. The second axis refers to the transformations investing patients and their bodies. By combining the reflection on molecularization and on *clinical labor* (Waldby and Cooper 2014), Crabu shows how patients' bodies are reconstituted into a flow of mobile biological samples, parameters, and bioinformation, that can be treated *in vitro*, *in vivo*, and *in silico*. The body is fragmented and rewritten through a complex technoscientific apparatus of molecular quantification. In this way, the individual patient is converted into an experimental subject enrolled in the process of bio-knowledge production.

The adjustments of laboratory knowledge to clinical activities and the related re-arrangements of the everyday procedures of care and patients monitoring, according to the requirements of scientific research, are encapsulated in the original notion of *technomimicry.* This notion is the main theoretical contribution of Crabu to social studies of biomedicine. Crabu distinguishes between *clinical technomimicry* and *experimental technomimicry*. The first one captures the "cognitive, material, and technological resources" operationalized in the situated everyday practices that make "scientific research epistemologically consistent with clinical action" (p. 69). The second refers to the ways "the clinic locally re-adjusts its routines and practices" to the norms and methodologies of the scientific laboratory (p. 74). According to Crabu, *technomimicry* is what makes the biomedical platform of translational medicine working, by providing the medical experts with the operative logic for producing clin-

ical data and samples that can be used in the laboratory setting. *Technomimicry*, in its clinical and experimental acceptation, is the analytical device that enables to grasp how translational biomedical platforms are concretely and locally enacted and how the practices of care interpenetrate technoscientific research and innovation.

In the third chapter, Crabu explores the field of nanomedicine, that is the combination of nanotechnologies with the biotechnological design of new entities aimed at improving drug delivery and developing novel molecules to treat cancer. Here, the analytical framework is enriched with the contribution of the so-called *sociology of technoscientific expectations* (Brown and Michael 2003). Largely used in the analysis of emerging and future-oriented technoscientific innovations, this approach is suitable for investigating how discursive spaces of future promises and technoscientific imaginaries are enacted to shape and orient the course of action of research and innovation. The sociology of technoscientific expectations allows Crabu to deploy the notions of biomedical platforms and *technomimicry* for an analysis of future-oriented biomedical technologies. In this way, Crabu investigates the articulation of practices, discourses, and biological and technological objects in the everyday activities of a laboratory working on prospective biotechnological applications.

In the final chapter Crabu goes back to STS and social studies of biomedicine to theoretically discuss the implications of translational biomedical platforms. The ethnographical analysis undertaken in the previous chapters enables the identification of four trajectories that are reshaping the contemporary biomedical landscape: 1) the making of a hybrid space of increasing interaction between the laboratory and the clinical setting and the related technological and organizational arrangements enabling the coordination among different disciplinary fields; 2) the manipulation of the biological and the life itself; 3) the redefinition of the role of the patient as a central actor in nowadays biomedical practices; 4) the transformation of the roles, expertise, and identities of medical, research, and health professionals involved in contemporary biomedicine. The implications of these four trajectories are discusses along two axes.

The first one, centered on Crabu's notion of *technomimicry*, focuses on the articulation and the assemblage of knowledge, practices, and technological objects. Translational medicine is thus not represented as merely a strategy for improving the application of genomic and post-genomic knowledge and techniques to the clinic, as in the biomedical literature. Rather, translational medicine is studied as a new style of practice where the boundaries between the clinical and the experimental are blurred and reconfigured. *Technomimicry,* in both its clinical and experimental acceptation, is the core notion that enables the identification of this novel, emergent style of practice, where clinical routines are shaped to produce scientific data (through the lenses of molecularization), and laboratory procedures are adapted for the generation of knowledge and technologies

usable in the clinic.

The second axis is related to the implications of molecularization for the role of patients. Here lies a huge contrast between how the patient-centered approach of translational medicine is depicted in the dominant narrative of the biomedical literature and how the patient is subjectified in current, concrete biomedical practices. By drawing on the notions of molecularization, clinical labor, and experimental subjectification (Rose 2007; Waldby and Cooper 2014), Crabu shows how the claims of a personalized, patient-centered medicine are instead translated into the reduction of the patient to her/his biological and genetic specificities, materially represented by the bio-information extracted from her/his samples and her/his informatized medical records. Crabu stresses how the patient is, in other words, transformed into a flow of samples and bioinformation, metabolites and biomarkers, bits and data analyzed and manipulated by complex technoscientific apparatuses of calculation and intervention. The translational biomedical platform transforms the living body into elements that are manipulated, mobilized and translated into information according to experimental, patient-oriented practices. In this way, a striking paradox in the dominant rhetoric of translational medicine is addressed: through molecularization, the patient-centered approach turns into the re-inscription of bodies in terms of biological entities and bioinformation. Patients are only represented in discourses, experimental practices, and clinical procedures but not as actors-in-the-flesh. The literature in social studies of biomedicine has largely worked on the implications of molecularization for the re-shaping of the self, individuality, personhood and the subjectification of those who are enrolled as experimental subjects in contemporary biomedicine. A stronger engagement with this literature, and a closer analysis of how patients are experiencing their re-inscription as "separable, mobile, exchangeable and reincorporable body parts" (Rabinow 1999, 95) would have enriched the valuable problematization of translational medicine made by Stefano Crabu. Similarly, the notion of *technomimicry* is useful to capture the mutual and continuous realignment of clinical and laboratory practices in translational medicine, but a discussion about the existing lines of conflict between purely clinical settings and novel translational practices would have further improved the problematization of this emerging biomedical platform.

This book is indeed a precious contribution, well integrated in the existing literature in STS and social studies of biomedicine, and it introduces the Italian readers to the scholarly problematization of the situated discursive, symbolic, and material practices characterizing the contemporary emergent biomedical fields.

References

Brown, N. and Michael, M. (2003) *A Sociology of Expectations: Retrospecting*

Prospects and Prospecting Retrospects, in "Technology Analysis & Strategic Management", 15 (1), pp. 3–18.

Clarke, A.E., Mamo, L., Fosket, J., Fishman, J.R. and Shim, J.K. (2010) *Biomedicalization: Technoscience, Health, and Illness in the U.S.*, Durham, Duke University Press.

Keating, P. and Cambrosio, A. (2003) *Biomedical Platform: Realigning the Normal and the pathological in Late-Twentieth-Century Medicine*, Cambridge, MA, MIT Press.

Rabinow, P. (1999) *French DNA. Trouble in Purgatory,* Chicago, Chicago University Press.

Rose, N. (2007) *The Politics of Life Itself. Biomedicine, Power, and Subjectivity in the Twenty-First Century*, Princeton, NJ, Princeton University Press.

Waldby, C. and Cooper, M. (2014) *Clinical Labor: Tissue, Donors and Research Subjects in the Global Bioeconomy*, Durham, NC, Duke University Press.

* * *

Silvia Gherardi

How to Conduct a Practice-based Study: Problems and Methods. 2nd Edition, Cheltenham, Edward Elgar, 2019, pp. 295

Inti Lammi *Mälardalen University*

As a renowned scholar within organization studies, Silvia Gherardi needs little introduction. Spanning topics such as work, organizational learning, sociomaterial practices, and more recently, affectivity, Gherardi's work is generally known for its ability to introduce and reinforce insightful new perspectives in a timely manner. Most prominently, Gherardi's work has been influential in establishing practice-based thinking around the same time that the notion of a 'turn to practice' gained traction. It is thus fitting that the latest edition of her book *How to conduct a practice-based study* manages to reflect much of the range of her and her colleagues research with specific attention to practice.

In so far as the book covers research, it more importantly covers the process of doing research. The book is not a standard book on methods but one that engages with giving some idea of how phenomena can be conceptualized in a practice-based manner and in presenting stories of how practice-based studies are possible. Consequently, the book is not a summary of research findings or a step-by-step guide on how research is done. While possibly confusing at first for those who might want an easy read on what they should be doing in research, the narrative approach

makes for an excellent run-through of the actual challenges of doing practice-based research.

Given the scholarship of Gherardi, the book can be assumed to be primarily intended for audiences in organization studies. However, it is fair to state that the book is relevant to other audiences. Not only is this notable in the inspirations Gherardi draws from, e.g. microsociology, Science and Technology Studies (STS) and feminist theory, but also the themes covered in the book. Next, I give a short summary of each chapter to clarify the main themes of the book.

In Chapter 1, the book posits a general position of practices as interesting units of study and a means to re-conceptualize traditional understandings of the social. This position is based upon Gherardi's reading of microsociology, i.e. ethnomethodology, symbolic interactionism, and phenomenology, i.e. Schütz and Merleau-Ponty. Drawing on these insights the book lifts the embodied character of practical knowledge, an important staple of Gherardi's theory of practice. Moreover, it positions such knowledge as essentially collective and situated. Practice is not individual doing but collective knowledgeable doing that happens somewhere.

The chapters that follow generally expand upon Gherardi's introductory definition of practices and how they can be studied. In Chapter 2, the topic of knowledgeable doing is fleshed out by illustrating its collective nature in workspaces. In Chapter 3, the embodied aspect of practical knowing put forth and illustrated in terms of how aspects of the body, as well as the gendered body, matter in practices. Chapter 4 presents how an interest in practices also can extend beyond the confines of classical sociology. Most notably, Gherardi draws upon insights from science and technology studies and post-humanist feminist theory in suggesting the performativity and agency of materiality.

In Chapter 5, Gherardi discusses the issue of normativity in practices and how rules are instantiated and used as resources for practical doing. Chapter 6 follows this by discussing the discursive nature of practices and its study, channeled in a methodology to grasp language-in-use and communicative practices. Chapter 7 then expands upon why practitioners engage in practices, and the concerns and issues that drive them. To accomplish this, Gherardi connects to wider theoretical discussions on topics ranging from aesthetics, ethics, and affectivity.

As she posits, a study of practice can more justly be defined as always engaging with aesthetic sensibility, ethical dimensions, and the affectivity that suffuses practical doing. Here Gherardi makes her interest clear in bridging the study of practice into domains that could both be seen as enriching it while also being theoretically compatible. With the emphasis on doing research, the book goes beyond others (e.g. Andreas Reckwitz), who made similar conceptual points to discuss more concrete examples of an expanded study of practice. In Chapter 8, Gherardi connects the

notion of studying practices with the issue of studying multiple practices, i.e. nets or complexes of practices. Drawing upon her previous work, Gherardi defines a line of inquiry involved in understanding the relationality of practices in what she refers to as the *texture of practice*. Moreover, she expands upon her earlier definitions of this by connecting with an interest in the assemblages of the sociomaterial world, or as she prefers to regard it: the *agencement* involved in the texture of practice.

The final two chapters stand out from the rest in having different ambitions. Chapter 9 presents some more hands-on advice in terms of techniques in the study of practice. Topics such as doing interviews and ethnographic research are given particular attention. Finally, Chapter 10 lays the foundation for Gherardi's more recent theorizing as a means to tie together the various themes of her research mentioned in the book. Here, at the center, lies an explicit idea of a post-humanist understanding of practice, and more so, a post-humanist practice theory. This chapter goes beyond Chapter 4 in discussing the conceptual implications of such theory, while simultaneously making room for all themes covered in the book.

Readers of new materialism will most likely feel a sense of familiarity when approaching the theoretical synthesis of Gherardi. Even though Gherardi draws from social phenomenology and classical microsociology, her doing so is largely accomplished in order for it to be compatible with posthumanist reasoning. This is not particularly surprising for those who have kept tabs on the development of practice-based thinking. Departing from its classical theoretical form in the works of Bourdieu and Giddens, practice scholars have been open towards critiques of humanist thinking in efforts to treat materiality. Given the rise of new technologies, ongoing climate change, and – more recently – pandemics, making an explicit posthumanist point can be seen as warranted for practice scholars to better assess these new challenges methodologically.

In her final chapter, Gherardi states that she is aware that her work draws from multiple traditions that differ in terms of assumptions, lines of inquiry and methods. Nonetheless, she bridges these differences to suggest important commonalities to be gained by framing these perspectives under the umbrella of practice-based studies. The most important among these – given the context of the book – is that practitioners' practices and researchers' practices are to be conceptualized as interlinked. Rather than the pursuit of the study of the 'Other' through some form of distanced, rationalistic inquiry, practice-based scholarship realizes that researchers are not withdrawing from the world when engaging in scholarship but very much engaged with their bodies, affects, non-humans, pursued ends, ethics, and so on.

Having summarized the chapters and the book's central message, a fitting question to ask is whether the new edition of book has anything new to offer for those who have read the first edition. The major differences can be posed as follows: some chapters have been re-structured to

more poignantly present particular themes of practice-based research. In addition, the description of practice theory has been reframed and Gherardi makes a more distinct effort in presenting her own theorizing. These changes are welcome as they make the book and its contents stand out more distinctly and simultaneously be more accessible.

Some things in the book can, however, be critiqued. I must first signal that my impression of the book is colored by my own background in organization studies. I originally read both editions of the book with an explicit interest in practice theories in particular and their implications for organizational scholarship. From this perspective, the book can be posed as providing an introduction to practice thinking, fit for those who might wonder what practice approaches are good for and what they mean for research practice. The ties to organizational scholarship are, however, not particularly prominent. There is no grand effort in mounting a major offense on mainstream organizational theory here from a practice-based perspective. This is not a detriment of the book as such, and perhaps suggests that it is more appealing for a broad readership.

Leaving organization studies aside, the book can also be judged on the basis of its appeal for scholars of practice. For those expecting a book with a focus on practice theory– this book is not immediately for you. In contrast to another popular textbook on practice studies (Nicolini 2012), Gherardi makes no major effort to account for a genealogy of practice theory nor does she make any major effort in defining the family of intellectual inspirations connected to practice theory. While some assessment of the tradition of practice research is present, it mostly is directed towards a short excursion into classic microsociology and the sociology of science. A reader of classical practice theory, e.g. Bourdieu and Giddens, would perhaps also not immediately feel at home with some of the connections drawn. Here, I object to the emphasis on Alfred Schütz phenomenology as a guiding inspiration for practice theory on the basis that it underplays the legacy of Heidegger's philosophy in the theorizing of Bourdieu and Giddens, and more recently: Theodore Schatzki. This objection, however, rests upon a specific understanding of the genealogy of practice thinking; one among others that are not brought forth here.

While one could argue that making a deep dive into theoretical elaboration is not necessary there are a couple of important implications. First, and as stated above, this book does not fully analyze core assumptions of the various theoretical approaches discussed. Secondly, due to the book's nature of being oriented towards the craft of research, the book is less evidently related to later, prominent developments in practice theory (e.g. Schatzki 2019; Shove et al. 2012). When they are mentioned, they are only discussed in superficial manner. While not necessarily a problematic issue, there are parts of Gherardi's text that can be seen as polemic in nature. Indirectly, the book is found in a discussion with alternative accounts of practice that are never properly presented in the book. This

implies that the uninitiated readers are left in the dark concerning the full implications of Gherardi's methodological reasoning. Third, the book also does not deal with some of the critique leveraged against practice theory (Turner 1994). It can, at times, appear to be a text dedicated less to argue in favor for its assumptions and more in line with helping scholars who are already on-board in their research.

These aspects are not necessarily major flaws, and for some readers these are possibly irrelevant concerns. I would go as far as to say that the lack of theoretical emphasis makes this book particularly helpful for scholars of practice. Unlike much discussions on practice theory, Gherardi launches directly into discussions of epistemology – practice as epistemology in her terminology – and in discussions of actually doing research. As much thinking in regards to practice theory has been marshaled in conceptualizations rather than actual empirical elaborations, Gherardi's emphasis is sorely needed.

To conclude, this book is of value for all those interested in pursuing practice-based scholarship empirically. More so, one could claim that the book provides an interesting read for all interested in anecdotes that cover the processes of doing qualitative research. Given its style and the themes covered, the book can be seen as relevant across the social sciences including thus STS.

References

Nicolini, D. (2012) *Practice Theory, Work, and Organization: An Introduction*, Oxford, Oxford University Press.

Schatzki, T.R. (2019) *Social Change in a Material World: How Activity and Material Processes Dynamize Practices*, London and New York, Routledge.

Shove, E., Pantzar, M. and Watson, M. (2012) *The Dynamics of Social Practice: Everyday Life and How It Changes*. Los Angeles, SAGE.

Turner, S.P. (1994) *The Social Theory of Practices: Tradition, Tacit Knowledge, and Presuppositions*, Chicago, University of Chicago Press.

* * *

Daniela Rosner
Critical Fabulations. Reworking the Methods and Margins of Design, Cambridge, MA, MIT Press, 2018, pp. 216

Mariacristina Sciannamblo *Sapienza Università di Roma*

The first time I have approached the book *Critical Fabulations. Reworking the Methods and Margins of Design* by Daniela Rosner was during the EASST Conference held in Lancaster in 2018. At the time, Rosner was in Lancaster acting as one of the discussants in the open panel "Situating designs", and presenting her freshly published book. I remember that Rosner's insights into the rich and complex relationship between design and STS have been quite encouraging for me, a postdoctoral researcher in Participatory Design back then, with a PhD in STS and a background in Media Studies. I was grappling with the particular condition of navigating neighboring, yet different, research fields, striving to find my place somewhere between them. In that circumstance, I found Rosner's thoughtful considerations about how STS and design are connected rather promising insofar as she identified the contribution that each of them could offer to the other (Boeva 2018). More than anything, after listening to Rosner's intervention, I have started the process of dismissing that idiosyncratic picture of design made up of sticky notes, portfolios, posters, websites etc. (that is, what I was the least familiar with), and pinpointing the actual, although challenging, entanglements between STS and design. This commitment was definitely confirmed and reiterated by reading the book, which advances the theoretical argument of 'critical fabulations' understood as ways of storytelling that rework how things we design come into being, therefore opening new paths for design by awakening alternative stories.

The book is divided into five chapters, crossed by a narrative thread that starts with theoretical and impersonal chapters (1 and 2) and runs towards practical and personal examples of critical fabulations (chapters 3, 4, 5). The distinction between 'personal' and 'impersonal' narrative is not a trivial one, as it reflects both the theoretical pivots underpinning Rosner's book and work as well as the narrative tone deployed in the book. The book's structure, indeed, moves from a historical critique tracing central influences on design today and search for "correctives" (identified in feminist programs of technoscience) to interventionist possibilities. Such content structure is also experimented in form and voice, with Chapter 1 presenting a historical account, Chapter 2 a biographical narrative, Chapter 3 an autobiographical note, while Chapters 4 and 5 portray Rosner herself as deeply embedded into critical fabulations. Accordingly, she adopts a more embodied and experiential writing voice along the way, a narrative choice that reflects her professional and personal transi-

tion from a dominant design paradigm towards a more implicated, open-ended, collaborative practices of technoscience. As a matter of fact, Chapter 1 reconstructs the intellectual pillars that, according to Rosner, have dominated design thinking: individualism, universalism, objectivism, and solutionism. Each of them is situated, so as the doctrine of *individualism* is associated with John Dewey's American Pragmatism, while *universalism* is linked with Cold War cybernetics, *objectivism* is related to the cognitive model developed by economist Herbert Simon, and *solutionism* is coupled with the increasing tendency toward problem solving the design discipline took up at the outset of the 1960s. According to Rosner, these intellectual foundations of the dominant design paradigm advance an understanding of design as a disembodied activity comprising universal subjects, thus neglecting or underrecognizing certain bodies and voices.

An alternative way of understanding design is drawn from feminist programs of technoscience, which are examined in Chapter 2 through the biographical notes of two major figures in the field: Lucy Suchman and Donna Haraway. Rosner engages with Suchman's and Haraway's work and lives though biographical notes collected from various public interviews and from conversations she personally had with them. The outcome is an interesting double portray that emphasizes connections by highlighting the different paths walked by the two scholars, namely ethnomethodology and symbolic interactionism in the case of Suchman, and Heidegger's phenomenology, Whitehead's writings and cybernetic theory in the case of Haraway. Such heterogeneous formations developed later into two more coherent research frames: whereas Suchman attended to the position of the user by developing the concept of 'situated action', Haraway focused on the position of the analyst by elaborating the concept of 'situated knowledges'.

These intellectual sensitivities are put at play in the subsequent chapters, in which Rosner narrates her personal encounters with critical fabulations. Chapter 3 provides an account of her fieldwork with knitters and crafters in the Bay Area, an experience that made her grapple with issues of invisible labor and the view of users as a united category of practices. In this respect, *Spyn* – the new knitting technology Rosner developed – served more as a tool whereby to open the intimate relationships at stake than the right solution to achieve a supposed universal state. This experience allows Rosner to develop a deep reflection on the role of design practice and designers, leading to the elaboration of four orienting tactics characterizing critical fabulations: alliances, recuperations, interferences, extensions. Rooted in the theoretical commitments of feminist technoscience, these techniques work as guiding orientations for critical fabulations, in order for investigators to reimagine established design techniques and to recuperate invisible stories behind contemporary technoculture's extractive systems of power. More specifically, *alliances* refer

to the set of relations designers can foster through their practice, enabling ways whereby to cultivate collective action and to inquire in concert with those standing in the design setting. An example of this tactic is mentioned in relation to contemporary design projects aimed at enabling alliances between gig workers as in the case of *Turkopticon*, a digital platform developed to allow Amazon Mechanical Turk workers to search and add reviews of employers, thus prompting both workers and employers to be known and accountable to one another. *Recuperations* point to attempts to revive stories entangled with the design settings, but neglected by prevailing design narratives. This tactic pushes investigators to ask questions such as: Whose invisible work underpins your own? How might inform your inquiry? What histories of practice have been suppressed or elided? Whose legacies are being left out or dismissed? Similarly, the tactic of interferences works to disturb a narrative that is privileged within a prevailing design culture, showing that it might work otherwise, and how. In the case of *extensions*, designers work to uncover and value an abandoned or ignored design situation within a prevailing design culture.

The last chapter of the book brings us into the critical fabulations through an account of design projects in which Rosner was involved. These projects have been devoted to challenging the established ideas of craftwork as a plan to be given form by design (*Arc* project), embracing legacies of repair (*Broken Probes* project), recuperating the textile work of Little Old Ladies – the female workers who wove the software into the core memory for the *Apollo* Missions – to trouble the current mainstream understandings of design and engineering innovation (*Making Core Memory* project).

Critical Fabulations is a brilliant piece of intellectual and empirical work, which falls into an interesting lineage of scholarship focused on developing a conception of design as an activity inherently cultural, social and political (Balsamo 2011; Manzini 2015; Escobar 2018), aiming at creative and ethical transformation. What I think makes Rosner's book particularly interesting for the STS audience is the effort to portray a critical and engaged practice of design building on works that are central in the STS scholarship, such as Suchman and Haraway's intellectual legacies. Such an effort is palpable in the recurrent emphasis on the alternative processes of knowledge production that critical fabulations can spark. In this respect, I feel that the most interesting contribution of the book to STS researchers is an invitation to experimenting with material objects and practices as methodological tools to be added to the STS traditional toolbox (e.g. interviews, observations, archive research, etc.) in order to detect issues and intervene in the field. Such a commitment resonates with the emergence of a "collaborative mode of practicing STS" (Farías 2017) based on dialogue, mutual learning, and caring relationships with other research fields and disciplines as well as with non-academic collec-

tives. After all, one of the orientations informing critical fabulations is precisely *making alliances* in order to cultivate transformative collective actions by standing with the groups with which we inquire.

Critical fabulations is a compelling reading for STS scholars interested to find their distinctive way into design as much as for designers to rethink and retool their practice from a critical point of view. It is a tool that can help building fruitful bridges between design and STS, fostering promising alliances and possibilities.

References

Balsamo, A. (2011) *Designing culture: The technological imagination at work*, Durham, NC, Duke University Press.

Boeva, Y. (2018) *The Confluence of Design and STS: Reflecting Disciplinary Positions and/or Situatedness, Place, Publisher*, in "EASST Review", 37 (4).

Escobar, A. (2018) *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*, Durham, NC, Duke University Press.

Farias, I. (2016) *A collaborative turn in STS?*, in "EASST Review", 35 (3), pp. 4-5.

Manzini, E. (2015) *Design, when everybody designs: An introduction to design for social innovation*, Cambridge, MA, MIT Press.

* * *

Tiago Saraiva and Marta Macedo (eds.)

Capital Científica. Práticas da Ciência em Lisboa e a História Contemporânea de Portugal [Science Capital. Science Practices in Lisbon and Contemporary History of Portugal], Lisbon, Imprensa de Ciências Sociais, 2019, pp. 410

Ana Delicado *Instituto de Ciencias Sociais da Universidade de Lisboa*

Capital Científica [Science Capital] examines how Lisbon became not just the official (political) capital of Portugal but also the capital of its scientific system and how scientific knowledge helped build the contemporary city outlook.

This book is an edited volume that brings together ten chapters authored by some of the leading scholars in History of Science in Portugal, from the main universities and research centers dedicated to this discipline, such as Tiago Saraiva (University of Drexel), Ana Carneiro and Maria Paulo Diogo (New University of Lisbon), Ana Cardoso de Matos (University of Évora), Ana Simões (University of Lisbon, current presi-

dent of the European Society for the History of Science). It stems from two research projects funded by the national agency (Portuguese Foundation for Science and Technology) focusing on the development of science and technology between the mid-19th and the mid-20th century. Although each chapter focuses on a particular subject, they are structured around a few crosscutting issues, such as the importance of place in the production of knowledge, the construction of new urban landscapes, or the role of scientific research and some professional groups (scientists, engineers, doctors) in policy making and policy implementation. As the editors state, science is a lens through which to understand the historical dynamics of contemporary Portugal. At the same time, the book shows how urban problems in Lisbon inspired the work of scientists and engineers and, conversely, how their work changed the city in material, social, and symbolic terms.

The connections between science and the political regimes are made clear. The book is divided into three sections that pertain to different chronological and political periods in Portugal: the later stages of the monarchy (mid-19th century to early 20th century), the First Republic (1910-1926), the Dictatorship (from 1926 until 1974). The first section addresses the role of scientific institutions in modernizing the nation, by mapping the territory, standardizing time and providing expert support to public services such as street illumination, water, and sewage systems, the design of parks, gardens and streets. The second section shows how the Republican project of education and health for all had repercussions on the creation of new hospitals and biomedical research institutes and also of 'people universities', institutions devoted to the education of adults with low formal education. The third section illustrates how the Fascist regime concentrated its efforts on research institutions under its direct supervision, namely State Laboratories and hospitals, and on applied scientific disciplines (namely medicine and engineering), while neglecting universities and persecuting academics.

Some chapters focus on specific research institutions (Chapters 2, 3, 6 and 10), others on teaching institutions (Chapters 1, 4 and 7), or on the intersection between research, teaching, and professional practice (Chapters 5, 8 and 9). A few chapters (1, 2, 3, 5, 8 and 9) examine how the architecture of purpose built scientific institutions, such as the Polytechnic School, the Astronomical Observatory, the office of the Geological Service, the Faculty of Medicine, the Institute of Engineering or the Oncology Hospital, serve both practical and symbolic functions. Some of them (Chapter 1, 5, 8, 9) show how the neighborhoods in the vicinity of scientific institutions suffered significant transformations, in terms of hygiene, rationalization, and civic architecture. Only the chapter on Industrial Institutes and public illumination (Chapter 4) explores the connections between art (literature, theatre, opera) and technoscience.

The chapters cover a fairly wide array of scientific disciplines (astron-

omy, geology, physics, microbiology, engineering, and medicine), though the social sciences are entirely absent. Omissions in terms of institutions and scientific disciplines are acknowledged by the editors in the Introduction. Some chapters pay particular attention to the training of new professionals, such as engineers (Chapters 1 and 8) or physicians (Chapters 5 and 6), whereas others focus on the promotion of science and technology education for factory workers and adults with lower educational backgrounds (Chapters 4 and 7). Most chapters also include some biographical detail of historical figures of particular relevance, such as doctors (Chapters 5, 6, and 9), architects (Chapter 1 and 8), astronomers (Chapter 2), geologists (Chapter 3), industrialists (Chapter 4), or university professors (Chapters 7 and 8). It is notorious the absence of women in these narratives, with the exception of the wives of doctors in the Oncology Hospital that conducted philanthropic work (Chapter 9) and one female researcher who worked in a biomedical laboratory (Chapter 6).

The book follows in the footsteps of other works on the relations between science and territorial or urban contexts (see, for instance, Agan and Smith 1998 or Nieto-Galan and Hochadel 2019) and the relevance of the architecture of spaces in knowledge production (see, for instance, Galinson and Thompson 1999). It is closely connected to the previous work of the editors, namely their PhD theses: Saraiva's (2005) take on science and the city with regard to Madrid and Lisbon and Macedo's (2012) analysis of the role of engineers in producing science and territory in the 19th century.

The chapters seek to establish an extensive dialogue with the international literature on the topic, in particular by drawing parallels with studies on other European or American cities, on architects and urbanists from other countries, on research and education institutions in France, Russia, or USA, and on the history of particular scientific disciplines or technological innovations. Some chapters also draw on research on contemporary science and technology issues, going beyond the time limits of their scope.

As in any edited volume, the quality of chapters is slightly uneven. Some chapters are mainly descriptive, whereas others show more concerns with interpretation and contextualization. Some chapters draw from previous published books and articles, so the innovative nature of these texts is to some extent doubtful. The title of the book is somewhat misleading, since scientific practices, in the sense of the everyday life of laboratories, offices or lecture halls or how science was actually produced, taught, applied or disseminated, are mostly absent. Rather, the chapters mostly focus on institutions, spaces, and agents of science, medicine, and engineering. The absence of an index at the end does not afford the reader an opportunity to browse for particular topics.

Nevertheless, the book is profusely illustrated, with maps, photographs, plans, and portraits. The writing style is clear and accessible to a

wide audience. Given the dearth of publications in History of Science (and STS) in Portugal, this book provides a much-needed contribution to the field. Also, the book brings to the light the "invisible" scientific endeavors carried out in a southern European country during the 19th and early 20th century, putting into question the dominant narrative that Portugal had barely any scientific activity until the accession to the European Community in the 1980s.

References

Agar, J., and C. Smith (eds.) (1998) *Making Space for Science. Territorial Themes in the Shaping of Knowledge*, London, Palgrave Macmillan.

Galison, P. and E. Thompson (eds.) (1999) *The Architecture of Science*, Cambridge, MIT Press.

Macedo, M. (2012) *Projectar e Construir a Nação: Engenheiros, ciência e território em Portugal no século XIX*, Lisbon, Imprensa de Ciências Sociais.

Nieto-Galan, A. and O. Hochadel (eds.) (2019), *Urban Histories of Science*, London, Routledge.

Saraiva, T. (2005) *Ciencia y Ciudad: Madrid y Lisboa (1851–1900)*, Madrid, Ayuntamiento de Madrid.

* * *

Howard Shrobe, David L. Shrier and Alex Pentland (eds.) *New Solutions for Cybersecurity,* Cambridge MA, MIT Press, 2018, pp.491

Stefano De Paoli *Abertay University*

Cybersecurity and cybercrime are fast becoming two of the most important issues of our digital society and, as such, they deserve attention from Science and Technology Studies (STS). We can define cybersecurity as the theory and practice of preventing or detecting attacks on digital systems. We can define cybercrime as the unauthorised access to digital systems for a variety of purposes, which can include disruption, manipulation, deception and crime more generally, among others. Much of what exists in social sciences research especially around cybercrime comes from criminological studies. However, criminologists are debating on the problem of using traditional criminological approaches (that focus on the study of human criminals and social structures) to the study of phenomena deeply ingrained with digital technologies. Thus, criminologists speak about the problem of the "Novelty of Cybercrime" (e.g. Yar 2005). Few authors in criminology have started to look at STS approaches as poten-

tial alternatives to traditional approaches. At present, we indeed have limited STS contributions studying cybersecurity and cybercrime. Few of the known exceptions are the papers by Van Der Wagen and Pieters (2015; 2018) on cyborg crimes and hybrid victims. I would also like to highlight a recently funded research project in the UK called "Scaling Trust: An Anthropology of Cyber Security", led by Matthew Spencer at the University of Warwick.

We live in a world increasingly shaped by digital technologies, whether computers, algorithms, infrastructures or the Internet of Things, and all come with the purpose of serving a multiplicity of needs such as the running of business, the offering of public services or making our cities smart, among others. However, it has long been known that computers (and by extension all digital technologies) can be attacked often with malicious intents. Designing secure systems has been a main concern since the creation of shared computing resources in the early '60s of the last century. Security still is a major concern today as it is clear that the increased complexity of our digital technologies, their pervasiveness and our overreliance on them can only bring increases in risks and in the sophistication of the attacks toward them. All of this could cause major disruptions to our society's life, as the quite recent case of the Wannacry attack has demonstrated (ENISA 2017). Cybercrime is major problem for many actors, whether companies, public authorities or even just citizens. Consequently cybersecurity becomes a necessity, which is however often overlooked for a variety of reasons that can include costs, lack of skills or simply disinterest.

The book *New Solutions for Cybersecurity* edited by Shrobe, Shier and Pentland (2018) thus contributes to this important field. The book contains chapters written by leading academics and researchers from the MIT. Now, to be clear, this book does "what it says on the thin", to use a catchphrase. It is a book that offers solutions, i.e. practical solutions to cybersecurity problems. It is not a book that advances theoretical thinking or empirical research specifically, although all the chapters are based on high quality research. The book does not have research or academia as its main audiences. This is a book aimed at practitioners, people working for companies, public authorities and organisations, which are looking for recent and advanced cybersecurity solutions, hence the title "new solutions". Solutions, those offered in the book, which could be often readily implemented to solve technical or organisational problems around cybersecurity. Each of the chapter is very lightweight in terms of discussing debates, theories or providing reviews. Each focuses on a solution to a specific problem, whether this is a more secure computing architecture, the need for tapping into bug-hunters expertise or advances in social network analysis that can be used for prevention or detection of crimes. The book is organised in three main blocks geared respectively toward: a) "Management, Organizations and Strategy", b) "Architecture" and c)

"Systems". The first block proposes mostly solutions that can be implemented at organisational level for incresing or improving cybersecurity. The second block reports on solutions for the architecture of secure computer systems and for overcoming limits in the traditional design of computer architectures. The third block contains chapters wich broadly encompass a variety of systems, such as Internet of Things security or the DarkWeb. The three proposed blocks seem also an emergent way of organising and clustering a variety of solutions, as proposed in the book's chapters.

Now I will concentrate on some of the chapters, in order to highlight a few of the main contributions of the three main blocks of the book. I will also concentrate on the chapters that I believe are representative of the content of the book and that in my perspective may be of interest from an STS angle.

The chapter 1 of the book entitled *Institutions for Cybersecurity: International Responses and Data Sharing Initiatives* is part of the "Management, Organization and Strategy" block of the book. It provides an overview of the main institutional actors involved in cybersecurity, also detailing different institutionalisation processes that took place in both the USA and Europe. The main contribution of this chapter, I would suggest, is a table providing a detailed list of organisations and their roles in cybersecurity. This table thus offers a useful reference map to navigate the quite complex variety of institutional actors dealing with cybersecurity, including Computer Emergency Response Teams (CERTs), Information Sharing and Analysis Centers (ISACs) and other national and international players.

Chapter 4 entitled *Fixing a Hole: The Labor Market for Bugs*, also part of the "Management, Organization and Strategy" block, offers an interesting analysis of the labour market associated with bug-bounties programs, that is, companies offering rewards to programmers (defined as researchers or sellers) that can find critical bugs in their software. This chapter does well in describing the stratification of the bug bounty labour markets and provides interesting recommendations for companies wishing to use this specific form of labour for reducing the vulnerabilities of their software. The main solution is the suggestion of developing programs geared toward attracting low numbers of sellers but capable of delivering high volume of results (i.e. identification of bugs), rather than large numbers of sellers, which have shown to deliver much less, due to a variety of reasons including lack of knowledge of the codebase.

Although strictly a technical chapter devoted to an architecture called CHERI (Capability Hardware Enhanced RISC Instructions) for increasing systems trustworthiness, and thus included in the "Architecture" block, Chapter 6 *Fundamentals Trustworthiness Principles in CHERI* is quite enjoyable in its discussion and revision of the Saltzer/Schroeder principles of information security (Saltzer and Schroeder 1975). I would

recommend this chapter to get a sense of how security policies and mechanisms functions in most advanced secure and trusted architectures. Consequently, the chapter provides an interesting reference point for knowing how current advanced security architectures work toward overcoming the security limits of previous computer architecture designs.

Chapter 10 *Who's Afraid of the Dark Web?*, included in the block on "Systems", provides an interesting discussion about the concepts of privacy, anonymity and the Dark Web. This is, perhaps, the chapter that least of all proposes a specific solution to a problem. It offers, instead, reflections on the role of technologies enhancing privacy and anonymity (such as the onion routing and encryption more general). The chapter also reflects on the difficulties of maintaining the balance between the positive use of these technologies for e.g. protecting privacy and the prevention of their use for fostering criminal enterprising.

Some warnings about the content of a few chapters. Although, as I said earlier, this is not a book particularly strong on theory, I need to flag up that in some chapters there is pervasiveness of positivism and deterministic thinking. I refrain here in this review to discuss a critique of positivism in the field of cybersecurity and I would suggest that probably the measure of success to apply to each of the proposed solution is the extent to which they really offer something to address specific cybersecurity problems. Nonetheless, the positivistic perspective is for example clear in the chapters describing the concept of "social physics" (Chapter 11 chiefly *Social Physics and Cybercrime*, part of the "Systems" block) that, as the term goes, clearly builds a parallel between social action and mechanics, with the intent of identifying patterns in human data, based on "socio-behavioural laws". This perspective is a critique to machine learning, i.e. technology driven and highly expensive approaches to make prediction based on big data. However, social physics clearly resembles the idea that there are laws governing social behaviour and that now, with the amount of data (or better human signals) been generated, by knowing the laws we can anticipate the evolution of behaviour (in this case associated with security). Likewise, the chapter *Cybersafety: A Systems Theory Approach to Managing Cybersecurity Risks* (Chapter 2, included in the "Management, Organization and Strategy block") clearly advocates a strict top-down approach to cybersecurity based on the idea of cybersafety. In this approach the actions to be enacted toward better security (in particular the identification of why control systems were ineffective in incidents) are deduced from set of high-level principles/factors, in particular encompassing missing constraints, inadequate safety, inadequate safety control commands, commands incorrectly executed at lower level and inadequate communications. The authors promote this approach as an alternative to technology driven approaches to control and safety.

To conclude this is not a book I would recommend to a colleague or a student looking for a first introduction to the topics of cybersecurity and

cybercrime. I would also not recommend this book specifically to the social scientist that is looking for a publication describing the current theoretical thinking around these topics, from any specific area or research tradition. The main audience of this book, as I stated earlier, are practitioners in medium to large organisations, looking for new solutions and the publication does well in presenting them with the state-of-the-art of what is possible with novel advances. As this stands, it is possible to approach the book only with prior knowledge of the areas of cybersecurity and cybercrime and, for most chapters, with sufficient knowledge of computing and current evolution of cybersecurity.

References

The European Union Agency for Network and Information Security (ENISA) (2017) *WannaCry Ransomware Outburst*, "Cyber security info notes", May 15th.

Saltzer, J. H., and Schroeder, M. D. (1975) *The protection of information in computer systems*, "Proceedings of the IEEE", 63 (9), pp. 1278-1308.

van der Wagen, W. and Pieters, W. (2015) *From cybercrime to cyborg crime: Botnets as hybrid criminal actor-networks*, "British journal of criminology", 55 (3), pp. 578-595.

van der Wagen, W. and Pieters, W. (2018) *The hybrid victim: Re-conceptualizing high-tech cyber victimization through actor-network theory*, "European Journal of Criminology", 17 (4), 480-497.

Yar, M. (2005) *The Novelty of 'Cybercrime' An Assessment in Light of Routine Activity Theory*, "European Journal of Criminology", 2 (4), pp. 407-427.

* * *

Cornelia Sollfrank (ed.)

The Beautiful Warriors. Technofeminist Praxis in the Twenty-first Century, Colchester, New York and Port Watson, Minor Compositions, 2020, pp. 151

Monika Urban *Universität Bremen*

The #MeToo movement has recently broken silence on feminist matters worldwide. Using mostly social media, the movement has mobilized hundreds of thousands of people on topics such as sexual harassment and sexual assault. With reference to their digital practices, we could well associate the movement with cyberfeminism. This genre of contemporary feminism emerged in the early 1990s. Focusing on new digital technolo-

gies, activists have developed techno-utopian feminist visions of opportunities through technological innovations, theoretical grounds in the fields of science and technology studies, and strategic tools for cybertechnical feminist interventions.

Thirty years later, the early movement has given rise to technofeminism, which again fosters the rise of feminist technoscience. Coined by Judy Wajcman (2004), the concept of technofeminism gathers reflections on the interrelation between technical innovations and specific constitutions of gender (inequalities). Technofeminist elaborate feminist readings of human-machine interrelations. Therefore activists take up critical discourses and subaltern perspectives as well as developing new theoretical positions (e.g. in reference to new materialism), responding to today's technological state of the art. The recently published anthology, *The Beautiful Warriors. Technofeminist Praxis in the Twenty-first Century*, introduces technofeminist positions on social and aesthetic interventions against misogynist (technological) settings. This comprehensive volume, edited by the artist Cornelia Sollfrank, an early cyberfeminist and founder of the Old Boys Network, selects current technofeminist positions from the fields of academic theory, political activism and artistic work.

The volume starts by declaring no less than war against patriarchal structures, by quoting authors such as Donna Haraway, Gilles Deleuze, and Adrienne Rich. The preface situates the volume's warriors, mentioned in the title, in struggles against the political economy, with its exploitative and discriminatory outcome. In this context, Sollfrank enunciates the theme common to the eight assembled articles: the authors' analysis of and practices with technologies are inherently bound to economic and ecological matters. To sum up, all of the authors' references to technologies can be regarded as socio-political and aesthetic interventions.

The anthology can be subdivided into four dominant technofeminist themes: Hacking, subaltern perspectives, co-creational practices, and contemporary artistic interventions— even though all four aspects appear, in one way or another, in all of the contributions.

Sophie Toupin discusses hacking from a feminist perspective. In her understanding, hacking is a certain kind of computer programming, strategically used to interfere with the conditions for oppressive gender constitutions— online and offline. The author demands more accessible entry points for future feminist hackers to traditional hackspaces and a broader awareness of the dynamics of their current exclusion. Isabel de Sena, on the other hand, understands hacking in a metaphorical sense: she displays her criticism of the *Xenofeminist Manifesto*, published in 2014. The Manifesto calls for a new, pro-technology and anti-naturalist feminism, which draws on transfeminist and queer theory as well as philosophical rationalism. De Sena points out the inconsistencies of the quite abstract *Xenofeminist Manifesto* and notes the way the *Manifesto* runs counter to some basic feminist principles—as for example in its concept

of universality, which has a key claim of current feminism, accountability, at stake. In closing, De Sena links to this idea while calling for a common struggle for accountability and, along with that, a joint revolutionary process.

The second technofeminist theme is dedicated to the distribution of subaltern perspectives. Such a feminist position derives from postcolonial studies and critical theory, which emphasize the needs and demands of populations that are socially, politically, and geographically outside the hierarchy of power. In this case, Spideralex's contribution gives a voice to feminist Latin American online activists. These activists are cited for their interventions against machismo and violence in both online and physical spaces. Spideralex highlights how digital infrastructures have strengthened macho culture and violent living conditions, while giving space to an openly misogynistic agenda, including the disproportionate proliferation of hate groups, fanatical religious, and conservative movements. Against this background, the chapter addresses (cyber)feminists' self-defense and the creation of safe spaces, both online and offline. It calls for transforming these material and ideological settings.

The third major theme is the promotion of co-creational processes. Femke Snelting reflects, as a form of feminist hacker initiative, the potential benefits of a regulatory framework in the shape of codes of conduct. These codes could influence a community's culture of communication by promoting diversity and respect while simultaneously preventing harassment and mechanisms of exclusion. She argues that working communally on a document that enunciates shared values may create a platform for self-reflection and for learning about discriminatory language and behavior. In a similar fashion, the activist hvale vale reports on a multi-year process fostered by activists who are members of the Association for Progressive Communication (APC). During a Feminist Internet event in Malaysia in 2014, a first version of "Feminist Principles of the Internet" was created. At the same time, the #feministinternet meme surfaced. A co-created version 2.0 of "Feminist Principles of the Internet", reprinted in this anthology, covers topics from the need for open access through public participation, alternative economies, and freedom of expression, to agency for informed decisions. Because the document was co-created, contributors hope to inspire and support a broader struggle for informational and sexual self-determination. That means, the right of the individual to decide what information about oneself is communicated to others and under what circumstances as well as keeping one's sexual life and body free from determination by anyone else.

The fourth theme brings contemporary art activism into focus. The chapter *Viral Performances of Gender* by Christina Grammatikopoulou puts contemporary protest-art phenomena on display. She dedicates her analysis to social media interventions, which take place either as online performances or as interrelation of online and offline spaces. Gram-

matikopoulou discusses the work of artists who express feminist issues, focusing on how they use "virality" and "noise" as communicative strategies. "Virality" denotes a strategy using humorous, catchy, or provocative content, which also allows for feedback loops between the online image and offline corporeality. "Noise" denotes a strategy that deploys intercepting and confusing messages until they become progressively less clear to the readers. By using these strategies, feminism can gain ground, but the same strategies can also be turned against it. Grammatikopoulou concludes that contemporary feminists need to develop new strategies of visibility, expressing the hope that those she has introduced might provide some orientation. In a similar vein, Yvonne Volkart argues on the basis of her analysis of contemporary works of art. She develops the idea of Techno-Eco-Queer-Feminism. Therefore, Volkart integrates two conflicting feminist concepts: eco- and technofeminism. Ecofeminism originated in the '70s and postulated a close relationship between women and nature in contrast to men's exploitative and oppressive behavior, enabled by technology. In contrast, in the late seventies, European ecofeminists distanced themselves from such an essentialist identity and argued from a social-constructivist perspective on gender. In the nineties, Queer Ecologist challenged the dichotomies in which nature/technology and gender stereotypes are formulated. Volkart's concept of Techno-Eco-Queer-Feminism integrates these earlier feminist ideas and combines them with some ideas from "New Materialist" thinkers, as in the "agential realism" of Karen Barad. For Barad (1988), phenomena emerge through particular interactions between humans and non-humans, between materiality and meaning. In Volkart`s account, in recent capitalist societies nature and technology are entangled, contingent, and interacting phenomena.

The anthology is interesting to read and accessible to a broad audience. For STS scholars in particular the compilation brings a compact overview of current feminist STS debates. The anthology therefore displays the technological and theoretical enhancements that have occurred since early cyberfeminism, as well as the alterations in interests and perspectives in on- and offline feminism. The assembled authors propose new ideas of spaces (e.g. the entanglements of the online sphere and material environments), they queer dichotomies, refer to the agencies of things, and elaborate emancipatory cultures of resistance. In doing so, the authors walk in Haraway's (1991) footsteps by calling for the reconceptualisation of digital practices and by designing strategies for emancipation.

References

Barad, K. (1998) *Getting real: technoscientific practices and the materialization of reality*, "differences: A Journal of Feminist Cultural Studies", 10 (2), pp. 87–128.

Haraway, D. (1991) *A Cyborg Manifesto: Science, Technology, and Socialist*

Feminism in the Late Twentieth century, in Haraway, D., *Simians, Cyborgs, and Women: The Reinvention of Nature*, New York, Routledge, pp. 149-181.

Wajcman, J. (2004) *TechnoFeminism*, Cambridge, UK, Polity.

* * *

Shoshana Zuboff
The Age of Surveillance Capitalism. The Fight for a Human Future: at The New Frontier of Power, London, Profile Books, 2019, pp. 704

Adrienne Mannov, Astrid Oberborbeck Andersen and Jaqueline de Godoy *Aalborg University*

Authors: Alexa, who is W. H. Auden?

Alexa: Winston Hugh Auden was a British American poet. Auden's poetry was noted for its stylistic and technical achievement, its engagement with politics, morals, love, and religion, and its variety in tone, form and content. By the way, you can now ask another question, without having to first say Alexa. Enable this feature by saying turn on follow-up mode.

It is not customary that books reviewed in an academic STS journal have been translated into 17 languages only one year after publication. Shoshana Zuboff's *The Age of Surveillance Capitalism. The Fight for a Human Future at the New Frontier of Power*, published in 2019 by Profile Books, is not a customary book. Zuboff's story is both personal – each chapter begins with an excerpt of W.H. Auden's poetry – and draws on her work as a scholar of social psychology, but the book is not a scientific publication. For that reason, we approach the book as a quasi-scholarly work and as an object-phenomenon that exists within the broader field of contemporary computing and those concerning science, technology and society. This makes it worth reading for STS scholars for reasons we will elaborate upon shortly.

Daily press reviewers have qualified *The Age of Surveillance Capitalism* as "a scaffolding of critical thinking" (Silverman 2019), offering "in-depth technical understanding and a broad, humanistic scope" (Bridle 2019) and that Zuboff's life-work and "merciless analyses peak"(Jakobs 2018) in this publication. But scholars whose areas of expertise are Organization Studies, STS, Law, and critical journalists have criticized the

book for not citing contemporary, relevant literature (Ellinger 2019), for circular argumentation (Morozov 2019) and for hyperbole (Cuéllar and Huq 2019). In what follows, we offer a summary of the almost 700 page "brick", critical reflections on Zuboff's arguments and the ways in which it presents as a social and material phenomenon in and of itself. We close with how we envision the kind of field that Zuboff carves out for scholars of science and technology studies.

Zuboff's central claim is that surveillance capitalism and its societal effects represent an unprecedented threat to Enlightenment values of humanity (p. 323). Zuboff begins with eight definitions for Surveillance Capitalism. The first is: "A new economic order that claims experience as free raw material for hidden commercial practices of extraction, prediction, and sales". The last is: "An expropriation of critical human rights that is best understood as a coup from above: an overthrow of the people's sovereignty". In what follows, we attempt to summarize her path of argumentation between the two.

Part I begins with a re-telling of a Marxist narrative in which assembly line workers are "individualized", having distanced themselves from the "traditions of village and clan"(p. 33). This leads us to neoliberalism, which "reverses (…) claims to self-determination" (p.37) and "thwarts our pursuit to effective life" (ibid). In this atmosphere and with the introduction of the internet, individual users' "data exhaust" could be seen as an untapped resource for tech companies, rebranding this as "the discovery of behavioral surplus"(p. 74). This holds the promise of an "advocacy-oriented capitalism", enabling consumers' search queries to be tailored to their interests. But the "dot-com bubble" at the dawn of the new millennium pushed budding tech companies to re-think their avenues to profit, leading first Google, then others, to the realization that "data exhaust" could be used to sell ads. This "mutation" (p. 76) saved the big tech companies financially, and according to Zuboff, kick-started surveillance capitalism. Referencing the well-worn capitalism-critical story about how "human life" came to be redefined as "labor" for capitalist endeavors, and "nature" to "real estate", Zuboff draws a line from Marx's notion of "primitive accumulation" and "original sin" (citing Arendt, p. 99), to David Harvey's "accumulation by dispossession", arriving at her own "digital dispossession". Thus, "human experience" becomes a source of profit, free to be taken by tech companies, repackaged as prediction products, and sold to advertisers (p.100). Having discovered this gold mine, Zuboff details how big tech companies protect their treasure with claims of "freedom of speech" (p. 106) and the seduction of a neoliberal state (the US) impressed by new surveillance capabilities in a post-9/11 era. This included deeply entangled relationships with state actors. Part I ends with the "division of learning", a contemporary riff on the division of labor (p.181), in which "a new priesthood" is lured away from academia to lucrative positions in big tech companies (p.189). Surveillance capi-

talists' power is consolidated because they now know a lot about us, but we know little about them.

In Part II, Zuboff painstakingly and convincingly documents the history and methods with which "ubiquitous computing" (p. 199) moves from exclusively online fora (defined as "virtual") to public and private physical spaces (consistently referred to as "real"). The introduction of Internet of Things (IoT) technologies ushers in the goal of "digital omniscience" (p. 207-208). Zuboff identifies developments in "telemetry" or animal tracking devices, as the beginning of this trend, implying that they are the inspiration for "wearables" and other devices that move with us through the physical environment, documenting – and later, modifying – our behavior. Leaning on metaphors of territorial conquest, Zuboff argues that, with these connected and "smart" devices, surveillance capitalists conquer our "still wild spaces" (p. 238). This includes details such as facial expressions, social media posting patterns, voice recognition, personality traits, floor plans of a home and "block-by-block map data" (p. 317) detail, including your backyard. Under the guise of "personalization and customization"(p. 256), Zuboff explains that innovators wish to create products that "nudge" the citizen toward certain behaviors, often using "gamification" tools (p. 313) in a "living laboratory" (p. 312), generating a market utopia with "guaranteed outcomes"(p. 214). These innovations are presented as intentionally misleading, likening them often to the Trojan Horse. Surveillance capitalists make strategic use of "lawless space" because technology tends to develop faster than the regulations meant to govern them (p. 105). Zuboff shows how "consent" is a Kafkaesque exercise in futility, privacy and anonymization are moving technical and legal targets, and these changes are framed as inevitable anyway. Technology giants like Google and Facebook use their power to redefine social norms, to dodge privacy activists and to pay off government officials. For Zuboff, nothing less than free-will and democracy are at stake.

In Part III, Zuboff outlines her theory of the power that underpins the age of surveillance capitalism, and the consequences it has for human society and social relations. The vision of surveillance capitalism, according to Zuboff, is that machine processes replace human relationships so that certainty can replace social trust and democracy. She dubs this power "instrumentarian", and defines it as "the instrumentation and instrumentalization of behavior for the purpose of modification, prediction, monetization, and control" (p. 352). Using it as a foil, she explains that totalitarianism worked through *ideology*, seeking to gain and modify souls; it was a political project that operated through the means of violence. Instrumentarian power, in contrast, does not seek to modify souls but human behavior; "to achieve its own unique brand of social domination", Zuboff locates the roots of instrumentarianism in the intellectual field of "radical behaviorism", pioneered by the psychologist Barrhus F. Skinner (p. 353), whose classes Zuboff followed at Harvard when she was

a young graduate student. Skinner held that human behavior could be studied, known and even engineered through thorough observation of external action. For the behaviorist, the human could be objectively observed as "the Other-One". Here, the human was seen as an organism, with no free will to make choices. Freedom was considered an illusion, and thus also democracy. Big Other is the name that Zuboff gives to this instrumentarian form of power. As a hybrid concept that brings together Big Brother – that fictional character and figure symbolizing totalitarian power from Orwell's dystopic novel *1984* – with "the Other-One" from radical behaviorism. Zuboff warns that surveillance capitalism is breaking down the walls of our homes as sanctuary, and, ultimately, risks the right to a human society in which we are free to decide our future, threatening the very right to a "future tense"(p. 329).

As should be clear, Zuboff is outraged. The text is maddeningly repetitive, and we miss more detail and reflection about her role and research methods. Almost no contemporary, critical work in this field are cited, such as that of Paul Dourish, Mary Gray, Ian Lowrie, Nick Seaver, Lucy Suchman, Peter-Paul Verbeek and many more.

In addition, Zuboff's analysis is highly US-centric. In fact, she situates herself as a product of the immigrant, capitalist American Dream, where hard work can earn you "the good life"(p. 34), including physical comforts, education, the arts, and civic engagement. This is perhaps why she is so enamored of the poet W. H. Auden. We prefaced this review Alexa's explanation of Auden's work, because Zuboff's prose can, despite her critique, read as manipulative as the prodding of a digital assistant.

But perhaps we are not the audience meant to be nudged. In a review in *Surveillance and Society,* Kirstie Ball suggests that "this book was not written for us. It is intended as a wake-up call for the educated business reader to recognize the massive power of the tech platforms" (Ball 2019, 253). As a professor emerita from Harvard Business School, Zuboff's critique comes from within this community, not as an outsider.

If Zuboff's intended audience is "the educated business reader", then it may be useful for STS scholars to think about this tome as an event, a material phenomenon and a public debate. Despite the book's shortcomings, Zuboff makes surveillance capitalism a dinner table conversation, rather than an esoteric realm reserved for math geeks. We understand that this dinner table is likely located in a wealthy, white, suburban one-family house, and that might be the point. The wide-spread use of contact tracing apps in connection with the current Covid-19 pandemic suggests that engagement with broader publics about surveillance capitalism and digital trust (Bruun et al. 2020) are timely. Thus, the book's physical presence and its language can be re-positioned as boundary objects, tools, and powerful actors and interlocutors. This is an approach inspired by Annelise Riles's (1998, 378) suggestion to consider documents as "aesthetic objects", where form itself has meaning. Continuing in this vein,

what insights might be won by interacting with *The Age of Surveillance Capitalism* as an event and gift, as a performance of relations (Sansi and Strathern 2016) at the dinner table? Zuboff's work may also inspire an inward dialogue (Kumar 2019) with our own sociotechnical tools. *The Age of Surveillance Capitalism* will exhaust you, but it does not exhaust all that there is to be said. On the contrary, it is a public door to debate through which STS scholars should enter with our detailed, nuanced and in-depth analyses of the digitization of social relations and its consequences.

References

Ball, K. (2019) *Review of Zuboff's The Age of Surveillance Capitalism*, "Surveillance and Society", 17 (1/2), pp. 252–256.

Bridle, J. (2019) *The Age of Surveillance Capitalism by Shoshana Zuboff review – we are the pawns*,"The Guardian", February 2nd, 2019.

Bruun, M.H., Astrid Oberborbeck Andersen, and Adrienne Mannov (2020) *Infrastructures of Trust and Distrust. The Politics and Ethics of Emerging Cryptographic Technologies*, "Anthropology Today", 36 (2), pp. 13–17.

Cuéllar, M.-F and Huq A. Z. (2020) *Economies of Surveillance*, "Harvard Law Review", 4 (133), pp. 1280-1336.

Ellinger, E. W. (2019) *Book Review:The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*, "Organization Studies", December 2nd.

Jakobs, H.-J. (2018) *Das Zeitalter des Überwachungskapitalismus – Wenn Kunden zu Datenquellen werden*, in "Handelsblatt", October 25th.

Kumar, P. C. (2019) *A Post-Humanist Take on Surveillance Capitalism*, paper presented at the CHI 2019 Conference, Glasgow, Scotland, May 4th, 2019.

Morozov, E. (2019) *Capitalism's New Clothes*, "The Baffler", February 4th.

Riles, A. (1998) *Infinity within the Brackets*, "American Ethnologist", 25 (3), pp. 378–398.

Sansi, R. and Strathern, M. (2016) *Art and Anthropology after Relations*, "HAU: Journal of Ethnographic Theory", 6 (2), pp. 425–439.

Silverman, J. (2019) *How Tech Companies Manipulate Our Personal Data*, in "The New York Times", January 18th, 2019.