Conclusion

> If you want to understand the big issues, you need to understand the everyday practices that constitute them.
>
> —Suchman, Gerst, and Krämer (2019, 32)

> Constituent power thus requires understanding constitution not as a noun but a verb, not an immutable structure but an open procedure that is never brought to an end.
>
> —Hardt (1999, xii)

There was a follow-up of the work required to ground the veracity of a computational model for digital image processing whose academic article was provisionally rejected (chapter 2), a description of the actions deployed to write a short Matlab program (chapter 4), and an analysis of the shaping of a four-parameter formula abstracted from a small training dataset (chapter 6). These empirical elements might seem quite tenuous when compared with the ogre to whom this book is explicitly addressed: *algorithms* and their growing contribution to the shaping of the collective world.

And yet, this book is nonetheless driven by a certain confidence. If I did not believe in its convenience, I simply would not have written (or at least published) it. What justifies such confidence? Which way of thinking supports such a presumption of relevance? In this conclusion, it is time to consider this inquiry's half-hidden assumptions regarding the political significance of its results, however provisional they may be.

Catching a Glimpse, Inflating the Unknown

In the introduction, I mentioned some of the many contemporary sociological works on the effects of algorithms, and I assumed these works progressively

contributed to making algorithms become matters of public concern. I then suggested that the current controversies over algorithms call for composition attempts. As algorithms are now central to our computerized societies *while* engaging in moral and ethical issues, their very existence entails constructive negotiations. I then suggested that the ground for these contentious compromises needs to be somewhat prepared or, at least, equipped. As it stands, the *negative invisibility* (Star and Strauss 1999) of the practices underlying the constitution of algorithms prevents from grasping these entities in a comprehensive way; it is difficult, indeed, to make changes on processes that have no material thickness. I then suggested that one way—among other possible ones—to propose refreshing theoretical equipment was to conduct sociological inquiries in collaboration with computer scientists and engineers in order to document their work activities. This may lead to a better understanding of their needs, attachments, issues, and values that could help disputing parties to start negotiate, as Walter Lippmann (1982, 91) said, "under their own colors."

This was an unprecedented effort. While I could build on several STS authors dealing, among other things, with scientific and mathematical practices, I have most often, to be fair, been left to my own devices. However, it was a formative exercise that forced me, beyond the general framework proposed by the "laboratory study" genre, to propose methodologies and concepts—especially in chapters 1, 3, and 5—that I believe are well adapted to the analysis of computer science work. The careful and fastidious unfolding of courses of action allowed me to document the progressive formation of entities—ground truths, programs, and formulas—aggregating choices, habits, objects, and desires. Moreover, it seemed that the congruence of these entities and the practices involved in their shaping form, at least sometimes and partially, other entities we tend to call algorithms.

Nevertheless, this analytical gesture suffers from a certain asymmetry: on the one hand, a small ethnographic report resulting from a PhD thesis, and on the other hand, a whole industry that is constantly growing and innovating. With such limited means, the present investigation could only glimpse the irrigation system of algorithms in their incredible diversity. Worse, by shedding new light on a very limited part of the constituent relationships of algorithms, this inquiry suggested a continent without saying much about it. What about the courses of action involved in getting algorithms out of the laboratories, incorporating them into commercial arrangements, integrating

them into software infrastructures, modifying their inner components, maintaining them, improving them, or cursing or loving them? By the very fact of showing that it was possible to bring algorithms back to the ground and consider them products of mundane amendable processes, this investigation probably promised more than it delivered. What value can be attributed to an inquiry that suggests more than asserts?

An Insurgent Document

One can start by stressing the protesting subtext of this investigation. Even if it did not wish to criticize contemporary social studies on algorithms—because they help us to be concerned by our "algorithmic lives" (Mazzotti 2017)—the present inquiry's approach and results nonetheless take a stand against a habit of thought these studies sometimes tend to instill.

This habit, briefly mentioned in the introduction, consists in considering algorithms from an external position and in the light of their effects. I have said it over and over again, this posture is important as it creates political affections. However, by becoming generalized, it also comes up against a limit that takes the form of a looping drama. The argument, initially developed by Ziewitz (2016), is the following: while salutary in many ways, the recent proliferation of studies of the effects of algorithms insidiously tends to make them appear autonomous. Increasingly considered from afar and in terms of the differences they produce, algorithms slowly start to become stand-alone influential entities. This is the first act of the *algorithmic drama*, as Ziewitz calls it: algorithms progressively become, at least within the social science literature, *powerful floating entities*.

Moreover, once the networks allowing them to deploy and persevere are overlooked, algorithms also become more and more mysterious. Indeed, according to this risky standpoint, what can these powerful entities be made of? As the study of the effects of algorithms tends to be privileged to the study of what supports and makes them happen, these entities appear to be made of theoretical, immaterial, and abstract ingredients, loosely referred to as mathematics, code, or a combination of both. Having no grip on what these packages contain, complexity is easily called for help: Whatever the mathematics or the code that form algorithms may refer to, algorithms have to be highly complex entities since they are abstract *and* powerful. How can something be distributed, evanescent, and influential at the same

time? This is the kind of question induced—in hollow—by the multiplication of studies on the effects of algorithms, surreptitiously introducing the second act of the algorithmic drama: *algorithms become inscrutable*. The end result is a disempowering loop, for as Ziewitz (2016, 8) wrote, "the opacity of operations tends to be seen as a new sign of their influence and power." The algorithmic drama surreptitiously unfolding within the social science landscape is thus circular: algorithms are powerful because they are inscrutable, because they are powerful, because they are inscrutable …

The present investigation goes against this trend (which yet remains important and valuable). Instead of considering algorithms from a distance and in light of their effects, this book's three case studies—with their theoretical and methodological complements—show that it is in fact possible to consider algorithms from within the places in which they are concretely shaped. It is therefore a fundamental, yet fragile, act of resistance *and* organization. It challenges the setup of an algorithmic drama while proposing ways to renew and sustain this challenge. As it aims to depict algorithms according to the collective processes that make them happen, this inquiry is also a constituent impetus that challenges a constituted setup. Again, *there is no innocence*.

All the credit, in my opinion, goes to philosopher Antonio Negri for having detected the double aspect of insurgent acts. In his book *Insurgencies: Constituent Power and the Modern State,* Negri (1999) nicely identifies a fundamental characteristic of critical gestures: they are always, in fact, the bearers of articulated visions. It is only from the point of view of the constituted setup and by virtue of the constitutionalization processes that were put it in place that insurgent impulses seem disjointed, incomplete, and utopian. Historically, and philosophically, the opposite is true: beyond the appearances, the constituted power is quite empty as it mainly falls back on and recovers the steady innovations of the constituent forces that are opposed to it. This argument allows Negri to affirm, in turn, that far from representing marginal and disordered forces to which it is necessary, at some point, to put an end—in the manner of a Thermidor—constituent impetuses are topical and coherent and represent the permanent bedrock of democratic political activities.

Though this book does not endorse all of Negri's claims regarding the concept of constituent power,[1] it is well in line with Negri's strong proposition that the political, in the sense of politicization processes, cannot avoid

insurgent moves. By suggesting interesting, and surprising, bridges with the pragmatist tradition,[2] Negri (1999, 335) indeed affirms that "the political without constituent power is like an old property, not only languishing but also ruinous, for the workers as well as for its owner." And that is where the political argument of this book lies; it offers an alternative insurgent view on the formation of algorithms in order to feed arguments and suggest renovative modes of organization.

But if this book can be seen as an act of resistance and organization that intends to fuel and lubricate public issues related to algorithms by proposing an alternative account of how they come into existence, why not call it "the constituent of algorithms"? Why did I deliberately choose the term "constitution," seemingly antithetical to the insurgent acts that feed politicization processes? This is where we must also consider this investigation as what it is *materially*: an inscription that circulates more or less. We find here a notion that has accompanied us throughout the book. Thanks to their often durable, mobile, and re-presentable characteristics, inscriptions contribute greatly to the continuous shaping of the collective world. And like any inscription, due to what I have called "Dorothy Smith's law" (cf. introduction), this inscribed volume seeks to establish one reality at the expense of others. Once again, as always, *there is no innocence*: by expressing realities by means of texts, inscriptions also enact these realities. A text, however faithful—and some texts are definitely more faithful than others—is also a wishful accomplishment.

The fixative aspect of this investigation, which comes from its very scriptural form, should not be underestimated. This is even a limit, in my opinion, to Negri's work on constituent power, however interesting and thorough it may be. Although insurrectional impetuses form the driving force of political history—we can keep that—they are nonetheless, very often, scriptural acts that contain a foundational character.[3] The term "constitution" thus appears the most appropriate; if this inquiry participates in the questioning of a constituted setup, it remains constitutive, in its capacity as an inscription, of an affirmation power.

An Impetus to Be Pursued

However, nothing prevents this insurgent document from also being complemented and challenged by other insurgent documents. It is even one of

its main ambitions: to inspire a critical dynamic capable of making algorithms ever more graspable. This was the starting point of this investigation, and it is also its end point: to learn more about algorithms by living with them more intimately. And there are certainly many other ways to do just that.

Such alternative paths have been suggested throughout the book in both its theoretical and empirical chapters. Chapter 1, in introducing the methodology of the inquiry, also indicated ways of organizing other inquiries that are grounded in other places and situations. For example, it would be immensely interesting if an ethnographer integrated the team of a start-up trying to design and sell algorithm-related products.[4] With regard to chapter 2, systematic investigations on the work required for the conception, compilation, and aggregation of academic and industrial ground truths would certainly help to link algorithms with more general dynamics related, for example, to the emergence of new forms of on-demand labor. Such an investigative effort could also build analytical bridges between current network technologies that support the commodification of personal data and, for example, blockchain technology which is precisely based on a harsh criticism of this very possibility.[5] In chapter 3, when it came to the progressive setting aside of programming practices from the 1950s onward, more systematic sociohistorical investigations of early electronic computing projects could ignite a fresh new look at "artificial intelligence," a term that, perhaps, has built on other similar invisibilizations of work practices.[6] With regard to chapter 4 and the situated practices of computer programming, conducting further sociological investigations on the organizational and material devices mobilized by programmers in their daily work could contribute to better appreciating this specialized activity that is central to our contemporary societies. Programming practitioners may, in turn, no longer be considered an esoteric community with its own codes but also, and perhaps above all, differentiated groups constantly exploring alternative ways to interact with computers by means of numbered lists of instructions. In chapter 5, although it was about operationalizing a specific understanding of mathematical knowledge, the reader will certainly have noticed the few sources on which my propositions were based. It goes without saying that more sociological analyses of the theoretical work underlying the formation of mathematical statements is, in our increasingly computerized world, more important than ever. Finally, concerning

formulating practices, as outlined at the end of chapter 6, analyzing the recent dynamics related to machine learning in light of the practical processes that make them exist could lead to considering the resurrected promises of artificial intelligence through a new lens: What are the costs of this intelligence? How is it artificial? What are its inherent limits? These are urgent topics to be considered at the ground level, not only to fuel controversies but also, perhaps (and always temporarily), to close them.

For now, we are still far from such a generalized sociology of algorithms this book hopes to suggest. We are only at the very beginning of a road that, if we want to democratically integrate the ecology of algorithms into the collective world, is a very long one. With this book, beyond the presented elements that, I hope, have some value in themselves, one can also see an invitation to pursue the investigation of the mundane work underlying the formation and circulation of algorithms—an open-ended and amendable constitution, in short.

The Constitution of Algorithms

Ground-Truthing, Programming, Formulating

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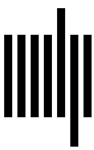

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