

“Changing” one's mind: Historical epistemology as normative psychology

Massimiliano Simons

Department of Philosophy, Maastricht University, the Netherlands

Correspondence

Department of Philosophy, Maastricht University, Grote Gracht 90–92, 6211 SZ Maastricht, The Netherlands

Abstract

This article argues that historical epistemology offers the history of philosophy and science more than a mere tool to write the history of concepts. It does this, first of all, by rereading historical epistemology through Michel Foucault's “techniques of the self.” Second, it turns to the work of Léon Brunschvicg and Gaston Bachelard. In their work we see a proposal for what the subjectivity of scientists and philosophers should be. The article thus argues that their work is driven by a normative psychology: a set of prescriptions for which mental constitution a scholarly self has to have. In the Conclusion, it returns to existing analyses of “open-mindedness” as a virtue and explores in what way these cases challenge these analyses, as well as to what extent Foucault's “techniques of the self” can be applied to other cases in the history of French philosophy.

KEYWORDS

Gaston Bachelard, historical epistemology, Léon Brunschvicg, Michel Foucault, open-mindedness, virtue epistemology

Scientists have made science advance; then science made scientists advance. A warning to the philosophers. / And I played my best as a warned philosopher.

(Brunschvicg 1948, 61; quoted in Terzi 2022, 133)

1 | INTRODUCTION

Rationalism has a bad reputation. That at least was the diagnosis of the French philosopher Gaston Bachelard in June 1936, when he wrote the opening article, “Le surrationalisme,” for the sole issue of *Inquisitions*, the product of a collaboration between the surrealists Louis Aragon, Roger Caillois, Jules Monnerot, and Tristan Tzara. What sensibility acquired in the hands of the

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surrealists, Bachelard tried to transplant to the domain of reason: instead of accepting reason's existing forms, we should experiment with novel ones.

Bachelard complained that rationalism was too often associated with a sterile deductive process: on the basis of a set of fixed procedures, conclusions were drawn that never surprised its author or challenged the foundation of any intellectual edifice. But, for Bachelard, this was not what rationalism is about. "One almost always confuses the decisive action of reason with the monotonous recourse to the certainties of memory" (Bachelard 1936a, 7). Instead, the essence of rationalism lies in its open and creative activity. Its products, however, tend to petrify into barren logical principles. Hence the task of a renewed surrationalism: to free the activity of reason from its fixed logical forms. "Wherein then lies the duty of surrationalism? It is to take these forms, which have been purified and economically arranged by the logicians, and to fill them psychologically, to put them back into motion and into life" (Bachelard 1936a, 9).

Bachelard's inspiration partly derived from historical context. Bachelard was fascinated by a number of scientific revolutions, in particular non-Euclidean geometry and Einstein's theory of relativity. These revolutions uprooted the most elementary and basic scientific intuitions. Even the simple principle that the sum of the angles of a triangle is 180° lost its self-evidence. Instead, it depended on one's choice of axioms. Basic truths had to be *unlearned*: "So closed rationalism is replaced by open rationalism. Reason, happily unfinished, can no longer fall asleep in a tradition; it can no longer rely on memory to recite its tautologies. It must constantly prove and test itself. It is in a struggle with others, but first of all with itself. This time it has some guarantee of being incisive and young" (Bachelard 1936a, 12). It was this capacity to open up one's reason, to "change" one's mind, that Bachelard put forward as the primary virtue of a good scientist, and moreover, a good philosopher.

Bachelard's proposal has a striking similarity to recent literature that applies a vocabulary of virtues and vices to epistemology (Zagzebski 1996; Cassam 2019) and to the history of science (Murphy and Traninger 2014; van Dongen and Paul 2017). Central to this literature is its ambition to read knowledge claims, not through the lens of a set of principles or rules, but through a set of virtues and vices ascribed to scholars.

For instance, Herman Paul argues that throughout history scholars shaped their work and that of others through the prescriptions of certain scholarly virtues; he proposes to study the history of science as a repertoire of "scholarly personae" (Paul 2014), which he defines as "models embodying the personal attributes that are regarded as necessary for being a scholar" (Paul 2016, 140). Central to such scholarly personae are a set of virtues that these exemplary scholars embody, or vices that they avoid. Though often attributed to them by later scholars (think of hagiographies of Galileo and Newton), these virtues and vices are also played out by the scientists themselves, as Jeroen van Dongen (2017) has argued for the case of Einstein: whereas in his early work Einstein emphasized the necessity of empirical research, in his later work he emphasized the value of abstract thinking.

This article, however, aims to argue that there is an alternative framework for describing these scholarly personae, which can complement the existing virtue epistemological approaches: historical epistemology. Historical epistemology is present in the literature, but as a framework to map the history of concepts, including the history of certain virtues and vices (Daston 1995; Paul 2017). Though historical epistemology is often understood as a methodology in the history of science, its French roots highlight how historical epistemologists had more ambitious goals. They did not merely want to write the history of science but used it to map the virtues of the "scientific mind" (Chimisso 2008; Simons 2022). In that sense, early French historical epistemology has to be understood as a *normative psychology*: it aims to map a set of psychological traits and virtues that it prescribes to scientists and philosophers. This article therefore seeks to partly correct a one-sided reading of historical epistemology as historiography of science (e.g., Rheinberger 2010). This it illustrates through the cases of Léon Brunschvicg and his pupil Gaston Bachelard.

Specifically, there are two clusters of reasons why historical epistemology provides a fruitful angle to the history of scholarly personae. First of all, the history of historical epistemology itself provides us with an additional set of interesting case studies of scholars proposing an ideal scholarly self. In that sense, a first aim of this article is to shift historical epistemology from being a *resource* to being a *topic*. In other words, the history of historical epistemology itself offers us a number of interesting cases of scholarly personae being developed and defended. The case studies explored in the article, moreover, highlight how an unduly neat separation between a virtue approach in the history of science and one in the history of philosophy is untenable, even in the twentieth century. Instead, as we will see, Brunschvicg and Bachelard argue that the virtuous character of the scientist is applicable to the virtuous philosopher as well: a good philosopher can and must copy the virtues of a good scientist.

Second, historical epistemology can also enrich the methodology to study the history of these scholarly personae. The existing literature mainly draws inspiration from virtue epistemology (Montmarquet 1993; Zagzebski 1996). Although writers on the topic disagree about which virtues are relevant, or even what a virtue is, they agree on the fact that it is worthwhile to analyze epistemic phenomena in terms of virtues. In this sense, virtue epistemology draws inspiration from virtue ethics, which similarly tries to formulate an alternative to traditional ethical theories such as deontology and utilitarianism, by capturing ethical phenomena, in terms not of principles or rules, but of virtues and vices. This perspective opens up the possibility of drawing on alternatives to traditional rule-based interpretations of norms besides standard virtue approaches. This article precisely wants to argue that historical epistemology itself provides us with such an alternative approach to norms, which can subsequently be translated to epistemic phenomena, in a way similar to what virtue epistemology has done with virtue ethics. In particular, I use the "ethical phase" of Michel Foucault (Elden 2016) as an alternative framework that can be used to write the history of scholarly personae.

There are number of reasons why Foucault's framework is worthwhile. First of all, it diversifies our methodological repertoire for mapping the scholarly personae in science and philosophy. Second, Foucault's framework also leaves more room for a historical approach to these scholarly personae, given that there is no need to presuppose a fixed set of virtues or even a fixed subjectivity in his framework. Finally, it can contribute to debates in virtue epistemology itself.

One of the most commonly discussed virtues in virtue epistemology is "open-mindedness" (Riggs 2010; Kwong 2017; Spiegel 2019).¹ The debate on open-mindedness concerns whether this virtue is truth conducive and, if so, under what circumstances. For example, Kwong (2017) argues that the virtue of open-mindedness requires several things, such as an openness to other beliefs, an awareness of one's own biases and prejudices, a willingness to give opposing views serious consideration, and a certain sensitivity to the conditions under which one should be open to other views. The conclusion is often that the ideal position lies somewhere between closed-mindedness and gullibility. Open-mindedness is often narrowly understood, however, as the openness to revise certain beliefs. For instance, Riggs (2010, 179) defines it as follows: "To be open-minded about p seems to imply that we should take challenges to p seriously. In other words, we should take seriously the possibility that $\sim p$ is true." What the cases of Brunschvicg and Bachelard highlight is that a more radical version of that virtue exists: the capacity not just to revise the answers to one's questions but also to change the questions one is asking in the first place. In that sense, historical epistemology forms both a *resource* for and a *topic* of writing the history of scholarly personae in science and philosophy.

The article is structured as follows. I begin by revisiting the literature on historical epistemology, in order to argue that it offers the history of philosophy and science more than a mere tool to write the history of concepts. First of all, this is done by rereading historical epistemology

¹Similarly, as Cassam emphasizes, the opposite, closed-mindedness, is also often seen as a primary epistemic vice: "Closed-mindedness is usually at the top of philosophical lists of epistemic vices" (Cassam 2019, 30).

through the later work of Foucault, who reinterprets the history of philosophy as a history of “techniques of the self.” Second, I turn to the work of some historical epistemologists, in particular Brunschvicg and Bachelard. In their work we see a proposal at work of what the subjectivity of a scientist, and subsequently also a philosopher, has to be. In that sense, their work is driven by a normative psychology: a set of prescriptions of which mental constitution a scholarly self must have. In the Conclusion, I return to the existing analyses of open-mindedness as a virtue and explore in what way these cases challenge these analyses and to what extent this approach can be applied to other cases in the history of French philosophy.

2 | HISTORICAL EPISTEMOLOGY AND THE TECHNIQUES OF THE SELF

The term “historical epistemology” became popular in the 1970s through the work of Dominique Lecourt, a follower of Louis Althusser, who initially used it to refer to Bachelard (Lecourt 1969) and soon, by extension, to Georges Canguilhem and Michel Foucault (Lecourt 1972). In this context, historical epistemology is often equated with a “philosophy of the concept,” referring to a distinction in French philosophy, popularized by Foucault, between “a philosophy of experience, of sense and of subject and a philosophy of knowledge, of rationality and of concept. On the one hand, one network is that of Sartre and Merleau-Ponty; and then another is that of Cavailles, Bachelard and Canguilhem” (Foucault 1978, 8). Historical epistemology is then defined as a “tradition [that] views the study of scientific concepts as the single most pressing task of the history and philosophy of science” (Peña-Guzmán 2020, 69).

Although the term was initially restricted to French philosophers, historical epistemology has recently gained wider traction thanks to the work of a number of Anglo-American authors (Davidson 2001; Hacking 2002) and scholars linked with the Max Planck Institute for the History of Science (Daston 1994; Renn 2004; Rheinberger 2010). Different projects under the banner of historical epistemology have proliferated. In an attempt to summarize, Feest and Sturm (2011) suggest that there are today three types of historical epistemology: (1) histories of epistemic concepts, such as objectivity (Daston and Galison 2007); histories of epistemic things, such as Hans-Jörg Rheinberger's history of molecular biology (Rheinberger 1997); and dynamics of long-term scientific developments, such as Jürgen Renn's reading of the history of relativity theory (Renn 2004).

There is also, however, the recent countermovement of historians of philosophy who argue that these recent projects have concealed the fact that in the original French context more than historiography of science was at stake. This has been most explicitly put forward by Cristina Chimisso, who suggests that early twentieth-century French scholars were mainly interested in what she calls the “writing of a history of the mind” (Chimisso 2008) and used history of science as a tool to do so. This is accompanied by a rereading of the central figures in historical epistemology, such as Bachelard (Chimisso 2001; Simons 2022) and Canguilhem (Roth 2013; Talcott 2019), distancing them from themes that became prominent only in the 1960s. Early French historical epistemology thus consisted of a set of deeply normative projects, attempting to sketch and promote certain understandings of rationality. These normative projects, so I claim, have strong affinities with the virtue epistemological approach that has often been mobilized in recent scholarship.

In that context, it is interesting that the text in which Foucault introduces the distinction between a philosophy of consciousness and a philosophy of the concept is an introduction written for the English translation of Canguilhem's *The Normal and the Pathological* (1978). In this text, Foucault simultaneously tries to answer what motivated Canguilhem to delve into, among others, the history of medicine and the life sciences. Foucault situates Canguilhem in a tradition going back to Immanuel Kant's *What Is Enlightenment?*, which he characterizes as

"philosophical journalism" (Foucault 1978, 9). On the one hand it interrogates the starting point of the emancipation of the West, and on the other hand it questions the present: how must we understand ourselves in relation to this tradition?

Foucault writes this text in the context of what is typically called his ethical phase (Elden 2016). Though subjectivity was a theme in his earlier work, in his final decade it mainly became a question of how individuals shape their own subjectivity, rather than how their subjectivity is shaped by power relations and discourses. Instead, Foucault wanted to sketch "the history of how an individual acts upon himself, in the technology of self" (Foucault 1988, 19). He defines these technologies of the self as "techniques which permit individuals to effect, by their own means, a certain number of operations on their own bodies, on their own souls, on their own thoughts, on their own conduct, and this in a manner so as to transform themselves, modify themselves, or to attain a certain state of perfection, of happiness, of purity, of supernatural power, and so on. Let's call this kind of techniques a 'techniques' or 'technology of the self'" (Foucault 2015, 25).

I want to take up Foucault's suggestion and show how his work offers us an understanding of norms and their history that can be mobilized for the history of scholarly personae and their epistemic norms as well. Much like the link between virtue ethics and virtue epistemology, Foucault's framework offers us a way of thinking about ethical virtuous action that helps us to understand epistemic virtuous thinking. Foucault himself mainly focuses on Greco-Roman philosophy. But in several instances, he also hints that this focus can serve as a tool to reread the complete history of philosophy. From this perspective, philosophy is not so much concerned with producing the ultimate truth about the structure of the world but is preoccupied with what Foucault calls the "care of the self": a range of practices that mobilize these technologies of the self to transform and improve the self. Though at first this framework seems to restrict itself to ethics, I want to argue that the framework can nonetheless be used to analyze epistemic norms as well. First of all, because for Foucault the line between both is not strict: to live the good life is also to live the true life—that is, to stand in a certain epistemic relation to truth. And second, because Foucault understands the notion of ethics in a broader sense than it is commonly understood. For Foucault, the ethical refers to the presence of a certain *ethos*: a collection of norms that an individual tries to uphold in order to live a proper life. Though this *ethos* includes ethical norms in the narrow sense, it includes norms about how to think properly as well. The case studies of Brunschvicg and Bachelard I present below illustrate this.

Foucault suggests that we can analyze these practices through four aspects (Foucault 1984, 352–55). First of all, there is what he calls the ethical *substance*: the object, the part of ourselves, of our behavior, on which the individual acts. Second, there is the *mode of subjection*: the manner in which individuals are invited to take up this moral task to work on their self. A third aspect is the *self-forming activity*: the means by which individuals can ethically change their self. Finally, there is the *telos*: "Which is the kind of being to which we aspire when we behave in a moral way?" (Foucault 1984, 355).

Foucault also suggests, however, that this tradition has disappeared. Whereas until the sixteenth century the idea remained dominant that "a subject could not have access to the truth if he did not first operate upon himself a certain work which would make him susceptible to knowing the truth—a work of purification, conversion of the soul by contemplation of the soul itself" (Foucault 1984, 371). This changes through what Foucault calls the "Cartesian moment" (Foucault 2005, 14), which breaks the relation between asceticism and access to truth. "Before Descartes, one could not be impure, immoral, and know the truth. With Descartes, direct evidence is enough. After Descartes, we have a non-ascetic subject of knowledge" (Foucault 1984, 372).

This claim, however, has been criticized by Pierre Hadot (2002, 263–64). As Foucault himself acknowledges, Descartes still wrote his *Meditations* on how to prepare the subject to have access to the truth, and Spinoza similarly wrote his *Treatise on the Improvement of Understanding*. At other places, Foucault even recognizes elements of this tradition in the work of Friedrich Nietzsche and Jacques Lacan (Foucault 2005, 189). More productively, therefore, Foucault's

claims can be read as an invitation to write a different kind of history of philosophy: “Maybe the history of European philosophy from the sixteenth century should not be seen as a series of doctrines which undertake to say what is true or false concerning politics, or science, or morality” (Foucault 2010, 349). The history of philosophy can be reread as a history of different ethical projects, each proposing a specific practice for taking care of the self.

In this sense, Foucault's framework comes close to the virtue epistemological approaches described above. Indeed, some of them explicitly refer to Foucault in this context to understand virtuous practices of scientists, such as note taking (Daston 1994; Daston and Galison 2007). My aim, however, is to use this framework to reread parts of the early history of historical epistemology and thus the history of philosophy—this in order to illustrate the value of historical epistemology both as a resource to write the history of scholarly personae and as a topic. The work of early historical epistemologists consisted in a normative psychology, proposing a set of virtues and vices of the mind. I focus in particular on Brunschvicg and Bachelard.

3 | THE EMANCIPATORY IDEALISM OF LÉON BRUNSCHVICG

Although now all but forgotten, Léon Brunschvicg (1869–1944) was one of the most influential figures in early twentieth-century French philosophy, together with Henri Bergson and Alain (Terzi 2022). A professor of the history of modern philosophy at the Sorbonne, Brunschvicg deeply influenced French philosophy, mainly through his students. He was the supervisor of a number of figures who defined historical epistemology: Gaston Bachelard, Jean Cavaillès, and Albert Lautman. Although Canguilhem was not supervised by him, his early work was similarly shaped by the spiritualist tradition to which Brunschvicg belonged (Roth 2013).

Brunschvicg's philosophy is often characterized as neo-Kantian, though he himself spoke of critical idealism. He is mainly known for a number of works on the history of mathematics (Brunschvicg 1912), the history of the concept of causality in physics (Brunschvicg 1922), as well as the history of philosophy (Brunschvicg 1927). He was first of all a philosopher of progress, as made clear by the titles of his books: *Les étapes de la philosophie mathématique* (1912), *Le progrès de la conscience dans la philosophie occidentale* (1927), and *Les âges de l'intelligence* (1934). This belief in progress is now often considered naïve optimism, especially after the atrocities of the Second World War. As his student Raymond Aron would write shortly after Brunschvicg's passing, “Brunschvicg is our contemporary, but he is Einstein's contemporary, not Hitler's” (Aron 1945, 138).²

This optimism, however, can be read as a product of the fact that history of science was never Brunschvicg's main goal but rather constituted a tool that served another purpose: not only to write a history of the rationality of the mind (Chimisso 2008) but also to promote and install it in his contemporaries. It is therefore telling, for instance, that Brunschvicg regularly and explicitly distanced himself from the label of historian of science. Instead, he saw himself as a historian of the mind: “[My aim is] not to know the *nature of things*, but to tell how the *human mind* works” (Brunschvicg 1922, xiii). History of science was a toolbox to unearth the necessary virtues of the mind, the requirements for proper scientific rationality.

My ambition here is not to flesh out Brunschvicg's full philosophy, only to (a) indicate how his work can be interpreted through the lens of virtue epistemology and (b) illustrate that Foucault's framework of the techniques of the self can be seen at work in Brunschvicg's reflections on the ethos of the scientist and the philosopher. More specifically, my focus is on Brunschvicg's *Les âges de l'intelligence* and how it can be read through the framework of Foucault's techniques of the self. The book consists of a series of lectures that Brunschvicg gave at the Sorbonne in the winter of 1932–1933. Though the lectures concern the history of philosophy and science, the

²All translations in this article are my own unless otherwise indicated in the References section.

stakes are ethical and political. As Brunshvick indicates in the preface, "Its listeners were young people who we know are affected and threatened by the disorder of the society they enter. They are right to desire that tomorrow does not resemble today; but we are all the more justified in wishing that the day after tomorrow does not repeat the day before yesterday" (Brunshvick 1934, 5). In that same preface, Brunshvick also presents a part of the solution as the cultivation of a "first virtue . . . of a strictly intellectual order," defined by its negation of a primary vice: "the dogmatic pride from which the imaginary privileges of a person or a people, of a cult or a generation proceed" (Brunshvick 1934, 5). A similar message is found in the final lines of the book: "Perhaps the best or only chance of salvation for men will be to become aware that they can never be saved from the outside, that they do not have to slacken in their effort to exist, each one by himself, by developing what they possess of the effectively universal and divine, the disinterestedness of a true reason on which is based the truth of a love which looks after the soul and the freedom of others" (Brunshvick 1934, 150).

Let us attempt to flesh out this ethos of Brunshvick through Foucault's analysis of techniques of the self and the four aspects he distinguishes: the ethical substance, the mode of subjection, the self-forming activities, and the telos.

The *ethical substance* of concern in the philosophy of Brunshvick is the human mind, which needs to be defended against "dogmatism" and the passive acceptance of received wisdom and daily experience. The manner in which the subject is called to take up this care of the mind is a call for a *maturing* of the mind, going through the necessary "ages of intelligence." In general this is done by making a split between the biological-psychological self and the spiritual self, the latter of which has to be cultivated and promoted. In other words, the development of the subject installs a distinction between "*biological time*, which is inevitable aging and finally leads to decay, [and] *spiritual time*, which consists in an incessant recovery, a continuous progress" (Brunshvick 1934, 8). Such a split prevents us from "confus[ing] the spiritual self of science with the biological self of perception, which naively relied on its gaze and claimed to explain the phenomena of heaven according to their immediate appearances" (Brunshvick 1934, 143).

Thus what we find in Brunshvick is what one could call an *emancipatory idealism*: the human subject has to work on itself to free itself from its biological, psychological, and social roots in order to lift itself up to a spiritual plane of reason. Again, this might sound naïve and optimistic to twenty-first-century readers, but Brunshvick's motivation was deeply political. He was a Jewish scholar working in a time of rampant biological racism and nationalism. The need to overcome this biological plane and reach a form of spiritual universalism was a requirement for scholars like him to even have a place in Europe.

More specifically, Brunshvick's emancipatory idealism seems to center around two main virtues: an *openness of the mind* and a *relativization of the self*. Both virtues are exemplified by the history of science, on which Brunshvick draws heavily. Concerning the virtue of openness, Brunshvick starts his introduction by pointing out that new developments in physics and mathematics highlighted its necessity. "The problem of the ages of the intelligence was posed in all its clearness as soon as the constitution of a true physics had put in evidence the vanity of what passed until then for rational knowledge of nature" (Brunshvick 1934, 7). In that sense, Brunshvick's historical studies form the basis of an inductive argument, highlighting how science progresses only through such radical openness: "Each time that humans have been tempted to yield to the seduction of dogmatism, to rest on their successes to fix a standard of truth in a system, nature has awakened them from their sleep; she has exercised her double function of eternal irony and eternal maieutic to provoke a coordination of the universe that is at once more paradoxical in its means and more rigorously attuned to experience" (Brunshvick 1931, 152).

This openness, however, is not so much a matter of a willingness to revise one's beliefs; it situates itself on a more fundamental level. In that sense, it differs from the open-mindedness discussed by virtue epistemologists today. It concerns rather the capacity to revise one's most fundamental intuitions and assumptions, which make other beliefs meaningful. Again, Brunshvick is mainly

thinking about non-Euclidean geometry and the theory of relativity: both revolutions did not so much consider a revision of beliefs as of the underlying scheme of intuitions on the basis of which we form our scientific beliefs. This fundamental openness forms the basis of the other necessary character traits of the scientist, such as “the virtues of scrupulousness and humility in which we have recognized the characteristics of homo sapiens” (Brunschvicg 1931, 157).

This openness, for Brunschvicg, is cultivated by another virtue, what one could call the relativization of the self: the capacity to detach oneself from the absoluteness of one's own point of view. The scientific mind is a mind that “*learns to see itself from another's point of view as it sees others from its own point of view*” (Brunschvicg 1927, 721). Brunschvicg's main reference point for this virtue is Socrates. Brunschvicg often refers to Xenophon's account in *Memorabilia* of Socrates' discussion with his son Lamprocles about his mother, Xanthippe. In response to Lamprocles' complaint concerning the harsh treatment by his mother, Socrates tries to force him to take the perspective of the mother. This capacity to take another perspective is the crucial virtue, according to Brunschvicg: Lamprocles “had to understand that he was not an individual ‘closed on itself,’ but that he was a son placed in a relation to a mother who has risked her life in bringing him into this world and who has fed and cared for him” (Brunschvicg 1923, 360).

For Brunschvicg this is the primary virtue in ethics, but also in aesthetics. He sees it at work in “[t]he silence which is established at the raising of the curtain in a theater, the abrupt stop of the mountaineer, suspending his walk to contemplate the appearance of the sun on the peaks,” which “underline a will of conversion” in which “we interrupt the chain of the actions and the reactions which concern our individual interests, our social condition; we invite other things and other beings to become us, interiorly” (Brunschvicg 1927, 736). But most of all, Brunschvicg sees it at work in science, embodied by the figure of Albert Einstein, which he puts forward as a “scholarly persona” (Paul 2014). Einstein's concept of the relativity of simultaneity, stating that two distinct events separated in space never occur at the same time in an absolute sense, embodies this relativization of the self in the fullest sense. “This complex and subtle function, which Einsteinian science thus places at the heart of human intelligence, is exactly that which we saw at work in Socrates' *Dialogues*” (Brunschvicg 1927, 721).

The *telos* of these virtues of openness and relativity is a mind that is plastic and dynamic, always ready to radically reorganize itself and adapt itself to new schemes: “The characteristic virtue of intelligence, in the maturity of its age, is to maintain itself ready to perpetually correct itself, by creating unforeseen means to adapt itself to the disconcerting complexity of a world that humans, in its parts as in its whole, must cease to imagine in their image” (Brunschvicg 1934, 124).

To argue for this emancipatory idealism, Brunschvicg relies on the work of Jean Piaget. In his theory of the different stages of the child, Piaget emphasized the initial stage of *egocentrism*. In its early years, every child tends to equate the world and the self, seeing its own perspective as the absolute point of view. The child does not realize the limits of its own point of view and that other perspectives are possible. According to Piaget, the child matures by overcoming this egocentrism: “To come out of his egocentrism thus consists for the subject . . . in decentering and dissociating the subject and the object, in becoming aware of what is subjective in him, in situating himself among the whole of the possible perspectives and by this very fact, in establishing between things, persons and his own self, a system of common and reciprocal relations” (Piaget 1923, 69–70).

This can also help us understand Brunschvicg's persistent use of a framework of “stages” and “ages” of the mind, which he often explicitly links to Piaget's theories. Brunschvicg's most infamous claim in this regard is his statement that Aristotle had the mental age “of a child of eight to nine years old” (Brunschvicg 1934, 47). This is not a gratuitous insult but must be read in line with this framework of ages. If Brunschvicg's history of science must be understood as a laboratory to flesh out the required virtues of the scientific mind, this results in frameworks that deal with science and its history in a sense different from the one we are used to.

When Brunshcivc aims to understand the work of an author, it is an attempt to grasp at what stage the author is in this maturing of the mind: which are the self-evident intuitions and principles the scholar is capable of transcending? And which are the principles that the author still sees as absolute and unquestionable? Brunshcivc thus acknowledges that the real history of science presents us with a complex mixture of claims, even within the work of a single author, often linked to their specific context and period, chaotic “like extras, with variegated costumes, which mingle in the backstage of a theater before entering the stage for a retrospective parade according to the order of the chronology” (Brunshcivc 1934, 128). But, he adds, “[i]f one has succeeded in specifying the age of intelligence that they imply, one sees them referring to successive stages, to different levels, and integrating themselves in an overall movement” (Brunshcivc 1934, 128). This leads to a different method of reading historical figures, in order to evaluate them according to virtuous thinking they have shown, again thinking of the history of science in terms of scholarly personae: “To understand Henri Poincaré [for example] is not to gather and specify the traits that characterize him as an individual among other individuals. Instead, it is to reach his personality, defined at its spiritual core by the phase of human thought in which he lived, by the gap between the state of the problems he received from his predecessors and the state of the problems he bequeathed to his successors” (Brunshcivc 1927, 708).

So far, we have seen how in Brunshcivc's model there are an ethical substance, a mode of subjection, and a telos. But what about self-forming activities? What would be the technologies of the self into which Brunshcivc proposes to install this plasticity of the mind? At first sight, there seem to be no clear activities that he proposes. There is, however, one specific technology of the self that Foucault describes that might be at work in Brunshcivc: the technology of reading and writing itself. Foucault stresses that texts played a fundamentally different role in Greek and Roman philosophy: “[T]he object or end of philosophical reading is not to learn an author's work, and its function is not even to go more deeply into the work's doctrine. Reading basically involves—at any rate, its principal objective is—providing an opportunity for meditation” (Foucault 2005, 356). In a similar sense one can interpret Brunshcivc's *Les âges de l'intelligence* and other works as technologies of the self: by reading these histories of science, and by reliving the struggles of figures like Descartes and Poincaré, the self obtains exemplars of virtuous and vicious behavior. The criteria by which we therefore should evaluate Brunshcivc's book are not those of exegesis, whether what it says is true with regard to the actual history of science. Instead, the relevant criteria reside in their consequences: what kind of self, what kind of virtues do these texts install in their readers? It was Brunshcivc's hope, at least, that these virtues could help orient the youth amid the chaos of the early twentieth century.

4 | THE SURRATIONALISM OF GASTON BACHELARD

Let us now turn to a student of Brunshcivc, Gaston Bachelard, in whose work the scheme developed by Foucault is even clearer. As Bachelard is better known than his supervisor, there is less need to go into the details of his work (see Chimisso 2001; Simons 2022). He turned to philosophy only late in his life. Though he was born in 1884, he wrote his dissertations in 1927, under the supervision of Abel Rey and Léon Brunshcivc. He became famous with the publication of later works, such as *Le nouvel esprit scientifique* (1934) and *La formation de l'esprit scientifique* (1938). As the titles of these book indicate, Bachelard would, much like Brunshcivc, use history and philosophy of science to write a history of the scientific mind (Chimisso 2008). His works are not strictly historical. Instead, they reflect on the recent transformations within science and what they tell us about the human mind.

Bachelard spoke of a “new scientific mind,” as a new stage in scientific thinking, which he linked to the theory of relativity and quantum mechanics (Bachelard 1934; 1940). Like his supervisor Brunshcivc, Bachelard appreciated these historical transformations as instances that made

the scientific mind more dynamic. As we saw in the Introduction, he linked this to a rethinking of rationalism, which has to be made dynamic, transformed into surrationalism or “open rationalism” (Bachelard 1934, 179).

Let me, however, restrict myself to just one Bachelard book: *La formation de l'esprit scientifique* of 1938. The book title itself hints at a central ambiguity: the formation of the scientific mind can refer to the historical formation of that mind but also to the pedagogical project of forming the minds of the next generation. Bachelard's ambition in this book is pedagogical (see Chimisso 2001), and he mobilizes history of science for that purpose. In the preface, for example, he sketches a three-stage historical model, echoing Auguste Comte: a prescientific stage (until the eighteenth century), a scientific stage (until the beginning of the twentieth century), and “[t]hirdly, we would set the era of the *new scientific mind* exactly in 1905, at the moment when Einstein's Relativity distorted primordial concepts that were thought to be immovable forever” (Bachelard 1938, 7). Bachelard immediately links this historical model to corresponding stages of the *mind* and even of the *soul*. Starting from a “concrete state,” the scientific mind transforms itself into a “concrete-abstract state,” and finally ends in a fully “abstract state,” where the mind is “voluntarily detached from immediate experience and even in open polemic with the primary reality, always impure, always formless” (Bachelard 1938, 8). Simultaneously, Bachelard links these three stages to three different desires driving scientific research. The first stage is linked with a “*childish soul*,” driven by naïve curiosity about the spontaneous phenomena it encounters. This is then replaced by a “*professorial soul*, proud of its dogmatism, immobile in its first abstraction, supported for life on the scholastic successes of its youth.” Finally, there is the “*soul aching to abstract and quintessentialize*” (Bachelard 1938, 9), no longer accepting any given reference point.

If we subsequently translate this view in terms of Foucault's framework of the techniques of the self, we can say that for Bachelard the *ethical substance* is again human thought. The corresponding *telos* similarly echoes themes found in his supervisor: this mind has to be put into a dynamic state, freeing itself from any fixed starting point or principle. In that sense, the goal of Bachelard's philosophical interventions is not just to write the history of science but to install a set of “spiritual revolutions” (Bachelard 1938, 16).

But how must the self take up this challenge? What is its mode of subjection? In the case of Bachelard, this is interpreted in terms of a struggle against spontaneous and immediate thought. For this he mobilizes a psychoanalytic vocabulary, arguing that we have to dissociate the desire to know from utilitarian or other vital desires (such as hunger and pleasure): “[T]he task of scientific philosophy is very clear: to psychoanalyze interest, to ruin all utilitarianism, however disguised it may be, however high it may claim to be, to turn the mind from the real to the artificial, from the natural to the human, from representation to abstraction. Never perhaps more than in our time has the scientific spirit needed to be defended. . . . [This defense] must make the pleasure of spiritual excitement in the discovery of the true clearly conscious and active. . . . The love of science must become a self-generating psychic dynamism” (Bachelard 1938, 9–10).

It is in this context that Bachelard also makes his famous claim of an *epistemological rupture* between ordinary and scientific experience. But, again, this is not seen as merely descriptive; it is prescriptive as well: the proper scientific mind actively creates this rupture, so as to free itself from these vital desires. In this sense, in order to take care of itself, the scientific mind has to constantly pose itself against opinion and spontaneous thought: “Opinion *thinks* badly; it does not think: it *translates* needs into knowledge! By designating objects by their utility, it forbids itself to know them. Nothing can be founded on opinion: it must first be destroyed. It is the first obstacle to overcome” (Bachelard 1938, 14). In more general terms, Bachelard tries to capture this through the notion of an *epistemological obstacle*: “[I]t is in the very act of knowing, initially, that slowness and troubles appear, by a sort of functional necessity. It is there that we will show

causes of stagnation and even of regression, it is there that we will detect causes of inertia that we will call epistemological obstacles" (Bachelard 1938, 13).³

The philosophical project of Bachelard thus has many echoes with Brunshvieg's project. But Bachelard adds a number of features. First of all, and more explicitly than Brunshvieg, Bachelard uses this ethos of the self as an ideal, not just for the scientist, but also for the philosopher: like a good scientist, a good philosopher is one who has a dynamic mind, as dynamic as the scientist's. Correspondingly, bad philosophy follows from a rigid and dogmatic mind, which mistakes certain fixed moments of science for absolute truths. For Bachelard, many existing philosophies must be considered epistemological obstacles. The clearest case is realism. Bachelard associates realism with a desire to *possess*. "Hear a realist argue: he *immediately* has the upper hand over his adversary, because he believes that he has the real for himself, because he *possesses the wealth* of the real, while his adversary, the prodigal son of the spirit, runs after vain dreams" (Bachelard 1938, 131). In that sense, by mistaking a certain doctrine for absolute, rather than always linked to a certain stage and desire, the philosopher risks breaking down the dynamism of the mind.

Moreover, Bachelard adds elements that make clearer what the corresponding *self-forming activities* would entail. These concern not only the creation of a number of texts in which historical cases of epistemological obstacles are presented but also more concrete epistemic practices for making the mind dynamic. Central to *La formation de l'esprit scientifique* is first of all the practice of psychoanalysis. As we saw above, Bachelard proposes a psychoanalytic practice that investigates the desires behind certain scientific concepts and theories, again to assess their origin: whether they originate in vital desires or in spiritual desires.

But in other works, Bachelard proposes different practices. In *La dialectique de la durée* (1936b), for example, he introduces the notion of rhythm analysis: an investigation and evaluation of the rhythms that determine one's thought, again to assess their autonomy. In *La philosophie du non*, moreover, he proposes the practices of sketching *epistemological profiles*. We saw how any philosophical theory is linked not to one philosophy but to several, going through different stages, depending on the context and the maturity of the scientific mind. Nonetheless, the concepts of these theories can remain trapped in one stage. Bachelard gives the example of the concept of mass. In the first instance, the concept faces the obstacle that it is confused with size: "For a greedy child the larger fruit is the best, the one that speaks most clearly to his desire, the one that is the substantial object of the desire. The notion of mass embodies the very desire to eat" (Bachelard 1940, 22). Bachelard proposes the practice of mapping the implicit philosophies at work in one's concepts, to assess how dynamic they are: "It is by such a mental profile that one could measure the effective psychological action of the diverse philosophies in the work of knowledge" (Bachelard 1940, 42).

Bachelard gives two personal profiles of his own concepts, including diagrams of how the concepts are "distributed" along the different philosophies: the concept of mass and the concept of energy. Whereas in the case of mass his own profile is mainly dominated by the classical rationalism of Newtonian physics, in the case of energy a naïve realism is still present, seduced by the images associated with energy, constituting epistemological obstacles. It is through the creation of such epistemological profiles that one can see which philosophies are beneficial for the dynamism of thought and which are obstacles. This can, moreover, also apply to others. "The epistemological profile of the notion of energy of Nietzsche, for example, might perhaps suffice to explain his irrationalism" (Bachelard 1940, 47).

³This echoes in a way the interest Cassam has in epistemic vices, a view he calls obstructivism, the view that "epistemic vices get in the way of knowledge" (Cassam 2019, ix).

5 | CONCLUSION

We have seen how historical epistemology offers us two things: (1) a *resource* for doing history of philosophy, by offering us an alternative framework for mapping the scholarly personae proposed throughout history; and (2) at the same time also a *topic* for that history of philosophy, by offering us models of scholarly personae, in the sense of sets of virtues that according to Brunschvicg and Bachelard good scientists such as Einstein and good philosophers such as Socrates possess. Central to both authors' proposals was the virtue of a radical capacity to change one's mind.

But this proposed model of the scientific and philosophical self can also provide insights for contemporary virtue epistemology. In particular, it offers us tools for reinterpreting the often discussed virtue of open-mindedness and stresses a more radical version of that virtue which has not received much attention in the literature. As we saw, open-mindedness is often interpreted as the capacity to revise one's beliefs, but not so much as the broader framework that makes a specific belief (and its negation) even meaningful. It is this second kind of open-mindedness that concerns Brunschvicg and Bachelard: am I thinking about a certain topic in a radically wrong way? Regardless of whether I believe certain propositions to be true or not, are these the right kind of propositions I should be considering?

To clarify this, one might think of the work of a recent historical epistemologist, Ian Hacking (2002). In his project on the styles of scientific reasoning, he similarly argues that certain propositions only make sense if certain styles have come into being. For instance, statistical statements about the mean number of children in a household simply make no sense without a statistical style. "The style of thinking that befits the sentence helps fix its sense and determines the way in which it has a positive direction pointing to truth or to falsehood" (Hacking 2002, 160). According to the earlier French epistemologists, the virtuous scholar considers the option that the framework that makes *p* a candidate for truth or falsehood must perhaps be uprooted.

This article has restricted itself to only two cases: Brunschvicg and Bachelard. There is no reason to believe that this framework is not applicable as well to other scholars and periods in, at least, French philosophy of science. Following Roth (2013), one can argue that the work of Canguilhem was also heavily driven by a question of what the organization should be of the different values that shape the life of the scholar: not just the pursuit of truth (as in science) but also the pursuit of control (in technology) and health (in medicine). In a similar way, I have attempted to read the work of Michel Serres and his disagreements with earlier historical epistemologists, such as Bachelard and Canguilhem: not as a matter of disagreements about the history of science per se, but about the ethos of the self to be associated with the scientist, and with the philosopher (Simons 2022). A history of philosophy in terms of a history of a diverse set of thea of the self that scholars should possess thus seems to promise a fruitful framework within which to read the history of twentieth-century French philosophy.

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AUTHOR BIOGRAPHY

Massimiliano Simons is an assistant professor of philosophy of technology at Maastricht University. His expertise is in the philosophy of contemporary technosciences (synthetic biology, data science, robotics) and the twentieth-century history of philosophy of science and technology. He has worked in particular on the history of French historical epistemology and the history of philosophy of experimentation, and is the author of *Michel Serres and French Philosophy of Science: Materiality, Ecology and Quasi-Objects* (Bloomsbury, 2022).

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