HOW SCIENCE WENT BANKRUPT: PAVEL FLORENSKY AND THE CRISIS OF SCIENTIFIC RATIONALITY IN FIN-DE-SIÈCLE EUROPE

By

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Abstract

The thesis offers a new perspective on the debate about the "bankruptcy of science," which was a conspicuous feature of European intellectual life at the turn of the twentieth century, by examining the life and work of the Russian religious philosopher and polymath Pavel Florensky (1882–1937). The study consists of three research chapters and a conclusion, preceded by a general introduction and a note on methodology. Arranged in roughly chronological order, the chapters use material from Florensky's (auto)biography and writings to distinguish and outline several important components of the fin-de-siècle crisis of scientific rationality: (1) its intellectual genesis in the context of nineteenth-century psychologism, which fostered a new trend in epistemology that emphasized the limitations of conceptual reasoning and the relativity of knowledge, thereby raising doubts about the epistemic authority and moral import of science; (2) the relativization of scientific rationality and the appearance of its alternatives, the ideas of "mythical" and "four-dimensional" thinking; (3) the anti-Semitic racialization of scientific rationality, which underpinned and intensified criticism of the "inhuman" features of modern science. Finally, I briefly consider one of the most extreme consequences of this anti-scientific attitude — the rejection of the Copernican heliocentric cosmology — and draw a tentative conclusion as to what has so far prevented a more comprehensive understanding of how science went bankrupt.

Acknowledgments

This study has been shaped by the courses I was fortunate enough to take during my two years at Central European University. Since their impact is particularly evident in the following pages, I would like to highlight György Geréby's and Karl Hall's *Science and Religion*, László Kontler's and Emese Lafferton's *Perspectives on Humanity and Race in Modern European History of Ideas and Science*, Anna Somfai's *Ancient and Medieval Cosmologies*, Karl Hall's *Topics in Soviet Intellectual History*, Emese Lafferton's *Making of the Modern Mind*, and Michael Ignatieff's *History Writing as a Narrative Art*. Cristian Gaşpar's Latin courses must also be mentioned — though only reflected in a few terms in this text, these were some of the most enjoyable classes I attended, which made the early morning commute to Quellenstraße a welcome one.

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Table of Contents

List of Illustrations

Introduction

"Bankruptcy of Science" Reconsidered

In 1895, a debate erupted in France following a statement by the eminent literary scholar Ferdinand Brunetière, published in the country's leading intellectual journal, the *Revue des deux Mondes*. In the wake of an audience with Pope Leo XIII, whose project to reconcile science and religion by reviving the philosophy of Thomas Aquinas had by then largely run out of steam,[1] Brunetière wrote a piece entitled "After the Visit to the Vatican" (*Après une visite au Vatican,* 1895) in which he unexpectedly sided with Catholicism and sharply questioned the value of scientific knowledge. Modern science, he argued, had promised (via its various spokesmen, "the Haeckels and the Renans") to become humanity's ultimate vocation and to solve "the mystery" of the world, but turned out to be incapable not just "to solve, but to pose properly the only questions that matter: those which concern the origin of man, the law of his conduct, and his future destiny."[2] The answers to these questions given in popular scientific writings — Brunetière may have had in mind the title of the arch-materialist Ludwig Büchner's book *Man's Place in Nature in the Past, Present, and Future, or Where Do We Come From? Who Are We? Where Are We Going?* (*Die Stellung des Menschen in der Natur in Vergangenheit, Gegenwart und Zukunft oder: Woher kommen wir? Wer sind wir? Wohin gehen wir?*, 1869)[3] — completely missed the point, since they could only approach humans as part of the natural world, not as representatives of humanity proper. "If these are not total 'bankruptcies,' they are at least partial 'failures,' and it is easy to understand that they have shaken the credit of science."[4] Therefore, he concluded, a "revolution" in contemporary intellectual and spiritual life was underway: science, once purported to replace religion, "for the moment and for a long time to come, has lost the game."[5] Although Brunetière himself did not pronounce a complete "bankruptcy of science" (a phrase he most likely borrowed from his friend, the writer Paul Bourget[6]), the public naturally made no subtle distinction between "total" and "partial"

[1] See Harry W. Paul, *The Edge of Contingency: French Catholic Reaction to Scientific Change from Darwin to Duhem* (Gainesville: University Presses of Florida, 1979), 189ff.
[2] Ferdinand Brunetière, "Après une visite au Vatican," *Revue des Deux Mondes* 127 (1895): 99, 110. From here on, unless otherwise indicated, the English translation is mine.
[3] Cf. Louis Buchner, *L'Homme selon la science: son passe, son present, son venir ou d'ou venons-nous? qui sommes-nous? ou allons-nous?*, trans. Charles Letourneau (Paris: C. Reinwald, 1872). On Büchner and other like-minded mid-nineteenth-century scientific spokesmen, see Frederick Gregory, *Scientific Materialism in Nineteenth Century Germany* (Dordrecht and Boston: D. Reidel Publishing Company, 1977).
[4] Brunetière, "Après une visite au Vatican," 103.
[5] Ibid., 104.
[6] On its origins, see Peter Schöttler, "Scientisme. Sur l'histoire d'un concept difficile," *Revue de Synthèse* 134, no. 1 (2013): 99, note 39.

bankruptcies. It was clear that science was under attack, and a range of responses to this challenge, both negative and supportive, were forthcoming.

In an article that still serves as the main reference on this subject, Harry W. Paul reconstructed the local background and major French lines of this debate, showing that it was deeply embedded in the anti-clerical politics of the Third Republic.[7] But the sentiment of intellectual upheaval that Brunetière captured in his article was not just a local phenomenon, nor was it confined to France alone. As demonstrated most notably by Roy MacLeod and Anne Rasmussen, it was an expression of a much broader sense of crisis that characterized the period of the fin de siècle, marked as it was by decadent sensibilities and the rise of a general interest in the irrational — a reaction to the exaggerated progressivism and rationalism of the nineteenth-century intellectual currents associated with such philosophical labels as positivism, materialism, and naturalism.[8] However, due to its sheer generality, this familiar picture does not yield much useful information, especially if one does not pay attention to the historical specificity of the above-mentioned -isms, which stemmed from the peculiar French, German, and English national settings.[9] On the contrary, it tends to blur the focus and obscure important historical details, transforming a complex and significant phenomenon, highly characteristic and hence seemingly indispensable for understanding the intellectual life of the period, into a rather inconspicuous incident. This is particularly evident in the rather meager historiographical fortunes of the "bankruptcy of science" debate: without having inspired a single book-length study, it usually either falls out of sight altogether or is mentioned in passing in a footnote.[10] My study is intended to redress this situation and shed some new light on how exactly science went bankrupt — if it did.

It must be established right away that it apparently did not. By virtue of hindsight, we can confidently say that the conclusion Brunetière reached in 1895 was mistaken: whatever happened to science in the fin de siècle, it certainly has not "lost the game." Historians of science seem to agree that, from the point of view of most practicing scientists, it was an extremely productive time, especially in physics: "Physicists considered their science to be healthy and progressive, not

[7] Harry W. Paul, "The Debate over the Bankruptcy of Science in 1895," *French Historical Studies* 5, no. 3 (1968): 299–327.

[8] Roy MacLeod, "The 'Bankruptcy of Science' Debate: The Creed of Science and its Critics, 1885–1900," *Science, Technology, and Human Values* 7, no. 41 (1982): 2–15; Anne Rasmussen, "Critique du progrès, 'crise de la science': débats et représentations du tournant du siècle," *Mil neuf cent. Revue d'histoire intellectuelle*, no. 14 (1996): 89–113. For a more recent view, see Stathis Psillos, "Revisiting 'the Bankruptcy of Science' Debate." Lecture at the Rotman Institute of Philosophy, Western University. January 24, 2014, https://youtu.be/zwEYZNKeCpQ.

[9] The positivist tradition stemming from Auguste Comte is especially important to this study, see Chapters 1 and 2.

[10] For instance, John Burrow, *The Crisis of Reason: European Thought, 1848–1914* (New Haven and London: Yale University Press, 2000) makes no mention of it. Cf. Stephen Gaukroger, *Civilization and the Culture of Science: Science and the Shaping of Modernity, 1795–1935* (Oxford: Oxford University Press, 2020), 285, note 87.

stagnating or degenerating, and they looked with excitement and optimism toward the new century and its many opportunities."[11] This was duly noted by some contemporaries, who wrote tongue-in-cheek that "the 'bankrupt' has never been as well-off as he was on the eve of the twentieth century!"[12] Yet the very fact that the sense of crisis was so widespread and, as we shall see, articulated in one form or another by so many historical actors — and was not, moreover, the exclusive privilege of ignoramuses or obscurantists — should alert us to the possibility that our contemporary views on the nature of the enterprise called "science" may differ from those that prevailed at the turn of the twentieth century. Two historical circumstances need to be borne in mind here, the relationship between which has not usually been taken into account, making it more difficult to put the phenomenon of the perceived crisis of the "scientific worldview," as many contemporaries called it, into proper perspective.

First, although what we commonly think of as science in a sense of a systematic inquiry into the natural world has existed in one form or another at least since classical antiquity, historians only recently started to stress that the modern concept of science as a singular and unified entity is of much more recent coinage, having entered the common parlance sometime in the first half of the nineteenth century.[13] Emerging in response to a series of processes related to the development, institutionalization, and specialization of individual scientific disciplines, the term "science" came to denote not only a distinctly authoritative, epistemically privileged kind of knowledge, but also — at some indeterminate point connecting to the equally freshly minted concept of "worldview" (from the German *Weltanschauung*, coined by Immanuel Kant in 1790)[14] — a general outlook on the world, the "scientific worldview," that soon gained an unparalleled sway over Western intellectual life.[15] As Peter Harrison has suggested, it was precisely this "belated

[11] Helge Kragh, "The 'New Physics'," in *The Fin-de-Siècle World*, ed. Michael Saler (London: Routledge, 2014), 441. Cf. Suman Seth, "Crisis and the Construction of Modern Theoretical Physics," *The British Journal for the History of Science* 40, no. 1 (2007), 25–51

[12] Petr Boborykin, "Ispovedniki. Povest'," *Vestnik Evropy* 213, no. 1 (1901): 66.

[13] Peter Galison surmised "that modern talk of unification in the sciences originates in the German-speaking countries of the mid-nineteenth century. For it was there, amidst the protracted political struggle for German unification, that scientific unity was raised to a scientific-philosophical ideal" (Peter Galison, "Introduction: The Context of Disunity," in *The Disunity of Science: Boundaries, Contexts, and Power*, eds. Peter Galison and David J. Stump (Stanford: Stanford University Press, 1996), 3). More recently, Jan Golinski reflected on the history of what he termed "singular science," devoting only a handful of pages to its emergence in the first half of the nineteenth century (with a focus on the British and French contexts), see Jan Golinski, "Is it Time to Forget Science? Reflections on Singular Science and its History," *Osiris*, Vol. 27, no. 1 (2012): 19–25. Another helpful (though overly Anglocentric) analysis of the matter may be found in Peter Harrison, *The Territories of Science and Religion* (Chicago: University of Chicago Press, 2015), 145–182.

[14] David K. Naugle, *Worldview: The History of a Concept* (Grand Rapids and Cambridge: William B. Eerdmans, 2002), 55–107.

[15] Perhaps the most detailed account of this process to date is contained in Gaukroger, *Civilization and the Culture of Science*. Considering the recent suggestion that "the expression 'scientific worldview,' may have its origins in the manifesto of the Vienna Circle of Logical Positivism, published in 1929 under the title *Wissenschaftliche Weltauffassung — Der Wiener Kreis*" (Sergey Zenkin, "Vozzrenie na mir / slovo o mire," *Logos* 31, no. 5 (2021): 110, note 48), it is worth pointing out its widespread circulation in the second half of the nineteenth century, cf. the title of Ludwig

appearance" of the concept of science that set the stage for the conflict between science and religion that came to the forefront of public consciousness in the mid-nineteenth century and was codified in the infamous books of John William Draper and Andrew Dickinson White.[16] In this context, it became common to speak of science as a kind of secular religion (aptly dubbed "scientism"[17]) with its own "creed" and "articles of faith"[18] — in other words, a set of epistemological presuppositions or "largely unconsciously held, untestable, quasi-axiomatic ground beliefs," chief among them the view that nature is essentially mechanical, amenable to mathematization, and sufficiently intelligible in those terms.[19] As we will see in what follows, critics of this creed were acutely sensitive to the pretensions of the singular science, as evidenced by the same Brunetière: "One can well say [...] that, if there is hardly today an idol more tyrannical, nor a superstition more acclaimed or more widespread than that of 'Science,' there is not one either of which it is more difficult to define the nature, and to justify the claims to the domination which it exercises."[20]

Second, in our own time of overall scientific stagnation characterized by a lack of sensational theoretical discoveries,[21] it is not so easy to conjure up the feeling of "vertiginous progress," as Lorraine Daston has called it, that took hold around the middle of the nineteenth century and continued to develop in the following decades.[22] The view of the gradual, cumulative progress of scientific knowledge based on the solid foundation of Newtonian mechanics, which prevailed at the beginning of the century, gave way by mid-century to a new sense of the ephemeral nature of scientific theories due to a series of new developments, such as the introduction of the wave theory of light, which displaced the Newtonian emission theory, and the emergence of non-

Büchner's book *On Religious and Scientific Worldviews* (*Ueber religiöse und wissenschaftliche Weltanschauung. Ein historisch-kritischer Versuch,* 1887).

[16] Peter Harrison, *The Territories,* 172–174. For a more detailed discussion of the so-called "conflict thesis," see James Ungureanu, *Science, Religion, and the Protestant Tradition: Retracing the Origins of Conflict* (Pittsburgh: University of Pittsburgh Press, 2019).

[17] Schöttler, "Scientisme." This is a more expansive understanding of the term, distinct from a definition popularized by Friedrich Hayek and denoting the influence of the natural science on the social ones. On "scientism" in this sense, see Richard Olson, *Science and Scientism in Nineteenth-Century Europe* (Chicago: University of Illinois Press, 2008).

[18] MacLeod, "The 'Bankruptcy of Science' Debate," 2ff.

[19] Gerald Holton, *Science and Anti-Science* (Cambridge and London: Harvard University Press, 1993), 161. Holton went on to distinguish no less than sixteen core components of the modern scientific "world picture," see Ibid., 172–174. Some of these will be touched upon below. For a historical account of mechanical intelligibility, see Peter Dear, *The Intelligibility of Nature: How Science Makes Sense of the World* (Chicago and London: The University of Chicago Press, 2006).

[20] Ferdinand Brunetière, "La Métaphysique positiviste," *Revue des Deux Mondes* 11 (1902): 581.

[21] See Max Kozlov, "'Disruptive' Science Has Declined — And No One Knows Why," *Nature* 613 (2023): 225; cf. Michael Hagner, "At Night," *Globe*, no. 1 (2023): 30–31.

[22] Lorraine Daston, "When Science Went Modern," *The Hedgehog Review* 18, no. 3 (2016), https://hedgehogreview.com/issues/the-cultural-contradictions-of-modern-science/articles/when-science-went-modern.

Euclidean geometries, which radically undermined established conceptions of space.[23] "It was around that time that scientists began to wonder uneasily about whether scientific progress was compatible with scientific truth. If advances in knowledge were never-ending, could any scientific theory or empirical result count as real knowledge — true forever and always? Or was science, like the monarchies of Europe's anciens régimes and the boundaries of its states and principalities, doomed to perpetual revision and revolution?"[24] Coupled with the rapid technological advances, this thought — neatly captured in Alfred Tennyson's 1849 verse ("Our little systems have their day; / They have their day and cease to be […].") — troubled some of the most prominent scientists and philosophers of the era, from Alexander von Humboldt to William James and Henri Poincaré.[25] As may be expected, it was also immediately taken advantage of by those who were dissatisfied with the epistemic hegemony of modern science, which was "considered to be an unerring tribunal, the justice of whose verdicts no one can reasonably question":

> What is declared to be adverse to modern science, is virtually declared to be, of necessity, adverse to truth; and is therefore to be rejected as utterly fabulous. But the wisdom of such summary rejection, in every case of this kind, becomes very questionable when we reflect that much that was modern science at one time, is equally rejected by what is modern science now; and that very possibly the science of our successors may doom much which enters that of the present day to a similar fate.[26]

By the turn of the twentieth century, mingled with the contemporary critique of the idea of progress,[27] new epistemological programs, and novel scientific discoveries like the X-ray,[28] this view had become quite commonplace and directly contributed to a general sense that something akin to a revolution in science was underway, often colored by the feeling of crisis occasioned by the loss of previous scientific certainties.[29] Typical were assessments such as that of the Marxist philosopher Alexander Bogdanov, who in 1908 described this period as "an epoch of great and truly unparalleled revolution in the world of scientific knowledge, when scientific laws that seemed most immutable are wavering and falling, giving way to startlingly new forms, opening unexpected

[23] Idem, "The Historicity of Science," in *Historicization-Historisierung, Vol. 5, Aporemata: Kritische Studien zur Philologiegeschichte*, ed. Glenn W. Most (Göttingen: Vandenhoeck & Ruprecht, 2001), 204, 208. On non-Euclidean geometry, see Chapter 2.
[24] Idem, "When Science Went Modern."
[25] Alfred Tennyson, *In Memoriam* (London: Edward Moxon, 1850), vi; Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 212–213, 450, note 32.
[26] John Radford Young, *Modern Scepticism, Viewed In Relation To Modern Science* (London: Saunders, Otley and Co., 1865), 131.
[27] See Rasmussen, "Critique du progrès."
[28] John L. Heilbron, "Fin-de-Siècle Physics," in *Science, Technology, and Society in the Time of Alfred Nobel*, eds. Carl Gustaf Bernhard, Elisabeth Crawford, and Per Sörbom (New York: Pergamon Press, 1982), 51–73. For a more detailed discussion, see Chapter 1 and 2.
[29] Cathryn Carson, "The Revolution in Science," in *A Companion to Europe, 1900–1945*, ed. Gordon Martel (Oxford: Blackwell, 2006), 23.

and immeasurable prospects."[30] It was precisely to this view that Brunetière appealed in his proclamation of a "revolution" in progress. Conversely, it was sometimes seen as the essence of the presumed scientific bankruptcy. In his 1900 address to the International Congress of Physics in Paris, and then in his widely read *Science and Hypothesis* (*La Science et l'Hypothèse*, 1902), Poincaré invoked it as a springboard for his relationalist explanation of the aim and role of scientific theories:

> The laity are struck to see how ephemeral scientific theories are. After some years of prosperity, they see them successively abandoned; they see ruins accumulate upon ruins; they foresee that the theories fashionable today will shortly succumb in their turn and hence conclude that these are absolutely idle. This is what they call the *bankruptcy of science*.[31]

It is not difficult to notice that the two circumstances briefly summarized above must have been related to each other. The realization of the historicity and transience of scientific truths, which until recently seemed to be immutable, apparently did not accidentally coincide with the emergence of the concept of singular science, which helped to recognize it as a historical phenomenon and project it into the past, as it was done in Draper's *History of the Conflict Between Science and Religion* (1875) and in many other reflections on the history of science that started to appear around this time.[32] Perhaps the concept of science, which was introduced to designate "a model for all fields of inquiry and a focus for their potential unification,"[33] should be regarded as one of those future-oriented "collective singular" historical concepts, like "revolution," that were explored in the works of Reinhardt Koselleck and the German school of *Begriffsgeschichte*.[34] But this line of thought demands a separate inquiry.

Be that as it may, the history of the concept and the related circumstances are necessary but far from sufficient for understanding the fin-de-siècle turn in attitudes toward science, which may have had a number of other reasons of social, economic, or political nature. In this study I will focus primarily on the intellectual elements of this problem, more precisely on the ideas concerning scientific rationality that seem to have been — and still are — at the core of the modern

[30] Aleksandr Bogdanov, *Priklyucheniya odnoy filosofskoy shkoly* (Sankt-Peterburg: Slovo, 1908), 24; cited in Daniela Steila, "Natural Sciences and the Radical Intelligentsia in the Late Nineteenth and Early Twentieth Centuries" in *The Palgrave Handbook of Russian Thought*, eds. Marina F. Bykova, Michael N. Forster, and Lina Steiner (Cham: Palgrave Macmillan, 2021), 188.

[31] Henri Poincaré, *The Foundations of Science: Science and Hypothesis, The Value of Science, Science and Method*, trans. George Bruce Halsted (New York and Garrison: The Science Press, 1913), 140 (emphasis in original). Cf. the discussion of the bankruptcy of science debate and the "history-fed pessimism about science" in Stathis Psillos, "Realism and Theory Change in Science," in *The Stanford Encyclopedia of Philosophy (Fall 2022 Edition),* eds. Edward N. Zalta and Uri Nodelman, https://plato.stanford.edu/archives/fall2022/entries/realism-theory-change.

[32] Rachel Laudan, "Histories of the Sciences and Their Uses: A Review to 1913," *History of Science* 31 (1993): 15–16.

[33] Golinski, "Is it Time to Forget Science?," 22.

[34] Cf. Reinhart Koselleck, *Futures Past: On the Semantics of Historical Time*, trans. Keith Tribe (New York: Columbia University Press, 2004), 43–57. Regarding the German term *Naturwissenchaft*, similar suggestion has been put forward in Denise Phillips, *Acolytes of Nature: Defining Natural Science in Germany, 1770–1850* (Chicago: University of Chicago Press, 2012), 3ff.

"scientific worldview," but which have not yet been properly investigated in historical terms.[35] For this purpose, I will undertake a fairly detailed examination of a single figure, the Russian religious philosopher and polymath Pavel Florensky (1882–1937) — a staunch opponent of modern science who is nevertheless often called "one of the most wide-ranging intellectuals of all time," the Russian Leonardo da Vinci or Pascal, and so on.[36] This choice may be justified in various ways. For instance, it could be argued that an exploration of the materials from the late Russian Empire (and in part of the early Soviet Union), which was intimately connected to European intellectual life and highly receptive to all the processes taking place within it, including those related to science,[37] offers an especially fruitful outsider's perspective that is not readily available if one focuses on Europe itself. But in order to explain why I have decided to build my narrative around the figure of Florensky as a particularly illustrative example — a decision that, I believe, will largely speak for itself — I shall take a different route. Since introductions typically include an explication of the theoretical underpinnings of the study, I will take the liberty of making a brief methodological digression concerning the epistemological foundations of the historian's craft, which seems particularly appropriate in the context of the discussion of science and scientific epistemology.

A Note on Epistemology of History

In the eyes of the general public and even some specialists, history, like the other humanities, is often conceived as occupying an indeterminate position between the poles of the singular science and the equally singular art — an opposition analogous to that between science and religion, and one that was also established only in the nineteenth century.[38] Despite its seeming triviality, one rarely encounters an articulate discussion of history as a scholarly discipline that has its own

[35] One indication of this is that a recent review of the opposition to the view of "science as the one human enterprise that successfully escapes the contingencies of history to establish eternal truths about the universe, via a special, rational method of inquiry" begins only with the 1960s and does not even mention the circumstances of its inception and diffusion in the nineteenth and early twentieth centuries, see Thomas Nickles, "Historicist Theories of Scientific Rationality," *The Stanford Encyclopedia of Philosophy (Spring 2021 Edition)*, ed. Edward N. Zalta, https://plato.stanford.edu/entries/rationality-historicist).

[36] Michael Hagemeister, "Wiederverzauberung der Welt: Pavel Florenskijs Neues Mittelalter," in *Pavel Florenskij – Tradition und Moderne: Beiträge zum Internationalen Symposium an der Universität Potsdam, 5. bis 9. April 2000*, Hgg. Norbert Franz, Michael Hagemeister and Frank Haney (Frankfurt am Main: Peter Lang, 2001), 21ff; Avril Pyman, *Pavel Florensky: A Quiet Genius, The Tragic and Extraordinary Life of Russia's Unknown da Vinci* (New York: Continuum, 2010); Florence Corrado-Kazanski, "Préface," in *Pavel Florenski et l'Europe*, ed. Florence Corrado-Kazanski (Pessac: Maison des Sciences de l'Homme d'Aquitaine, 2013), 5. Some other relevant literature is cited below.

[37] The extent of this close relationship is well demonstrated in Alexander Vucinich, *Science in Russian Culture, 1861–1917* (Stanford: Stanford University Press, 1970).

[38] See, e.g., Lorraine Daston, "Fear & Loathing of the Imagination in Science," *Daedalus* 127, no. 1 (1998): 80ff.

distinctive form of knowing, ways of dealing with its subject matter, characteristic standards of argument, explanation, evidence, proof, and other basic elements of research activity. Lorraine Daston has argued that part of the responsibility for this situation lies with historians and philosophers of science, who have focused on the natural sciences at the expense of the humanities: "history and philosophy of science in most European traditions has been dominated by inquiries into the natural sciences [...], and there is as yet no epistemology of the humanities."[39] While this judgment rings broadly true, historiography certainly contains various important exceptions. Without any claim to comprehensiveness, I would like to focus on just one of them, given its relevance to the issues central to this study.

The case in point is Carlo Ginzburg's classic article "Clues: Roots of an Evidential Paradigm" (*Spie. Radici di un paradigma indiziario*, 1979), in which he made a brilliant attempt to historicize — perhaps unintentionally since it was not explicitly invoked — the unfortunately hackneyed distinction between nomothetic natural science and idiographic history (mentioned by Daston in passing).[40] The principal difference between the two, according to the neo-Kantian philosopher Wilhelm Windelband, lies in the "cognitive objectives of the science in question": one represents "an inquiry into general laws," another "into specific historical facts."[41] The "anti-anthropocentric" orientation of the natural sciences toward the study of the general and universal, expressed in the form of exact mathematizable laws, was secured in the seventeenth century due to the great success of Galileo Galilei's physics — and thus Ginzburg referred to it as the "Galilean paradigm."[42] History acquired its modern features a century later thanks to the incorporation of antiquarian methods,[43] but epistemologically it has always belonged to a heterogeneous group of

[39] Idem, "Objectivity and Impartiality: Epistemic Virtues in the Humanities," in *The Making of the Humanities. Vol. III. The Modern Humanities*, eds. Rens Bod, Jaap Maat, and Thijs Weststeijn (Amsterdam: Amsterdam University Press, 2015), 27.

[40] Ibid. For an original formulation of this methodological distinction, see Wilhelm Windelband, "History and Natural Science" [1894], trans. Guy Oakes, *History and Theory* 19, no. 2 (1980): 165–185. It is worth noting that Windelband articulated Daston's assessment more than a century earlier: "up to now, logic has been much more interested in the nomothetic sciences than in the idiographic sciences. There are exhaustive logical investigations concerning the methodological significance of precision instruments, the theory of experimentation, the determination of probability on the basis of multiple observations of the same phenomenon, and other similar questions. However, philosophical concern with parallel problems in the methodology of history does not even remotely approximate its interest in the methodological problems of the natural sciences" (Ibid., 177).

[41] Ibid., 175.

[42] Carlo Ginzburg, "Clues: Roots of an Evidential Paradigm," in Idem, *Clues, Myths, and the Historical Method*, trans. John and Anne C. Tedeschi (Baltimore and London: The Johns Hopkins University Press, 2013), 106–108. As Gerald Holton put it, "Galileo proposed the set of four great novelties that subsequently became part of our 'modern' scientific world picture — the quantification of nature, the mechanization of nature, the distancing of the world of direct daily experience from the world of science, and last but not least, secularization" (Holton, *Science and Anti-Science*, 115).

[43] The reference to the seventeenth century is apparently a mistype that was not corrected in the translation (Ginzburg, "Clues," 106). Cf. Arnaldo Momigliano, "Ancient History and the Antiquarian," *Journal of the Warburg and Courtauld Institutes* 13, no. 3/4 (1950): 311; Carlo Ginzburg, "Checking the Evidence: The Judge and the Historian," *Critical Inquiry* 18, no. 1 (1991): 80.

the "humane sciences" (along with, e.g., medicine and law), which are bound together by what Ginzburg called the "evidential paradigm": all of them are geared to deal with the domain of the individual and the unique, bear the unremovable stamp of conjecture, and operate by reconstructing directly unobservable realities on the basis of concrete pieces of evidence — clues, symptoms, traces, or testimonies.[44] Even when the representatives of these disciplines, particularly historians, address reoccurring and therefore potentially quantifiable phenomena, their "cognitive strategy [...] remains intrinsically individualizing (although the individual case may be a social group or an entire society)."[45] On the one hand, this observation helps to account for history's stubborn resistance to the methodological influence exerted by the social sciences.[46] On the other, it allows us to understand a "paradoxical" aspect of historical work noted (but unexplained) by Ginzburg's theoretical *bête noire* Hayden White: "the more we know about the past, the more difficult it is to generalize about it."[47] If this seems paradoxical, it is because we are not generally accustomed to thinking about the distinctive epistemic conditions of our knowledge of the past, and because, like White, we tend to understand the act of generalization in scientific rather than scholarly terms. I will return to the problem of generalization below.

Meanwhile, it appears that the argument regarding the "evidential paradigm" can be slightly adjusted. In the first instance, it should be observed that although Ginzburg claimed to use this neologism in accordance with Thomas Kuhn's *The Structure of Scientific Revolutions* (1962),[48] it does not seem to be a paradigm at all, if we understand that notoriously protean concept to mean a "universally recognised scientific achievemen[t] that for a time provide[s] model problems and solutions to a community of practitioners."[49] One can probably talk of a "Galilean paradigm" — or a "Galilean style"[50] — that emerged at a certain point in the history of European natural sciences, but the "evidential" one apparently has no date of birth: conjectural knowledge, based on the common sort of intuition, "can be found throughout the entire world, with no limits of geography, history, ethnicity, sex, or class [...]. [...] It is the property [...] of hunters; of sailors; of women. It binds the human animal closely to other animal species."[51] To clear this conceptual muddle, it is worth recalling the close connection between this type of knowledge and narrative.

[44] Ginzburg, "Clues," 96ff.
[45] Ibid., 106.
[46] Ibid. Like demography or economics, as discussed in François Furet, "From Narrative History to Problem-Oriented History," in *The History and Narrative Reader*, ed. Geoffrey Roberts (London and New York: Routledge, 2001), 269–280.
[47] Hayden White, "The Historical Text as Literary Artifact," in Idem, *Tropics of Discourse: Essays in Cultural Criticism* (Baltimore and London: The Johns Hopkins University Press, 1978), 89.
[48] Ginzburg, "Clues," 200, note 1.
[49] Cited in Margaret Masterman, "The Nature of a Paradigm" in *Criticism and the Growth of Knowledge*, eds. Imre Lakatos and Alan Musgrave (Cambridge: Cambridge University Press, 1970), 61.
[50] Ian Hacking, "'Style' for Historians and Philosophers," *Studies in History and Philosophy of Science* 23, no. 1 (1992): 2.
[51] Ginzburg, "Clues," 125.

Ginzburg himself put forward the witty and oft-cited hypothesis that the very idea of narration originated in the experience of the ancient hunter deciphering animal tracks: "The hunter would have been the first 'to tell a story' because he alone was able to read, in the silent, nearly imperceptible tracks left by his prey, a coherent sequence of events."[52] Possibly gleaned from the theoretical works of Soviet film director Sergei Eisenstein (and, as far as I can tell, dating back to nineteenth-century anthropology),[53] this hypothesis suggests that, instead of the ill-defined "evidential paradigm," we should perhaps speak of the narrative nature of conjectural knowledge (noting that "conjecture" derives from the Latin verb *conicere*, "to put together logically, connect," and "draw a conclusion from collected particulars").[54] This is not at all a novel suggestion, of course: since the publication of Ginzburg's article, a massive body of scholarly literature devoted to the epistemological significance of narrative has appeared.[55] To take one famous example, the philosopher of history Louis Mink convincingly argued that narrative should be regarded as an "irreducible form of human comprehension" and a "primary cognitive instrument" for making sense of the concrete particularity, individuality, and historicity of our experience, which cannot be accounted for in other ways — such as theory, which allows us to explain phenomena by relating them to a systematic set of generalizations or laws, or metaphor, which allows us to see one thing in terms of another, i.e. to conceptualize.[56]

This tripartite distinction between narrative, theory, and metaphor (which, *mutatis mutandis*, may be juxtaposed with a distinction between the humanities, the natural sciences, and the social

[52] Ibid., 103.

[53] Cf. the following passage from Edward Tylor's classic study: "When one day he [a Botocudo or Australian "savage"] has seen a deer or a kangaroo leave footprints in the soft ground, and the next day he has found new footprints and inferred that such an animal made them, and has followed up the track and killed the game, then he knows that he has reconstructed a history of past events by inference from their results" (Edward B. Tylor, *The Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom. Vol. 1* (London: John Murray, 1871), 333). In his reflections on the connections between primitive thought and artistic devices from the early 1930s, Sergei Eisenstein — whose works, as Ginzburg has repeatedly pointed out, constituted an important part of his intellectual formation — made a direct comparison between "the reading of tracks by a hunter" and "constructing the plot of a detective story" (see Oksana Bulgakowa, "Sergei Eisenstein's System Thinking: Influences and Inspirations," *Cultural Science Journal* 13, no. 1 (2021): 89). See also Chapter 2.

[54] Charlton T. Lewis and Charles Short, *A New Latin Dictionary* (New York: Harper & Brothers, 1891), 421. Referring to Ginzburg's "Clues," Sergey Zenkin highlighted an important characteristic of narrative logic, "which operates not with syllogisms, but with enthymemes — incomplete syllogisms in which the larger premise is systematically omitted: there is an event and its consequence, but there is no reliable general rule governing their relationship" (Sergey Zenkin, *Teoriya literatury: Problemy i rezul'taty* (Moskva: Novoe literaturnoe obozrenie, 2018). On enthymemes, see Carlo Ginzburg, *History, Rhetoric, and Proof* (Hanover and London: University Press of New England, 1999), 38–53.

[55] For a highly readable introduction, see Peter Brooks, *Seduced by Story: The Use and Abuse of Narrative* (New York: The New York Review of Books, 2022).

[56] Louis Mink, "Narrative Form as a Cognitive Instrument" in *The History and Narrative Reader*, ed. Geoffrey Roberts (London and New York: Routledge, 2001), 213–214. It seems to be a fairly straightforward task to demonstrate that it is precisely such narrative form that constitutes the bedrock of the conjectural disciplines discussed by Ginzburg: suffice it to mention case histories in medicine or the irreducible role of narrative in law, compellingly detailed by Brooks, *Seduced by Story*, 118–146 (who also makes use of Ginzburg's "Clues"); Ginzburg, "Checking the Evidence," 79–80.

sciences) allows us to note some important consequences of conjectural knowledge for the practice of historical scholarship. Unlike physicists and sociologists, who usually have to rely on abstract theories (say, Albert Einstein's relativity) and metaphorical conceptualizations (Erving Goffman's dramaturgy of social interaction[57]), historians tend to avoid using either, operating as it were with their materials themselves: excerpts from books, manuscripts, documents, specific quotations, footnotes, and so on. By reading, dissecting, comparing, and rearranging their primary and secondary sources (and the narratives contained therein), they construct their own scholarly narratives on this irreducibly concrete basis. This does not mean, obviously, that historians are pure empiricists who do not undertake any conceptual or theoretical work. In Robert Merton's terms, the point is that the historian's craft seems to depend much more on minor working hypotheses, which are used to put concrete pieces of evidence into a narrative structure, than either on highly abstract theories or "theories of the middle range," which are admitted only on occasion.[58] That is to say, instead of theories and metaphors, we habitually think in metonymies — the often conjectural relationships between parts and wholes, individual texts and general contexts — which, as the linguist Roman Jakobson had famously shown, are closely related to narrative prose.[59] More detailed discussion of the implications of these rather elementary observations falls outside the purview of this introduction. Suffice it to mention that, among other things, it seems to be the reason why the privileged way to draw generalizations in our discipline is the use of a representative or illustrative example (*Paradebeispiel*, *exemple suggestif,* Francis Bacon's *instantia ostentiva*): "A pattern or a model to be imitated, a parable that warns or teaches, a legal precedent that can be enlisted in future judgements. In short, any concrete, specific instance that points far beyond itself."[60] Although this device is by no means the preserve of historians alone, we seem to be particularly adept at it.[61]

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[57] Famously laid out in his study on *The Presentation of Self in Everyday Life* (1956). The metaphorical nature of sociological conceptualization is discussed at length in Viktor Vakhshtayn, *Voobrazhaya gorod. Vvedenie v teoriyu kontseptualizatsii* (Moskva: Novoe literaturnoe obozrenie, 2022).

[58] Robert K. Merton, *Social Theory and Social Structure* (New York: Simon & Schuster, The Free Press, 1949), 39–53.

[59] Cited in Ginzburg, "Clues," 103, 204, note 33. As Isaiah Berlin pointed out, using the language of associationist psychology discussed in Chapters 1 and 2 below, the "gifts that historians need are [...] those of association, not dissociation, of perceiving the relation of parts to wholes, of particular sounds or colours to the many possible tunes or pictures into which they might enter, of the links that connect individuals viewed and savored as individuals and not as instances of types or laws. These gifts relate more directly to practice than to theory (Isaiah Berlin, "History and Theory: The Concept of Scientific History," *History and Theory* 1, no. 1 (1960): 30).

[60] Lorraine Daston, "Exempla and the Epistemology of the Humanities," *Aby Warburg 150: Work. Legacy. Promise*, The Warburg Institute, London, 13 June 2016, https://www.youtube.com/watch?v=8JlXfIyqsG4. It is no coincidence that conjectural knowledge often works with these kinds of concrete examples: the metonymic relationship is baked into the word "example" itself, which comes from the Latin *eximere*, "to extract or to take out a part from a whole" (Ibid.).

[61] Ibid. For an in-depth discussion of the use of paradigmatic examples in the social and (to a lesser extent) natural sciences, see Monika Krause, *Model Cases: On Canonical Research Objects and Sites* (Chicago and London: The University of Chicago Press, 2021).

In this respect, my approach is entirely in line with standard historical practice, without any claim to methodological novelty. I intend to treat Pavel Florensky's life and work, which to my knowledge constitute one of the richest documents of the fin-de-siècle animosity toward science, as a kind of illustrative example that points far beyond itself — and thereby allows one to notice and reconstruct some intellectual contexts that have not yet been quite adequately explored. As Robert Richards has recently reaffirmed, biographies tend to provide particularly valuable material for such exercises in intellectual history and the history of science, because the "focus on an individual allows a coherent representation of science and of intellectual development at a moment in history," presenting one with "a complex of interacting causes that offers the basis for a realistic explanation."[62] Besides, he candidly added, "dealing with individuals such as William James, or Charles Darwin, or Ernst Haeckel, or Johann Wolfgang von Goethe is simply more interesting than following the activities of those in the lower ranks. They usually have many tricks up their sleeves and display, even when wrong from our perspective, the kind of genius that is compelling to explore."[63] Although Florensky was neither Haeckel nor Goethe — as we shall see, he would have frowned upon the first comparison, but eagerly welcomed the second — his case offers all of the above.

That said, I should emphasize that I do not aim to undertake an in-depth analysis of Florensky's philosophical, theological, or scientific works for their own sake. This is precluded both by my lack of access to Russian libraries and the archival materials necessary for such a task and by the formal limitations of a master's thesis. Instead, following the methodological precept that Anthony Grafton recalled receiving from Arnaldo Momigliano, according to which one "must study not a single individual who had been identified as important by the modern academic culture that one came from, [...] but the whole scholarly tradition that [this individual] had belonged to,"[64] I aim to see Florensky's figure as part of the larger historical picture and use the material from his (auto)biography and writings to distinguish and analyze several important components of the fin-de-siècle crisis of scientific rationality: (1) its intellectual genesis in the context of nineteenth-century psychologism, which fostered a new trend in epistemology that emphasized the limitations of conceptual reasoning and the relativity of knowledge, thereby raising doubts about the epistemic authority and moral import of science; (2) the relativization of scientific rationality and the

[62] Robert J. Richards, "The Role of Biography in Intellectual History," *KNOW: A Journal on the Formation of Knowledge* 1, No. 2 (2017): 296.
[63] Ibid., 296–297.
[64] Anthony Grafton, "Tell Me a Story," *Tablet,* September 1, 2020, https://www.tabletmag.com/sections/arts-letters/articles/arnaldo-momigliano-anthony-grafton.

appearance of its alternatives, the ideas of "mythical" and "four-dimensional" thinking; (3) its anti-Semitic racialization, which underpinned and intensified criticism of the "inhuman" features of modern science. Finally, I will briefly address one of the most bizarre consequences of this anti-scientific attitude — the rejection of heliocentrism — and draw a tentative conclusion as to what has so far prevented a more comprehensive understanding of how science went bankrupt.

Chapter 1. The Intellectual Origins of the Crisis

"The Disruption of Biography"

According to the autobiography entitled *To My Children (Detyam moim)*, which Pavel Florensky wrote piecemeal between 1916 and 1925, his own childhood and adolescence were marked by intense engagement with the natural sciences. This was largely due to his father Alexander Ivanovich, a railway engineer and follower of Auguste Comte's positivist philosophy, who from an early age showed his son scientific experiments that excited him "to the point of cold shivers, to heart palpitations, to the point where my breathing seemed to stop and my heart leapt out of my chest."[65] Instead of fairy tales, the Bible, or fiction (with rare exceptions like Johann Wolfgang von Goethe's *Faust*, his father's favorite) Florensky was brought up on popular science books, atlases, and encyclopedias such as the ubiquitous German *Meyers Konversations-Lexikon* (124). Drawing on late nineteenth-century pedagogical ideas, his parents believed that an excess of "fantasy" was harmful to their child's mental development and sought to "educate his mind free from the survivals of human history, squarely on the scientific worldview" (123).[66] Thus, instead of mythical, folkloric, or religious pictures his imagination was captured by various natural phenomena and scientific subjects: "Milky Ways and nebulae, star years, spectroscopes and telescopes, Saturn rings, Jupiter satellites and Venus phases, geological periods, infinitesimal and infinitely large, bacteria and plesiosaurs, conical refraction and northern lights, etc., etc." — and for all of these "there was a naturalistic explanation, schematically simple and perfectly intelligible. The strict regularity of nature and the continuity of all its phenomena were emphasized" (124–125). This was the direction of Florensky's education when he was about six years old.

[65] Pavel Florensky, *Iz moey zhizni: Detyam moim, Dnevnikovye zapisi, U grani mirov, Zaveshchanie*, ed. igumen Andronik (Trubachev) (Moskva: Gaudeamus, Akademicheskiy proekt, 2018), 125. From here on, references to Florensky's autobiography are given in parentheses in the main body of the text. On his father's Comteanism, see Ibid., 89–90; cf. Thomas Nemeth, "Positivism in Late Tsarist Russia: Its Introduction, Penetration, and Diffusion," in *The Worlds of Positivism: A Global Intellectual History, 1770–1930*, eds. Johannes Feichtinger, Franz L. Fillafer, and Jan Surman (New York: Palgrave Macmillan, 2018), 273–291.

[66] A reviewer of the Russian edition of Hans Christian Andersen's fairy tales (1863–1864) described their "dangerousness" in the following way: in the process of reading "the imagination develops to such an ugly, disproportionate degree that it threatens to take a decisive lead over the intellect, and this, of course, [...] cannot be particularly beneficial to the mental development of children" (cited in Aleksandr Belousov et al., "Kritika detskoy literatury 1864-1934: Fragment annotirovannogo ukazatelya," *Detskie chteniya* 8, no. 2 (2015): 8). This pedagogical view likely drew on a more general nineteenth-century tendency to view the imagination as inimical to scientific thought, see Lorraine Daston, "Fear & Loathing of the Imagination in Science," *Daedalus* 127, no. 1 (1998): 73–95. Comtean positivism, omitted in Daston's account, partially aligned with this tendency, cf. Auguste Comte, *Discours sur l'esprit positif* (Paris: Carilian-Goeury et V. Dalmont, 1844), 16. For a more detailed discussion of the relationship between science and imagination, see Chapter 2.

His subsequent intellectual formation followed the same course. The late Victorian English usually referred to as "scientific naturalism," while in both continental Europe and the Russian Empire it was often designated by various philosophical labels such as "positivism," "materialism," "rationalism," or even "realism." By the second half of the nineteenth century, all these words may have been used to highlight different aspects of what was commonly known by the collective singular term "science," or "scientific worldview." As mentioned in the introduction, at its core was the notion of the essential intelligibility of the natural world, considered to be generally uniform, continuous, and fully determined by mathematizable laws, and of Newtonian physics as the ideal of all possible knowledge.[67] About the time Florensky was fifteen years old, his "scientific attitude toward the world had fully developed and acquired a canonical character" (145). He reportedly "knew the Latin text of Newton's axiomata sive leges motus by heart," whereas such prominent figures of European natural science as Pierre-Simon Laplace, Charles Lyell, Charles Darwin, and Ernst Haeckel occupied in his mind the place of "holy fathers and teachers of the Church" — their works were presumably also "not only mastered but memorized by heart" (125, 140, 147). This was supplemented by extensive reading of more specialized literature "on physics and related sciences" (various textbooks, journals, encyclopedias — "anything I could get my hands on") as well as on the history of science, notably the 1867–1869 Russian translation of the three-volume *History of the Inductive Sciences* (1837) by William Whewell (147–148). At the same time, Florensky was actively engaged in physical experiments and empirical observations of his own, all in the picturesque Georgian countryside (his family lived between the cities of Tiflis, present-day Tbilisi, and Batumi). He had studied the formation of clouds (a characteristically late-nineteenth-century task[68]), investigated the color ratios of local vegetation, made observations on river flows, measured the temperature of springs, examined the structure of nearby mountains, took photographic pictures and sketches of "geological, meteorological or archaeological nature," and carefully documented his activities:

> A day in which a few paragraphs of my "Experimental Investigations," as I liked to call my notebooks in the manner of my dearest [Michael] Faraday, were not written [...] or at least a few pages summarizing my experiments and considerations, which I called "memoirs" after the French physicists of the late eighteenth

[67] For an account of how this popular Newtonianism had developed by the early nineteenth century, see Mordechai Feingold, *The Newtonian Moment: Isaac Newton and the Making of Modern Culture* (New York and Oxford: Oxford University Press, 2004). In the second half of the nineteenth century, the Enlightenment premise that "la nature est partout la même" (Arthur Lovejoy, *The Great Chain of Being: A Study in the History of an Idea* (Cambridge: Harvard University Press, 1936), 294) was reinforced by the 1859 invention of spectroscopy (advisedly mentioned by Florensky in the quote above), which revealed the "uniformity of known materials and known laws throughout the universe" (Ben Carver, *Alternate Histories and Nineteenth-Century Literature: Untimely Meditations in Britain, France, and America* (London: Palgrave Macmillan, 2017), 124ff). Cf. the discussion of modern cosmology in the Conclusion.

[68] Lorraine Daston, "Cloud Physiognomy," *Representations*, no. 135 (2016): 45–71.

> and first half of the nineteenth centuries, were not penned down, seemed to me a lost, almost criminally wasted day [...].
>
> To the question of what I was striving for, I would answer: "To know the laws of nature" — and indeed, all my strength, all my attention, all my time, I devoted to exact knowledge. Physics, partly geology and astronomy, as well as mathematics, were matters over which I sat with a perseverance and passion that reinforced each other (145–147, 184).

The results of these various pursuits seemed to "coalesce into a unified picture of the world" (185), and Florensky imagined that they were eventually meant to form the basis for a new, updated version of Alexander von Humboldt's multi-volume *Kosmos* (1845–1862). By 1899, when he was in his final year at the First Tiflis Classical Gymnasium, he found himself "at the pinnacle of physical thought" (147): he had already far outgrown the school curriculum and the expertise of his teachers, exhausted the available instrumental and laboratory resources (151–152), and seemed to have a promising career as a naturalist ahead of him.

But then, unexpectedly, it was all over. Florensky was struck by a "catastrophic" intellectual crisis — "the rupture, the disruption of biography, the sudden internal collapse" (150) — that completely overturned his views of the world and made him sharply disillusioned with the natural sciences. After the gymnasium, likely following an intuition found during his readings of Plato (who contrasted mathematical knowledge, which dealt with the eternal realm of being, and physical knowledge, confined to the transitory world of becoming), instead of the department of natural sciences he chose to enroll in the department of pure mathematics at Moscow Imperial University, with a view to "construct a philosophical worldview based on in-depth mathematical knowledge."[69] However, he soon decided that he had "nothing to do" at the university, where "everyone was busy with grades, exams, etc.," and that the most important task for the future was "to create a religious science and a scientific Religion."[70] To the dismay of his parents, after completing four years of undergraduate study, he left the university and entered the Moscow Theological Academy, where he began working on ancient philosophy and the history of religion. Whence started his career as a prolific religious thinker, an awe-inspiring mystic,[71] and a relentless critic of the scientific worldview to which he once so closely adhered.

Following Florensky's own claim that the crisis he had experienced in his youth "determined [his] entire future destiny" (184), scholars seem to agree that it represents a key

[69] Cited in Vladislav Shaposhnikov, "Mathematics as the Key to a Holistic World View: The Case of Pavel Florensky," *Lateranum* 83, no. 3 (2017): 540. On Florensky's reading of Plato, see Avril Pyman, *Pavel Florensky: A Quiet Genius, The Tragic and Extraordinary Life of Russia's Unknown da Vinci* (New York: Continuum, 2010), 15. On the distinction between mathematical and physical knowledge, notably found in *Timaeus* 28–29, see Francis M. Cornford, *Plato's Cosmology* (Indianapolis and Cambridge: Hackett Publishing Company, 1997), 28–31.

[70] Pavel Florensky, *Obretaya put'. Pavel Florensky v universitetskie gody, Vol. 2*, ed. P. V. Florensky (Moskva: Progress-Traditsiya, 2011), 559.

[71] See Chapter 2.

episode in his intellectual biography. It was as a result of this event that he turned away from science and became preoccupied with religion and mysticism, which led him to the Orthodox Church and priesthood.[72] The very structure of his autobiography testifies to this: although he had originally planned a much longer version,[73] the text he ended up writing concludes precisely at the moment when the crisis was resolved, making it the focal point of his early life story. What was the nature of that crisis? And how did he overcome it? In what follows, I will attempt to answer these questions.

The Autobiographical Narrative

Partly because of the nature of Florensky's reception in the late- and post-Soviet periods, when his figure acquired the status of "one of the most wide-ranging intellectuals of all time" and simultaneously "a martyr of the Orthodox Church,"[74] and partly due to the literary qualities of his autobiography, rich in colorful detail and styled in a confessional tone, oddly enough no attempt has yet been made to analyze it critically. As far as I can tell, those who have written about Florensky's life have faithfully reproduced his own account of it,[75] without pausing to consider the basic characteristics of autobiography as a literary genre that straddles the line between historical fact and imaginative fiction — and invariably contains an element of self-fashioning.[76] Judging by a lengthy cautionary digression addressed to the "critics of autobiographies and confessions," in which Florensky justified his retrospective interpretation of the past (159–160), he was no less aware of this than his senior contemporary H. G. Wells, author of the highly self-reflective *Experiment in Autobiography* (1932).[77] While I do not intend to undertake an exhaustive study of *To My Children*, for the purposes of this chapter some brief observations are in order.

Although Florensky's family belonged to a comparatively lower social stratum, his reminiscences reproduce many of the conventions of contemporary autobiographical narratives

[72] For a most recent statement to this effect, see Nikolay Pavlyuchenkov, "Kontseptsiya krizisa i putey ego preodoleniya v trudakh P. A. Florenskogo," *Vestnik PSTGU. Seriya I: Bogoslovie. Filosofiya. Religiovedenie*, no. 84 (2019): 77–93.
[73] Florensky, *Iz moey zhizni,* 7.
[74] Cited in Michael Hagemeister, "Wiederverzauberung der Welt: Pavel Florenskijs Neues Mittelalter," in *Pavel Florenskij – Tradition und Moderne: Beiträge zum Internationalen Symposium an der Universität Potsdam, 5. bis 9. April 2000*, Hgg. Norbert Franz, Michael Hagemeister and Frank Haney (Frankfurt am Main: Peter Lang, 2001), 21. On Florensky's reception, see Clemena Antonova, "Changing Perceptions of Pavel Florensky in Russian and Soviet Scholarship," in *In Marx's Shadow: Knowledge, Power, and Intellectuals in Eastern Europe and Russia*, eds. Costica Bradatan and Serguei Alex. Oushakine (Lahnam: Lexington Books, 2010), 73–92.
[75] This tendency is perhaps best exemplified by Avril Pyman, *Pavel Florensky: A Quiet Genius*.
[76] For a concise introduction, see Helga Schwalm, "Autobiography" in *Handbook of Narratology, Second Edition, Vol. 1*, eds. Peter Hühn, Jan Christoph Meister, John Pier, and Wolf Schmid (Berlin and Boston: De Gruyter, 2014), 14–29.
[77] Roy Pascal, *Design and Truth in Autobiography* (London and New York: Routledge, 1960), 191–193.

of Russian gentry childhood: the abstract image of a beautiful mother, the somewhat distant yet affectionate father, family home as a garden of earthly delights, and general dislike of the gymnasium, which in his case took the form of a "condescendingly high-handed" attitude toward his studies and teachers (154).[78] In considering Florensky's account of his upbringing, however, two particularly important presuppositions must be distinguished. On the one hand, the popular contemporary notion that a child is the equivalent of a "primitive savage," which in the second half of the nineteenth century attained the status of a hard and fast scientific fact due to the influential biological theory that each individual passes through the same developmental stages as mankind does as a whole (or, in Ernst Haeckel's famous formulation, that ontogeny recapitulates phylogeny).[79] On the other hand, traditional Christian primitivism, according to which prelapsarian Adam — who had an intimate knowledge of the world around him by virtue of his perfect senses, not yet corrupted by sin — was believed to be a child.[80] The combination of these ideas may be found in Florensky's remarks on the meaning of religious conversion, written down at the time of the composition of his autobiography: "To convert [into Christianity] means, obviously, to turn backwards. Every individual recapitulates in himself the history of the entire human race [In each of us there is both sin and resurrection]. Haeckel's [biogenetic] law. Everyone who experiences conversion receives the childlike structure of the soul."[81] With that in mind, his *To My Children*, modeled on the evolutionary coming-of-age story of Goethe's *From My Life: Poetry and Truth (Aus meinem Leben: Dichtung und Wahrheit,* 1811–1833),[82] appears as a rendition of the Christian narrative of the fall and salvation, that is, coming out of the primordial state of childhood, falling under the corrupting influence of the scientific worldview, and subsequent liberation from it — with an implied entry into the fold of the Church, which showed him the way to a new "Christian worldview" and a transformed way of thought.[83] As the following summary will make clear, the details concerning Florensky's early scientific pursuits with which I began this chapter have been

[78] Andrew Baruch Wachtel, *The Battle for Childhood: Creation of a Russian Myth* (Stanford: Stanford University Press, 1990), 96–102, 117–130.
[79] Stephen Jay Gould, *Ontogeny and Phylogeny* (Cambridge and London: Harvard University Press, 1977), 135–155; George Boas, *The Cult of Childhood* (Dallas: Spring Publications, 1990), 60–79.
[80] George Boas, *Essays on Primitivism and Related Ideas in the Middle Ages* (Baltimore: The Johns Hopkins Press, 1984), 4–5, 16–17, 24–25. Elsewhere I attempted to demonstrate that, not wholly unexpectedly, the idea of the fall of man occupied a central place in Florensky's Christian worldview, see Pavel Yushin, "The Cover of the Journal *Makovets* and Pavel Florensky's World Picture," in *In Anderen Zeiten/In Other Times*: *Zeitdiskurse im Wandel/Changing Discourses of Time across Human History*, eds. Brisca Hohenwald, Neele Illner, and Jürgen Renn (Berlin: Frank und Timme Verlag, 2022), 151–209. For more on this topic, see Chapters 2 and 3.
[81] Pavel Florensky, *Sochineniya. Vol. 3(2)*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 2000), 414.
[82] Florensky's larger autobiographical project was entitled *From My Life*, while its part concerning his childhood and adolescence was described as "Narrative like Wahrbeiz [sic] und Dichtung" (Florensky, *Iz moey zhizni*, 7).
[83] For more on this subject, see Chapter 2.

taken out of their original context — in fact, they are all elements of a peculiar narrative structure that colors their meaning in an entirely different way.

Florensky directly compared his childhood to a time in the Garden of Eden, characterized by a perfect unity with nature, which was the sole object of his "all-consuming passion": "In fact, I may have loved no one, that is to say, I loved no one except the One. This one lover was Nature [...] Even to animals, mammals I was quite indifferent — I felt in them a kinship all too close to man" (52).[84] In this connection, he unmistakably perceived the difference between the natural and the artificial: "directly, almost physiologically [...] I felt with full vividness the qualitative difference between the manual and the mechanical" (43–44). Likening his childhood state to that of the "savages" ("whose psychology I still feel akin to my own to this day"), he described the extreme impressionability and extraordinary acuteness of his senses: smell ("I always felt that through smell I merged with the thing itself"), hearing ("everything in me, every vein, was filled with ecstatic sound, which was my knowledge of the world") and especially sight ("the adults often used me, themselves not lacking in sight, as eyes or binoculars. [...] And now, with severe myopia, in the streets and on walks I constantly see many things that my companions with good eyesight do not see") (53–60). Accompanied by an "almost absolute memory," this sagacity was motivated by a sense of the mystical animation of nature and the inner unity of its outwardly dissimilar appearances:

> Each perception is related to the others, and by itself some system is built in the mind, where the heterogeneous things are related to each other in small but (according to my assessment) profound ways. Plants, stones, birds, animals (it was quite clear to me that it was impossible to group the lovely birds together with other creatures, "animals" in my terminology, and that birds were rather related to plants), atmospheric phenomena, colors, smells, tastes, heavenly luminaries and events in the underworld are woven together by manifold connections, forming a fabric of universal correspondence. [...] The whole world lived, and I understood its life. [...] Children's perception overcomes the fragmentation of the world from within. It asserts the essential unity of the world, not motivated by this or that general attribute, but directly felt when one fuses with the phenomena perceived by the soul. This is a mystical worldview. [...] In every fiber of the flesh [of nature] I saw and wanted to see, sought to see, believed that I could see — the soul, the one spiritual essence (64–65).

Over time, this sense of paradisiacal ecstasy began to fade, and the "joy and fullness of being" with its direct perception of nature was supplanted by the realization that it was filled with fearsome spirits: "As I grew up, the spiritual beings that inhabit nature grew with me, or were pushed aside by other beings of which I had not previously thought and of which I was not previously aware.

[84] This rather bizarre qualification seems to have relied on the Christian notion that "all intelligent beings are by their nature sinful," which was allegedly (according to Alexander von Humboldt) shared by the aforementioned William Whewell, a devout Anglican and theologian, see Michael J. Crowe, *The Extraterrestrial Life Debate, 1750–1900: The Idea of the Plurality of Worlds from Kant to Lowell* (Cambridge: Cambridge University Press, 1986), 207–208. On the relationship of the intellect to sin, see Chapter 3.

[...] The pernicious spirits of nature began to crawl out of the shadows on the other side of my Eden fence, and I felt them grow bolder and lose their complacency. Every bush, every backwater, every dark space was now becoming dangerous and unsettling" (86). The pedagogical efforts of Florensky's parents, who shielded him from fairy tales, were apparently in vain: "However my parents protected me from mystical fauna, my mind quickly made its way to devils, to mermaids and house-dwellers, especially to fairies, geniuses, elves, etc. creatures" (126). The same applied to his studies of the natural sciences. The experiments that his father showed him to explain "the strict regularity of nature and the continuity of all its phenomena" convinced Florensky of exactly the opposite:

> That which is called the laws of nature has always seemed to me to be a temporary facade. [...] It was even more clear to me that the matter is not exhausted by the physical explanation, that there are mysterious forces or, more precisely, mysterious beings producing [the phenomena of nature], that these spirits are terrible spirits, with whom it is risky to communicate, who are dangerous to annoy and who [only cover themselves] with the guise of physical comprehensibility [...]. Spirits impersonate mechanics, but only for the time being, that was my formula (132).

His entire further scientific training was imbued at first with an underlying distrust and then with a subconscious hatred of science. Although his positivist father's favorite principle was "the axiom of the relativity of all knowledge" (125; more on this below), he allegedly failed to instill it in his son. Instead, "scientific dogmatism, the catechism of the scientific worldview" was established: "The concepts were introduced into [my] soul, which were alien to it, hostile to its nature, and, while choking it, at the same time they were transformed into something foreign, I think, to my father's intentions. [...] The facts and fictions of science were far less natural to me than the mystical fauna of fairy tales" (125). Thus, Florensky actually "loathed mechanics since childhood, never wanted and could not master its fundamental principles," and although he knew the laws of motion laid out in Newton's *Principia* by heart, he "neither understood nor wanted to understand them, for they were pushed out of my mind. My mind bounced off them" (140).

> Of course, verbally, I knew the unsophisticated mechanisms of Renaissance mechanics and could reason in front of others with impeccable mechanical orthodoxy. I knew how to formulate the principles of Lagrange and D'Alembert. But I confess that I never understood them, just as I do not understand them now. Under the protective cloak of pleasant scientific concepts, other concepts lived in me, not fully expressed to this day (148).

The same was true of the other "holy fathers" of modern science and philosophy. Well acquainted with the writings of Laplace, Lyell, Darwin, and Haeckel, he had "an acute hatred of evolutionism, of the infinite extension of astronomical spaces and geological times, of that invasion of a bad infinity" (112–113), while the separation of noumena and phenomena stipulated in Immanuel

Kant's critical philosophy, "even when I had not yet been aware that any of these terms existed: 'Kantian,' 'separation,' 'noumena,' 'phenomena,' was always rejected by my whole being" (117). Despite the fact that on the surface the discovery of the laws of nature seemed to him the main purpose in life, subconsciously he was only interested in exceptions that disproved their universal character: "Laws were my enemy; having learned about any law of nature, only then was I soothed from the painful anxiety of mind, a feeling of constraint and dreary sadness, when the exception to this law was found as well" (139). This attitude extended even to the laws of logic — the very core of scientific rationality:

> I willingly accepted all explanations of reality, the most rational ones, and absorbed them; but in my soul I reserved to myself the right to think the contrary, having quickly discerned a pragmatic [...] utility of rational explanations, as well as their arbitrariness, conventionality, and emptiness. I quickly learned to live with two minds: on the surface with the mind of adults, accepting with ease the laws of logic, and in the depths with my own, childlike mind [...] (131).

The subsequent crisis, according to Florensky, was precipitated by that very situation of a morbid "bifurcation of the sense of self" (185). Perceiving "physics and everything connected with it as someone else's clothes or some skin that has come off me, already lifeless," he experienced symptoms of mental malaise: "Deadly melancholy and utter despair possessed me"; "I was breathless. It was boring and dreary in the vast icy spaces encompassed by the same laws. I was crushed by the uniformity of the laws of nature, the same everywhere. A spleen developed... [...] For my whole life consisted in science" (187, 205). Meanwhile, he kept convincing himself that everything he felt was only the temporary result of fatigue from his energetic research activities and repressed his mystical inclinations (understood as "the connection with my childhood paradise") behind the "iron doors" of the "building of scientific rationalism" (150). In a particularly important passage, Florensky interpreted the ensuing intellectual crisis as an expression of the crisis of modernity *tout court*:

> Experience, unquestionably authentic and true, was by itself, and scientific thought, which in some layer of my soul I simply did not believe, was by itself. This was the characteristic malady of all modern thought, of all Renaissance thought; now, in hindsight, I can define it as a disjunction of humanity and scientificity. Inhuman scientific thought, on the one hand, and thoughtless humanity on the other. The scientific abstraction dances with triumphant satisfaction of death on the bones of the man whom it destroyed, and the human spirit hiding in the corners. The whole of modernity suffered from this very bifurcation [...]. In me, these two elements collided with a unique force, because Renaissance science was not an external appendage or plumage, but a second nature, and I understood its true meaning not because I learned it from someone, but directly, as my own desires. But this understanding was counteracted by an equally powerful experience, one that radically negated Renaissance ideas. This is why it was in me, when the Renaissance tendency was accelerated and brought to its final strain, that all these ideas exploded. I was raised and grew up as quite a man of the modern age, and therefore I felt myself to be the limit and the end of the modern age; the last (certainly not chronologically) man of modernity and therefore the first man of the coming Middle Ages (167–168).

In the end, he managed to "throw off the hateful yoke" (205) of the scientific worldview, which in his imagination turned out to be an expression of a more general "rupture in world history" — the period of secular modernity seemed to be ending, giving way to what some in the early twentieth century called the new Middle Ages, associating it with the so-called "religious renaissance."[85] Writing at the turn of the 1920s, in the wake of the Bolshevik Revolution, Florensky was apparently still convinced that his own "[Christian] worldview, which emerged from the aforementioned explosion, in ten, twenty, thirty years would become self-evident, and people would come to it not on the basis of my thoughts, but all by themselves, just as they recently reached the conclusion that 'there is no God'" (168).

When one puts this autobiographical narrative within the context of his other writings, it appears that in his mind the crisis he experienced was the result of a struggle between "two experiences of the world — the universal human experience and the 'scientific,' that is, the Kantian experience."[86] This ideologically charged opposition, predicated on the racial juxtaposition between Aryans and Semites, will be discussed in the third chapter. In the remaining parts of this and in the second one, I will first try to reconstruct the intellectual context which seems to have formed the effective historical basis of Florensky's crisis, and then focus on the part of it which served as a resource for its resolution. Among other things, it will help to clarify the overall structure and particular details of his autobiography which I have purposely left without comment.

The Inhumanity of Science: Moral and Cognitive Elements

To all appearances, the source of the crisis experienced by Florensky did not lie in the melancholy induced by the uniformity of the laws of nature or in the "hypnosis from books and the people around that everything is explainable," as it has been interpreted retrospectively — and not only in his case. Beginning around the 1910s, there seems to have been a process of reevaluation of late-nineteenth-century experience, which included a sense of the completeness of science, "that all things worth knowing were [already] known."[87] As Florensky remarked, science seemed to be "almost a completed building":

> The range of fundamental concepts was already enclosed, possible corollaries from it were deduced or seemed to be deduced, the researcher faced tasks [...] promising no new horizons. As a reward for his work,

[85] Hagemeister, "Wiederverzauberung der Welt." Cf. Paul L. Gavriliuk, *Georges Florovsky and the Russian Religious Renaissance* (Oxford: Oxford University Press, 2014), 12–24.
[86] Pavel Florensky, *Sochineniya. Vol. 3(1)*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 2000), 61–62.
[87] Lawrence Badash, "The Completeness of Nineteenth-Century Science," *Isis* 63, no. 1 (1972): 49.

> the scientist could only expect for himself a quantitative expansion of knowledge, while what was required of him was either experimental or formal-analytical virtuosity, a virtue of old age — of both science and its workers (151).[88]

This view, based on the aforementioned notion of classical mechanics as the ideal of knowledge, most famously formulated by Pierre-Simon Laplace ("who held that a mind who knew the laws of mechanics could determine from the movements of all planets and atoms at one moment all their movements at every other moment in the past and future") seems to have been exceedingly common.[89] Later on, the historian Marc Bloch observed that the generations around the fin-de-siècle "have lived as if hypnotized by a very rigid image [...] of the sciences of the physical world," unanimously believing "that there could be no authentic knowledge that would not lead, by means of irrefutable demonstrations, to certainties expressed in the form of imperiously universal laws."[90] At the beginning of the twentieth century, however, many began to withdraw from the influence of this hypnotic image, seeing it as something tedious and stifling. One of the many examples of this view can be found in the poet Paul Claudel, who described the beliefs that he espoused before his conversion to Christianity in 1886 in the following way: "I believed that everything was subject to 'laws' and that this world was a hard chain of effects and causes that science would manage to unravel perfectly the day after tomorrow. All this seemed to me very sad and very boring."[91] In 1910, the philosopher Pavel Yushkevich, who left insightful observations on contemporary mental attitudes, formulated the sentiment behind this point of view:

> Positivism has become something superficial, cold, abstract, insultingly clear [...]. Positivism appeared as some huge multiplication table in which everything is known in advance. 'The world of positivism seems suffocating, confined, constricted. Everything is weighed, everything is measured, predetermined, everything is known, arch-known. Better total uncertainty than such total knowledge! Better the excitement and risk of faith, which brings with it surprises, but which also brings promises, than the prearranged, fatal, and unchangeable answer of knowledge!'[92]

[88] See the section titled "Senescence" in John L. Heilbron, "Fin-de-Siècle Physics," in *Science, Technology, and Society in the Time of Alfred Nobel*, eds. Carl Gustaf Bernhard, Elisabeth Crawford, and Per Sörbom (New York: Pergamon Press, 1982), 59–61. Cf. Anne Rasmussen, "Critique du progrès, 'crise de la science': débats et représentations du tournant du siècle," *Mil neuf cent. Revue d'histoire intellectuelle*, no. 14 (1996): 99ff.

[89] Frederick C. Beiser, *After Hegel: German Philosophy, 1840–1900* (Princeton and Oxford: Princeton University Press, 2014), 99.

[90] Marc Bloch, *Apologie pour l'histoire ou Métier de l'historien* (Paris: Librarie Armand Colin, 1952), 11.

[91] Paul Claudel, *Œuvres en prose* (Paris, Gallimard, 1989), 1009; cited in Rasmussen, "Critique du progrès," 91. Cf. Alfred North Whitehead's characterization of the fin de siècle: "in its last twenty years the century closed with one of the dullest stages of thought since the time of the First Crusade. It was an echo of the eighteenth century, lacking Voltaire and the reckless grace of the French aristocrats. The period was efficient, dull, and half-hearted (Alfred North Whitehead, *Science and the Modern World* (New York: Pelican Mentor Books, 1925), 103).

[92] Pavel Yushkevich, *Novye veyaniya (Ocherki sovremennykh religioznykh iskaniy)* (Sankt-Peterburg: "Obshchestvennaya pol'za," 1910), 89.

Before such a view took shape, however, there occurred another and arguably more fundamental intellectual shift — the disillusionment with the epistemic authority of science and its ability to grasp the truth that overtook many at the turn of the twentieth century, culminating in Ferdinand Brunetière's 1895 article and popular pronouncements of the bankruptcy of science. Florensky spoke about this as a core element of his crisis to his students at the Moscow Theological Academy, illustrating one of the lectures he gave in 1921 with an example from his own life: "I had a crisis — despair regarding the possibility of knowledge."[93] The same is evidenced by his autobiography, where, along with the fragments quoted above, he specified that his "dying was rather intellectual. I was suffocating from a lack of truth. In all human knowledge, there was not one reliable point, while truth and the meaning of life were for me [...] identical. [...] 'Truth is unattainable' and 'it is impossible to live without truth' — these two equally strong convictions tore at my soul and plunged me into mental agony. Deadly anguish and utter despair consumed me" (187–188). That is to say, the problem apparently did not lie in "the vast icy spaces encompassed by the same laws," after all. But where could this other "mental agony," connected to the lack of truth, come from?

Along with his father, Florensky regularly browsed the *Revue des Deux Mondes*, but it is unclear whether he paid any attention to Brunetière's programmatic article. Though he likely became acquainted with the French critic's work later on (see below), other writings seem to have played a key role in his case: Leo Tolstoy's *Confession* (*Ispoved'*, 1884) and Edward Carpenter's *Modern Science: A Criticism* (1885), an abridged Russian translation of which, made by Tolstoy's son Alexander and prefaced by the Count himself, was published in 1898. The following year, as part of a scientific-philosophical circle organized by him and his gymnasium classmates, Florensky wrote a report on "Carpenter's and Tolstoy's critique of the scientific worldview" (187). Although no record of this report has survived, its contents can be plausibly reconstructed: their leitmotif might have been precisely the "disjunction of humanity and scientificity" that he later considered to be "a characteristic malaise of all modern thought."

Confession was one of the most renowned contemporary autobiographical works describing an existential and spiritual crisis, and it clearly served as the primary model for Florensky's reflections on his own predicament. Moreover, it offered a forceful moral critique of science, which Tolstoy, following Jean-Jacques Rousseau's *Discourse on the Sciences and the Arts* (*Discours sur les sciences et les arts*, 1750), was inclined to regard as a product of idle and ethically harmful speculations of rich fools.[94] While recognizing the value of scientific knowledge in investigating

[93] Florensky, *Sochineniya. Vol. 3(2)*, 474, note 3.

[94] On Tolstoy's love for Rousseau, whose collected works he read from cover to cover, see Hugh McLean, *In Quest of Tolstoy* (Boston: Academic Studies Press, 2017), 143–144. For a more detailed discussion of Tolstoy's reflections on the import of science, see Michael Gordin, "Tolstoy Sees Foolishness, and Writes: From *On Life* to *Fruits of*

natural phenomena, he concluded that it was incapable both of understanding humanity properly and of providing satisfactory answers to the deeper meaning and purpose of human existence, which only faith could offer. His course of reasoning may be summarized by the following passages from *Confession*:

> Rational knowledge led me to the conclusion that life is meaningless; my life came to a halt, and I wanted to do away with myself. As I looked around at people, I saw that they were living, and I was convinced that they knew the meaning of life. Then I turned and looked at myself; as long as I knew the meaning of life, I lived. As it was with others, so it was with me: faith provided me with the meaning of life and the possibility of living. [...] Recognizing the errors of rational knowledge helped me to free myself from the temptations of idle reflection. The conviction that a knowledge of the truth can be found only in life led me to doubt that my own life was as it should be; and the one thing that saved me was that I was able to tear myself from my isolation, look at the true life of the simple working people, and realize that this alone is the true life.[95]

In his lectures from the 1920s, Florensky called Tolstoy's book "the best work of an apologetic character, which [...] acts like an explosion of a huge, heavy shell, and immediately destroys a complacent attitude toward life, a dilemma appears: either to find the Truth or to die of thirst for it [...]."[96] That in the last years of gymnasium he had indeed passed through a stage of strong infatuation with Tolstoism is evidenced by an 1899 draft of a letter addressed to the Count (but probably left unsent), in which the desperate young man asked for advice on how an intellectual should live in accordance with his teachings: "How does one satisfy one's intellectual needs? Where can one obtain books, journals, if one is not permitted to use money, and physical labour only brings in enough to eat? Should one allow time for intellectual work (self-education)?"[97]

Florensky was, of course, far from alone in being influenced by Tolstoy's criticism of science, which was largely animated by the antagonism towards amoral social Darwinism and positivist "religion of progress," based on the association between moral, intellectual, and material progress that had been in place since Nicolas de Condorcet's *Sketch for a Historical Picture of the Progress of the Human Mind (Esquisse d'un tableau historique des progrès de l'esprit humain,* 1795).[98] Acquaintance with Tolstoy's reflections may be discerned, for instance, in the opinion of Anatole France (his big admirer) that "science cannot aspire to govern us, because it has no morality of its own, and the principles of action that could be derived from it would be immoral. It is inhuman [...]."[99] Or in the same Brunetière, who (as a professional literary scholar) undoubtedly knew French

Enlightenment, and Back Again," in *A Critical Guide to Tolstoy's* On Life*: Interpretative Essays*, ed. Inessa Medzhibovskaya (DeLand: Tolstoy Studies Journal, 2019), 105–138.

[95] Leo Tolstoy, *Confession* [1884], trans. David Patterson (New York and London: W. W. Norton and Company, 1983), 60, 71.

[96] Florensky, *Sochineniya. Vol. 3(2)*, 475.

[97] Cited in Pyman, *Pavel Florensky*, 23.

[98] McLean, *In Quest of Tolstoy*, 159–180; cf. Rasmussen, "Critique du progrès," 89ff.

[99] Anatole France, *La vie littéraire* (Paris: Calmann Lèvy, 1892), 44.

translations of Tolstoy's works, and whose argument that science was unable "to pose properly the only questions that matter" seems to be a direct echo of Tolstoy's *On Life* (*O zhizni*, 1888), where he observed that the "tendency of contemporary scientists to search for uniformity in laws and regularity of phenomena [...] meant that they defined 'science' in such a way as to exclude all the phenomena that not only made humanity unique, but were in fact the only questions worth posing."[100] In Germany, on the other hand, it may be found in an anonymous 1898 article by the industrialist and future Weimar statesman Walter Rathenau, a rejoinder in the German *Ignorabimus-Streit*,[101] and in the late sociologist Max Weber, who was learning Russian and planned to write a book on Tolstoy.[102] We still require a more detailed investigation of the reception of the Count's ideas.

The criticism of the moral inhumanity of scientific knowledge was not, however, entirely self-sufficient. Much of its conceptual underpinnings, as well as a part of its persuasiveness, was predicated on another kind of criticism, exemplified by the Victorian essayist Edward Carpenter's 1885 pamphlet on modern science. Here it should be stressed once again that the Russian translation of this work, known by Florensky, was abridged by about half, with many of the caveats and qualifications removed, making the translation even more militaristic than the original.[103] Instead of pointing out the uselessness of natural science for understanding human life (which was emphasized once again in Tolstoy's preface[104]), Carpenter targeted its very cognitive foundations: "Science has failed because it has tried to base the whole inquiry into nature exclusively on the ground of reason, [...] [thereby] undertaking an impossible task; for to establish and firmly justify a reasoned representation of the universe is simply impossible. Such a representation cannot exist."[105] To elaborate his argument, he turned to the process of concept formation, taking the biological term "species" as an example:

[100] Gordin, "Tolstoy Sees Foolishness," 123. Reacting to the "bankruptcy" debate, the French philosopher George Fonsegrive "gave Tolstoy the honor of being the initiator of this [anti-scientific] movement" (Harry W. Paul, "The Debate over the Bankruptcy of Science in 1895," *French Historical Studies* 5, no. 3 (1968): 301). It is noteworthy that the reception of Brunetière's polemic in the Russian Empire also focused on the problem of morality, cf. Pavel Sokolov, *Bankrotstvo naturalisticheskogo mirosozertsaniya i sovremennyy nravstvenno-religioznyy krizis na Zapade* (Kharkiv: Tipografiya Gubernskogo Pravleniya, 1897).

[101] Frederick C. Beiser, *After Hegel: German Philosophy, 1840–1900* (Princeton and Oxford: Princeton University Press, 2014), 123–128.

[102] Guy Oakes, "The Antinomy of Values: Weber, Tolstoy and the Limits of Scientific Rationality," *Journal of Classical Sociology* 1, no. 2 (2001): 195–211. It seems that the similarity of Weber's and Rathenau's views on the detrimental effects of modern science may be attributed to Tolstoy's influence, cf. Fritz Stern, *Einstein's German World* (Princeton and Oxford: Princeton University Press, 1999), 173.

[103] Cf. Edward Carpenter, *Modern Science: A Criticism* (London: John Haywood, 1885) and Eduard Karpenter, *"Sovremennaya nauka": Kriticheskiy ocherk*, trans. A. L. Tolstoy (Moskva: Izdanie knigoprodavtsa M. V. Klyukina, 1898).

[104] McLean, *In Quest of Tolstoy*, 163–165.

[105] Karpenter, *"Sovremennaya nauka,"* 5.

> I see a dog for the first time; it is a foxhound. Then I see a second foxhound, then a third, and a fourth. Presently I form from these few instances a general conception of "dog." But after a time I see a greyhound and a terrier and a mastiff, and my old conception is destroyed. A new one has to be formed, and then a new one and a new one. Now I overlook the whole race of civilised dogs, and am satisfied with my wisdom; but presently I come upon some wild dogs, and study the habits of the wolf and the fox. Geology turns me up some links, and my conception of "dog" melts away, like a lump of ice into the surrounding water — my generalization loses its outlines. [...] The word "species" cannot be said to answer to any fact in nature. It is a fiction arising out of our own ignorance; no one ever pictured to himself a species, except as it were by shutting his eyes — or could even, except in the most arbitrary manner, define a species. Ignorance gave rise to the word, and only by a kind of wilful ignorance can science retain the word. As soon as observation extends its gaze backward over any lapse of time, or laterally over any extent of space, the fiction disappears or is superseded by another.[106]

The same, according to Carpenter, applied to virtually all the other scientific fields. Trained in mathematics at Cambridge and having been a teacher of astronomy, he took most of his examples from the latter discipline, but did not at all limit himself to it: the elliptical paths of celestial bodies discovered by Kepler, Newton's laws of motion along with the law of universal gravitation (which "reason refuses to understand"), Boyle-Mariott's law of compressibility of gases, physical atomism and luminiferous aether, even Darwin's natural selection and the economic theory of value — all of these were not explanations of the true nature of things, as they were often taken to be, but only hypothetical fictions convenient for mathematical calculations, "the elevation to the field of monstrous generalizations and abstractions of a partial understanding of phenomena, derived from a limited field of observation."[107] According to Florensky's memoirs, he was especially struck by Carpenter's remark that "physicists themselves do not know what temperature is and how to define it logically," which made him "ponder the subject intensely" and try to "come up with something in that direction," evidently to no avail (158–159, 185).[108] In discussing the concept of temperature, Carpenter aimed to hammer home the point that in its "search for precision, science has had to constantly discard elements of humanity and individuality in phenomena, hoping to find outside them a haven where [...] something absolute and unchanging can be found":

> The result of all these [attempts to define what temperature is] has been that, notwithstanding the talk about energy and atoms, science must sadly confess that it still cannot produce the real meaning of the word "temperature"; the unknown it seeks remains unknown; its independent existence somehow still eludes us. In trying to arrive at something independent of man's very sensations, science has come by a roundabout way to absurdity. When a man says "cold," his judgment, in spite of all its lamentable uncertainty, has some meaning — the man describes what he feels [...]; but when science, disregarding all that is human and trying to utter something absolute, declares that the temperature is thirty degrees, it condemns itself to a judgment that may be formally correct, but to which it does not and can never give any meaning.[109]

[106] Ibid., 6–7.
[107] Ibid., 34.
[108] For a history of attempts to bridge the gap between the measurement of temperature and its precise theoretical understanding, which succeeded only in the late nineteenth century, see Hasok Chang, *Inventing Temperature: Measurement and Scientific Progress* (New York: Oxford University Press, 2004), 159ff.
[109] Ibid., 46–47.

Herein lay the main "dilemma of science and all human knowledge," according to Carpenter. The human mind is capable of operating only with a few properties of real perceptible objects, which it abstracts and generalizes in the process of forming its concepts; as generalization takes over more and more objects, the level of abstraction increases, and we move farther and farther away from concrete reality: "as we continue to follow the process characteristic of this knowledge, we necessarily leave the solid ground of reality and pass into the airy realms of abstractions, which, the further we go, become more and more elusive and insubstantial, until they finally turn into complete phantoms." Scientific concepts and laws are just that — they are "phantoms" and "ghostly hulks of nature," "the last abstractions of our sensory experience," which professional scientists — "intentionally or unconsciously" — try to endow with objective reality independent of man.[110]

This was the cognitive inhumanity of science, which logically entailed moral inhumanity. In the final part of his essay (excluded from the Russian translation) Carpenter called for the rejection of the obsolete approach of modern science, "which wakes the mind to pursue the shadows of things, but dulls the senses to the reality of them — which causes a man to try to bottle the pure atmosphere of heaven and then shut himself in a gas-reeking ill-ventilated laboratory; or allows him to vivisect a dog, unconscious that he is blaspheming the pure and holy relation between man and the animals."[111] The days of the anti-anthropocentric "Galilean paradigm" with its ideal of the natural scientist who was "professionally deaf to sounds and insensitive to tastes and odors,"[112] morbidly repressing his subjective humanity in pursuit of the specter of scientific objectivity, were over.[113] The true "man of science," according to Carpenter, "should be lynx-eyed as an Indian, keen scented as a hound — with all senses and feelings trained by constant use and a pure and healthy life in close contact with Nature, and with a heart beating in sympathy with every creature."[114] As we will see in the following chapters, Florensky fully accepted both the diagnosis and, later on, the solution proposed by the English thinker, but in so doing he drew from them conclusions that the latter had hardly contemplated.

[110] Ibid., 30.
[111] Carpenter, *Modern Science: A Criticism*, 64.
[112] Carlo Ginzburg, "Clues: Roots of an Evidential Paradigm," in Idem, *Clues, Myths, and the Historical Method*, trans. John and Anne C. Tedeschi (Baltimore and London: The Johns Hopkins University Press, 2013), 198.
[113] Here Carpenter was reacting to the ideal of scientific detachment and self-abnegation (up to complete self-annihilation) that was a prominent theme of reflection in Victorian culture, see George Levine, *Dying to Know: Scientific Epistemology and Narrative in Victorian England* (Chicago and London: University of Chicago Press, 2002). Lorraine Daston and Peter Galison famously identified it with the novel nineteenth-century epistemic virtue of "mechanical objectivity," see Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 115–190, 203–204ff.
[114] Carpenter, *Modern Science: A Criticism*, 64.

Descriptionism and Its Appropriation

The significance of Carpenter's essay should not be exaggerated, however. Notwithstanding its pronounced anti-scientific pathos (especially evocative, again, in the Russian translation), his argumentation was not at all original in philosophical terms. One of his main sources of inspiration seems to have been John Stallo's book *The Concepts and Theories in Modern Physics* (1881), published a few years earlier, which radically and at the same time convincingly criticized the ontological claims of modern physical science.[115] Stallo's particular target was "the general principles of the atomo-mechanical theory, [...] the basis of modern physics," which he regarded as "substantially identical with the cardinal doctrines of ontological metaphysics."[116] Carpenter essentially borrowed his mode of argument and extended it to all other domains of scientific knowledge — thus engaging in the sort of "scientific pyrrhonism" of which Stallo himself had been accused.[117] I will address the nature of this argument in the next section.

For now, it should be noted that Stallo's book remained relatively obscure until it was noticed by Ernst Mach, perhaps the most influential philosopher of science of the second half of the nineteenth century, whose work Florensky had of course also read (although his radical empiricism and phenomenalism must have initially impressed him somewhat less than the combination of Tolstoy and Carpenter; 187). Thanks to Mach, who promoted Stallo's translation into German in 1901, the latter assumed a place of honor in the pantheon of a new trend in fin-de-siècle scientific epistemology that historian of science John Heilbron aptly called "descriptionism."[118] This pantheon was represented in the title of a popular book by the German philosopher Hans Kleinpeter, a translator of Stallo: *The Theory of Knowledge of Contemporary Natural Science: Based on the Views of Mach, Stallo, Clifford, Kirchhoff, Hertz, Pearson, and Ostwald* (*Die Erkenntnistheorie der Naturforschung der Gegenwart: unter Zugrundelegung der Anschauungen von Mach, Stallo, Clifford, Kirchhoff, Hertz, Pearson und Ostwald*, 1905).[119] The views of this motley crew of philosophers and physicists (which on the French side included figures like Emile Boutroux, his brother-in-law

[115] Bruce Clarke, *Energy Forms: Allegory and Science in the Era of Classical Thermodynamics* (Ann Arbor: The University of Michigan Press, 2001), 200–201. Carpenter was careful to deny this influence, stating in a footnote that "I have only now, just before going to the press, met with this book — which I am glad to see covers and corroborates many of the conclusions of the present essay; though the author's main line of thought is, I believe, considerably different from mine" (Carpenter, *Modern Science: A Criticism*, 46).

[116] John Bernhard Stallo, *The Concepts and Theories in Modern Physics* (New York: D. Appleton and Company, 1884), vi. Cf. John V. Strong, "The Erkenntnistheoretiker's Dilemma: J. B. Stallo's Attack on Atomism in His Concepts and Theories of Modern Physics (1881)," in *Proceedings of the 1974 Biennial Meeting Philosophy of Science Association*, eds. R. S. Cohen, C. A. Hooker, A. C. Michalos, and J. W. Evra (Dordrecht: D. Reidel Publishing Company, 1976), 105–123.

[117] Stallo, *The Concepts and Theories in Modern Physics*, ii.

[118] Heilbron, "Fin-de-Siècle Physics."; Richard Staley, "The Fin de Siècle Thesis," *Berichte zur Wissenschaftsgeschichte* 31 (2008): 313–319.

[119] Translated into Russian as Gans Kleynpeter, *Teoriya poznaniya sovremennogo estestvoznaniya na osnove vozzreniy Makha, Stallo, Klifforda, Kirkhgofa, Gerttsa, Pirsona i Ostval'da*, trans. R. Lemberk (Sankt-Peterburg: Shipovnik, 1910).

Henri Poincaré, and Pierre Duhem[120]) were far from homogeneous and contained significant differences.[121] But almost all of these figures — except for the physical chemist Wilhelm Ostwald, who turned the research program of "energetics" into a full-blown secular religion[122] — espoused the notion that science is incapable and, if properly understood, should not concern itself with the truth. From their point of view, scientific objectivity was "not only distinct from truth," it was "a retreat from truth."[123] In this framework, the traditional task of explaining the real structure of the world was replaced by that of merely describing it (hence "descriptionism") and organizing the available empirical data in the most economical and convenient way. The idea of the inaccessibility of truth was repeated in the descriptionist literature ad nauseam,[124] and so it is not difficult to imagine that in someone like the young Florensky, raised on the old notion of the epistemological authority of science, it could produce the mind-boggling and disorienting impression cited above: suddenly, in "all human knowledge, there was not one reliable point."

Heilbron suggested that the historical explanation for this wave of "professions of intellectual impotence" and "constant sermonizing in favor of descriptionism" should not be sought within physics itself: although there were some important theoretical disagreements, professional physicists hardly experienced any severe crisis, and normal scientific work hardly suffered from philosophical speculation about the absence of truth.[125] On his account, one should rather look at the more general cultural and intellectual climate of the turn of the century, which brimmed with anxiety and pessimism concerning the negative effects of progress, biological and spiritual degeneration, and the responsibility of modern science for all of the above.[126] From this perspective, descriptionist rhetoric represented an attempt by professional scientists to adjust the image and claims of their craft so as to escape the onslaught of cultural criticism and maintain their position in society — and this "tactic had some success."[127] On the other hand, however, it quite predictably backfired: "With a slight change of emphasis, descriptionism could be turned against

[120] Heilbron, "Fin-de-Siècle Physics," 53–55.
[121] These differences were discussed in detail by Abel Rey, a positivist philosopher and a "first historian of descriptionism" (Ibid., 55), see Abel Rey, *La théorie de la physique chez les physiciens contemporains* (Paris: Félix Alcan, 1907). Another useful overview may be found, for example, in Ernst Cassirer, *The Problem of Knowledge: Philosophy, Science, and History since Hegel*, trans. William H. Woglom and Charles W. Hendel (New Haven: Yale University Press, 1950), 81–117.
[122] See Casper Hakfoort, "Science Deified: Wilhelm Ostwald's Energeticist World-View and the History of Scientism," *Annals of Science* 49, no. 6 (1992): 525–544.
[123] Lorraine Daston, "Objectivity versus Truth," *Daimon: Revista Internacional de Filosofía* 24 (2001): 21.
[124] Heilbron, "Fin-de-Siècle Physics," 52.
[125] Ibid., 56–57. Cf. Suman Seth, "Crisis and the Construction of Modern Theoretical Physics," *The British Journal for the History of Science* 40, no. 1 (2007), 25–51; Helge Kragh, "The 'New Physics'," in *The Fin-de-Siècle World*, ed. Michael Saler (London: Routledge, 2014), 441ff.
[126] Heilbron, "Fin-de-Siècle Physics," 57–61. On degeneration, see Chapter 3.
[127] Ibid., 59; Staley, "The Fin de Siècle Thesis." Cf. Lorraine Daston, "When Science Went Modern," *The Hedgehog Review* 18, no. 3 (2016), https://hedgehogreview.com/issues/the-cultural-contradictions-of-modern-science/articles/when-science-went-modern.

science by the very interests it was intended to placate. [...] From descriptionism to distrust or depreciation of reason is a small step."[128] Among European contemporaries, this fact was dealt with most thoroughly by the Italian philosopher Antonio Aliotta, who maintained that it was precisely the new descriptionist epistemology that opened the gates to modernist idealism, mysticism, and irrationalism of all sorts. The following passage, which opens his book on *The Idealistic Reaction Against Science* (*La reazione idealistica contro la scienza*, 1912), put this point quite vividly:

> Art, moral life, and religious belief were called upon to fill the void left by scientific knowledge; and the reaction went so far as to extend to the human intellect as a whole a distrust which should have been confined to scientific naturalism and its claim to be able to comprehend the infinite riches of mind and nature within a few mechanical formulas. The ruined shrines of the Goddess of Reason, who for so long had tyrannised over the mind, were invaded by the rebel forces of feeling, will, imagination, and every obscure and primitive instinct: thus it came about that Schopenhauer achieved a posthumous triumph over his hated rival Hegel […]. Once the blind power of impulse was exalted and the sure guidance of the intellect abandoned, the door was opened to every kind of arbitrary speculation […] [which] masqueraded under the fine-sounding name of idealism. O unhappy Idealism, how many intellectual follies have been committed in thy name! Theosophy, the speculations of the Kabala, occultism, magic, spiritualism, all the mystic ravings of the Neo-Platonists and Neo-Pythagoreans, the most antiquated of theories, debris of every kind, heaped haphazard on the foundation of the speculations of the ages — all these have returned to favour in defiance of the dictates of logic and common sense.[129]

In the Russian Empire, where descriptionist epistemology in the variant of "empiriocriticism" of Mach and Richard Avenarius was especially popular among Marxist philosophers (while professional scientists were comparatively reluctant to embrace it),[130] the same fact was duly noted by Vladimir Lenin in his infamous *Materialism and Empiriocriticism. Critical Comments on a Reactionary Philosophy* (*Materializm i empiriokrititsizm. Kriticheskie zametki ob odnoy reaktsionnoy filosofii*, 1909). In a chapter on "the crisis of modern physics," polemicizing with Abel Rey's *Theory of Physics* (1907), Lenin stated that

> it is quite clear what reactionary elements have taken advantage of and aggravated this crisis. Rey explicitly states in the preface to his work that "the fideist and anti-intellectualist movement of the last years of the nineteenth century" is seeking "to base itself on the general spirit of modern physics" (p. ii). In France, those who put faith above reason are called fideists (from the Latin fides, faith). Anti-intellectualism is a doctrine that denies the rights or claims of reason. Hence, in its philosophical aspect, the essence of the "crisis in modern physics" is that the old physics regarded its theories as "real knowledge of the material world", i.e.,

[128] Ibid., 66.

[129] Antonio Aliotta, *The Idealistic Reaction Against Science*, trans. Agnes McCaskill (London: Macmillan and Co., 1914), xv–xvi. Florensky's case perfectly illustrates Aliotta's point, see Chapter 2. Unfortunately, a discussion of Schopenhauer's "triumph," which largely inspired Russian religious-philosophical tradition, is beyond the scope of this study.

[130] Daniela Steila, "Natural Sciences and the Radical Intelligentsia in the Late Nineteenth and Early Twentieth Centuries" in *The Palgrave Handbook of Russian Thought*, eds. Marina F. Bykova, Michael N. Forster, and Lina Steiner (Cham: Palgrave Macmillan, 2021), 179–199. See also Idem, *Nauka i revolyutsiya: Retseptsiya empiriokrititsizma v russkoy kul'ture (1877-1910 gg.)*, trans. Ol'ga Popova (Moskva: Akademicheskiy proekt, 2013).

> a reflection of objective reality. The new trend in physics regards theories only as symbols, signs, and marks for practice, i.e., it denies the existence of an objective reality independent of our mind and reflected by it.[131]

No matter how one evaluates Lenin's foray into the domain of philosophy of science, it appears that in this case his rhetorical venom was dispersed advisedly. At the beginning of the twentieth century, numerous religious intellectuals enthusiastically embraced descriptionist epistemology and appropriated it for their own ideological needs. On the part of the professional scientists, their epitome was Pierre Duhem, the devout Catholic who promoted "the physics of the believer" (to Lenin's indignation)[132] and maintained that the secular "teaching that claims to establish the irreducible antagonism between the scientific mind and the Christian mind is the most colossal, boldest lie that has ever attempted to dupe the human race."[133] Among the Russian-language publications written from this point of view, a prime example is a series of articles by the Orthodox philosopher and intellectual historian Vladimir Kozhevnikov entitled "The Prevalence of Scientific Doubt in Modern Unbelief" (*Preobladanie nauchnogo somneniya v sovremennom neverii*, 1911–1912), in which he extolled the "revolution, if not anarchy" that has engulfed modern science, "causing it to be more humble than ever in its assessment of its powers and pretensions."[134] Referring to epistemological discussions that stretched from Emil Du Bois-Reymond's address *On the Limits of Natural Knowledge* (*Über die Grenzen des Naturerkennens*, 1872) to Henri Poincaré's *Science and Hypothesis* (*La Science et l'Hypothèse*, 1902), Kozhevnikov wrote:

> This instance of the cultural life of mankind, which is presented by popular and agitational popular-scientific literature as the supreme, categorical legislator of all modern enlightenment, itself publicly rejects the arrogance of its tactless panegyrists. Now there are lively discussions about reassessing "the value of science, scientific truth, science and hypothesis, about the limits of natural science," "about the authority and legitimacy of science," "about the bankruptcy of science," even "about the justification of science"! Not long ago not only was a whole body of literature on such subjects impossible; but the very initiation of their discussion would have been considered an insult to the majesty of science. [...] And the result of all these reflections is an awareness of the inadequacy of science, of the limitedness and arbitrariness of the knowledge available to it![135]

A similar point was made a year earlier by Sergei Glagolev, one of the most prolific contemporary Russian writers on the relationship between science and religion, who had been Florensky's teacher

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131 Vladimir Lenin, *Materialism and Empiriocriticism. Critical Comments on a Reactionary Philosophy* (Moscow: Progress Publishers, 1948), 237; cf. Rey, *La théorie de la physique*, ii.
132 Lenin, *Materialism and Empiriocriticism*, 291.
133 Pierre Duhem, *Essays in the History and Philosophy of Science*, trans. Roger Ariew and Peter Barker (Indianapolis and Cambridge: Hackett Publishing Company, 1996), 159. Cf. Harry W. Paul, *The Edge of Contingency: French Catholic Reaction to Scientific Change from Darwin to Duhem* (Gainesville: University Presses of Florida, 1979), 137–178.
134 Vladimir Kozhevnikov, "Preobladanie nauchnogo somneniya v sovremennom neverii," *Bogoslovskiy vestnik* 1, no. 1 (1912): 124. This series of articles was published as *Modern Scientific Unbelief, Its Growth, Influence, and the Change in Attitudes toward It* (*Sovremennoe nauchnoe neverie, ego rost, vliyanie i peremena otnosheniy k nemu*, 1912), but I could not access this edition at the time of writing.
135 Ibid., 124–125.

at the Moscow Theological Academy: "The state in which the physical and mathematical sciences now find themselves is often described by the word 'anarchy.' Old theories have fallen, and new ones have not yet been worked out and formulated. [...] Now is a favorable time to study nature in the spirit of faith. Shall we take advantage of this favorable time?"[136] Florensky answered his teacher's question in the affirmative, as he eventually came to embrace the understanding of science as a "symbolic description" of reality, which had been previously articulated, for example, by the aforementioned philosopher Pavel Yushkevich.[137] In 1918, reconstructing the history of this new descriptionist view of science, Florensky justly attributed a major role in its establishment to Ersnt Mach's pioneering *History and Root of the Principle of the Conservation of Energy* (*Die Geschichte und die Wurzel des Satzes von der Erhaltung der Arbeit*, 1872), in which Mach began to criticize the approach to the knowledge of nature that he later dubbed "mechanistic mythology" (*eine mechanische Mythologie*).[138]

> In 1872, Ernst Mach, then just beginning to venture into the realm of thought, defined physical theory as an abstract and generalized description of natural phenomena. From a historical and philosophical point of view, this event was neither great nor even significant. It gave philosophy neither new methods nor new thoughts, but socially, in the outlook of wide circles which formed the philosophical atmosphere also among the leading thinkers, the year 1872 may be considered a turning point: something snapped in the pompous structure of materialistic metaphysics, which had been omnipotently and intolerantly imposing its dictatorship over our hearts. And although, in the provinces of thought, even to this day one still meets a belated marauder, harping on about the good old days of the "scientific" worldview, it was then, precisely then, that this sham palace began to crumble.[139]

"The great edifice" (*le grand édifice*) of science imagined by the likes of Ernst Renan,[140] which only a short time ago seemed almost complete, turned out to be nothing more than a crumbling "sham palace" (*butaforskiy dvorets*).[141] In the autobiography, describing the decisive moment of his crisis,

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[136] Sergey Glagolev, "Novoe miroponimanie," *Bogoslovskiy vestnik* 1, no. 1 (1911): 41–42.

[137] Steila, *Nauka i revolyutsiya*, 283–284. In this sense, Florensky was far less original than he is sometimes reputed to have been, cf. Aleksandr Gorelov, "Kontseptsiya nauki kak simvolicheskogo opisaniya v filosofii P. A. Florenskogo" (PhD Diss., Moscow State University, 2008).

[138] Ernst Mach, *Die Mechanik in ihrer Entwicklung* (Leipzig, 1883), 436. Cited in Florensky, *Sochineniya. Vol. 3(1)*, 103. For the way this expression could have been interpreted in the context of the Aryan theory, see Chapter 3.

[139] Florensky, *Sochineniya. Vol. 3(1)*, 103.

[140] Ernest Renan, *L'avenir de la science: pensées de 1848* (Paris: Calmann Lèvy, 1890), 228.

[141] Florensky most likely borrowed this image from a 1904 article by the poet Valery Bryusov, who joined popular discussions of "the unknowable" stimulated by Brunetière: "Not so long ago, the world seemed to be a vast building of solid marble, to be examined and measured by man. [...] But someone dared to test the actual strength of the structure, and it turned out to be nothing more than a sham palace [*butaforskiy dvorets*]. The surrounding columns turned out to be canvas curtains, and the sky was a crudely painted backdrop behind which was darkness. For four centuries, starting with Descartes, European civilization had been moving forward in the same direction, thinking it was on solid ground. [...] Suddenly 'the unknowable' revealed itself all around us, in our very everyday life, in the words we all utter, in the actions we do every day, in the things we constantly use. When did we leave the solid ground? And was it ever under our feet?" (Valery Bryusov, *Sredi stikhov, 1894-1924: manifesty, stat'i, retsenzii* (Moskva: Sovetskiy pisatel', 1990), 116; cited in Olivier Kachler, *Poétiques de l'inconnaissable: Essai sur les symbolismes en France et en Russie* (Paris: Classiques Garnier, 2020), 69–72). On the problem of the unknowable, see Chapter 2. For the probable philosophical sources of this architectural metaphor, especially Immanuel Kant, see Daniel L. Purdy, *On the Ruins of Babel: Architectural Metaphor in German Thought* (Ithaca: Cornell University Press, 2011).

when, sitting on the mountainside near his home, Florensky came to the realization of the futility of scientific knowledge, he used the same architectural metaphor:

> In a single moment, the magnificent edifice of scientific thought crumbled to rubble, [...] and suddenly I discovered that its material was not precious stones, but splinters, cardboard, and plaster. When I rose from the slope on which I had been sitting, I had nothing to take even from the wreckage of the whole structure of scientific thought in which I had believed and at which I had labored tirelessly. Not only devastated but utterly disgusted, I fled from this rubble (186).

Psychologism: Criticism of Concepts and the Relativity of Knowledge

This brief exposition of descriptionism and its appropriation by religious intellectuals, a group which Florensky himself eventually joined, obviously begs the question: what compelled him to come to terms with this new view of science, which precluded access to truth, if his intellectual crisis was induced precisely by the idea that "Truth is unattainable"? Emphasizing the specifically intellectual nature of his predicament, Florensky sharply distinguished himself from Tolstoy (188), and therefore the problem could not be resolved simply by the recourse to "fideism" and "anti-intellectualism" which were embraced by the Count and resented by Lenin, among many others. To answer this question, it is necessary to clarify the intellectual roots of late nineteenth-century descriptionist epistemology (and hence, by extension, of the whole "crisis of modern physics") that, as far as I know, have not been adequately examined.[142]

What I refer to here is psychologism, a crucial trait of nineteenth-century intellectual life and "the hereditary malady, so to speak," not just "of all 'phenomenological physics'," [143] but arguably of the entire positivist tradition as well. As will be discussed below, the latter was the direct heir to the British empiricist philosophy of John Locke and David Hume, a key part of which was the new associationist psychology that became the dominant scientific paradigm in this discipline up until the beginning of the twentieth century, casting a long and still largely unexplored epistemological shadow on the whole preceding period.[144] It received vigorous development in nineteenth-century Germany thanks to the psychological school of Johann Friedrich Herbart,

[142] While John Heilbron tentatively remarked that some of elements of descriptionism "may be found in Kant and Comte, and in the instrumentalist physics of the late eighteenth century, to go back no further" (Heilbron, "Fin-de-Siècle Physics," 53), historian of science Theodore Porter has judiciously traced its genealogy all the way back to the Middle Ages, see Theodore M. Porter, "The Death of the Object: Fin de Siècle Philosophy of Physics," in *Modernist Impulses in the Human Sciences, 1870–1930*, ed. Dorothy Ross (Baltimore: Johns Hopkins University Press, 1994), 128–129). Others, to my knowledge, usually start with the late nineteenth century physicists themselves, cf. Hans-Jörg Rheinberger, *On Historicizing Epistemology: An Essay* (Stanford: Stanford University Press, 2010), 5–17.

[143] Cassirer, *The Problem of Knowledge*, 101.

[144] In 1968, the philosopher Milič Čapek could still say that there is "no need to point out the tremendous and lasting impact of psychological associationism on our whole cultural life" (Milič Čapek, "Ernst Mach's Biological Theory of Knowledge," *Synthese* 18, no. 2/3 (1968): 172).

informing the inception of Gustav Theodor Fechner's psychophysics and Wilhelm Wundt's experimental psychology; in England, its most prominent proponents were Alexander Bain and John Stuart Mill; in France — Théodule Ribot; in the Russian Empire — for instance, Matvey Troitsky, the founder of the Moscow Psychological Society.[145] The extent of the influence of empiricist philosophy and psychologistic assumptions inherent to it, which stipulated that all products of the human mind must be viewed through the lens of associationist psychology (the latter acting, per Herbert Spencer, as "the foundation of every metascientific discourse"),[146] may be most readily appreciated by its relationship with philosophy. One only has to look at the titles of major philosophical journals of the late nineteenth and early twentieth centuries: the English *Mind* (1871), the French *Revue philosophique* (1876), the German *Philosophische Studien* (1881), the Russian *Voprosy filosofii i psikhologii* (1889), the American *Journal of Philosophy, Psychology, and Scientific Methods* (1904) — all of them were founded by psychologists and adherents of psychologism.[147] But contrary to the impression one gets from the philosophical literature on the subject,[148] its influence was not limited to philosophy alone: it was part of the common sense of a whole range of disciplines, being perhaps especially closely associated with linguistics.[149] Although a thorough investigation of this topic is far beyond the scope of my present work, some of its facets will be discussed in more detail in the next chapter. Here I shall confine myself to pointing out several historical circumstances that characterized the intellectual culture of the fin de siècle and accompanied the popularization of descriptionist epistemology, but whose connection with psychologism has not yet been explicated.

To begin with, the spread of descriptionism was paralleled by what the cultural historian Mikhail Yampolsky has recently shown to be a widespread aversion to abstract concepts and "big ideas," which in turn encouraged attention to formal elements in modernist art and art theory.[150] As a prime example of this tendency, he referred to the Austrian poet Hugo von Hofmannsthal,

[145] The best general overview I know of is contained in Ilona Svetlikova, *Istoki russkogo formalizma: Traditsiya psikhologizma i formal'naya shkola* (Moskva: Novoe Literaturnoe Obozrenie, 2005), 15–40. On the history of associationism, see Chapter 2.

[146] Fernando Vidal, "Psychology and Classifications of the Sciences," *Republics of Letters: A Journal for the Study of Knowledge, Politics, and the Arts* 3, no. 3 (2014): 15.

[147] Svetlikova, *Istoki russkogo formalizma*, 32–33.

[148] The standard work on philosophical psychologism is Martin Kusch, *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (London and New York: Routledge, 1995). Cf. Idem, "Psychologism," in *The Stanford Encyclopedia of Philosophy (Spring 2020 Edition)*, ed. Edward N. Zalta, https://plato.stanford.edu/entries/psychologism.

[149] For a brief overview, see Ryan D. Tweney, "Linguistics and Psychology in Nineteenth-Century German Science," in *Contributions to A History Of Developmental Psychology: International William T. Preyer Symposium*, eds. Georg Eckardt, Wolfgang G. Bringmann, and Lothar Sprung (Berlin et al.: Mouton, 1985), 283–299. This is probably the reason why the studies on the influence of psychological associationism have concentrated on literary theory and criticism, see Svetlikova, *Istoki russkogo formalizma*; Cairns Craig, *Associationism and the Literary Imagination: From the Phantasmal Chaos* (Edinburgh: Edinburgh University Press, 2007).

[150] Mikhail Yampolsky, *Lovushka dlya l'va: Modernistskaya forma kak sposob myshleniya bez ponyatiy i "bol'shikh idey"* (Sankt-Peterburg.: Seans, 2020).

another figure who had experienced an intellectual crisis at the turn of the century and described it in his fictional letter to Francis Bacon (*Ein Brief*, 1902) as follows, effectively bringing into the realm of everyday life what Edward Carpenter had written twenty years earlier about scientific concepts as "phantoms":

> In brief, this is my case: I have completely lost the ability to think or speak coherently about anything at all. First I gradually lost the ability, when discussing relatively elevated or general topics, to utter words normally used by everyone with unhesitating fluency. […] Rather, the abstract words which the tongue must enlist as a matter of course in order to bring out an opinion disintegrated in my mouth like rotten mushrooms. […] But this affliction gradually broadened, like spreading rust. Even in simple, informal conversation, all the opinions which are ordinarily offered casually and with the sureness of a sleepwalker became so fraught with difficulties that I had to stop participating in these conversations at all. […] I could no longer grasp them with the simplifying gaze of habit. Everything came to pieces, the pieces broke into more pieces, and nothing could be encompassed by one idea. Isolated words swam about me; they turned into eyes that stared at me and into which I had to stare back, dizzying whirlpools which spun around and around and led into the void.[151]

Pointing out the philosophical sources of this attitude toward abstractions, Yampolsky proceeded from Fritz Mauthner's critical philosophy of language to the criticism of abstract concepts in Friedrich Nietzsche and Ernst Mach, duly noting the latter's debt to Herbartian psychology.[152] In doing so, however, he overlooked the possibility that the entire trend under investigation may have been rooted in contemporary associationist psychology, where the process of concept formation was a constant topic of discussion, which naturally lent it to critical analysis. The most general survey is sufficient to see that few nineteenth-century works on psychology — by virtue of the fact that logic and epistemology were widely assumed to be its parts[153] — have failed to discuss the nature of abstract concepts in connection with the development of language. Illustrative example of such a discussion may be found in John Stuart Mill's *An Examination of Sir William Hamilton's Philosophy* (1865), where, in a chapter devoted to "The Doctrine of Concepts, or General Notions," one read the following:

> General concepts, therefore, we have, properly speaking, none; we have only complex ideas of objects in the concrete: but we are able to attend exclusively to certain parts of the concrete idea: and by that exclusive attention, we enable those parts to determine exclusively the course of our thoughts as subsequently called up by association; and are in a condition to carry on a train of meditation or reasoning relating to those parts only, exactly as if we were able to conceive them separately from the rest. What principally enables us to do this is the employment of signs, and particularly the most efficient and familiar kinds of signs, viz. Names. [...] "You have all heard of the process of tunneling, of tunneling through a sand-bank. In this operation it is

[151] Hugo von Hofmannsthal, *The Lord Chandos Letter and Other Writings*, trans. Joel Rotenberg (New York: New York Review of Books, 2005), 121–122.

[152] Yampolsky, *Lovushka dlya l'va*, 80–96. Unfortunately, I do not have space to address neither Mauthner's critique of language nor Nietzsche's critique of rationality, which was also heavily psychologized (Ibid., 87–89). However, in connection with the following topic, see Benjamin David Mitchell, "Dancing in Chains: A History of Friedrich Nietzsche's Physiological Relativism" (PhD. Diss, York University, 2016).

[153] For an instructive historical account, see Rolf George, "Psychologism in Logic: Bacon to Bolzano," *Philosophy & Rhetoric*, 30, no. 3 (1997): 213-242. Cf. Kusch, *Psychologism*.

> impossible to succeed, unless every foot, nay almost every inch in our progress be secured by an arch of masonry, before we attempt the excavation of another. Now, language is to the mind precisely what the arch is to the tunnel. The power of thinking and the power of excavation are not dependent on the word in the one case, on the mason-work in the other; but without these subsidiaries, neither process could be carried on beyond its rudimentary commencement."[154]

In his earlier *System of Logic* (1843), a classic instance of logical psychologism, Mill deduced from this connection between language and mind one of the fundamental "a priori fallacies" of thought — the "personification of abstractions": "Mankind in all ages have had a strong propensity to conclude that wherever there is a name, there must be a distinguishable separate entity corresponding to the name; and every complex idea which the mind has formed for itself by operating upon its conceptions of individual things, was considered to have an outward objective reality answering to it. Fate, Chance, Nature, Time, Space, were real beings, nay, even gods."[155] This way of thinking about abstract concepts evidently spread long before the development of epistemological descriptionism, which it apparently helped bring to life. In the Russian Empire, it was well-known thanks to Vladimir Solovyov, who, like Carpenter, saw the "hypostasization of abstractions" as the main deceit of rational knowledge: "for, remaining itself, it cannot relate to itself negatively, cannot recognize the results of its activity as only abstractions or one-sidednesses. It necessarily attributes the fullness of actuality to them."[156] Reflecting on scientific laws in 1963 in a similar fashion, Leo Tolstoy left the following entry in his diary:

> The discovery of laws in science is only the discovery of a new way of looking at things, in which what was wrong before seems right and consistent, making [...] other sides more obscure. It is clear to me that iron is cold, the coat is warm, the sun rises, sets, the body dies, the soul is immortal. From the new point of view, however, I must forget about coats and iron and not understand what coats and iron are, but see atoms repelling and attracting, so arranged that they become good and bad conductors of something called heat, or forget that the sun does rise and set, and dawn and clouds [sic], and imagine that the earth moves and I am moving with it. (I will explain many things in this way, but it is not the truth, it is one-sided.)[157]

Interestingly, while being fundamental to the new critical attitude toward natural science, the validity of this psychological framework itself tended to remain unquestioned. John Stallo claimed that his *Concepts and Theories in Modern Physics* (1981) was not a work on the philosophy of science but a contribution to what he called "the modern theory of cognition" that relied on "important truths developed by the sciences of comparative linguistics and psychology," whose sources were

[154] John Stuart Mill, *An Examination of Sir William Hamilton's Philosophy: And of the Principal Philosophical Questions Discussed in His Writings* (London: Longman, Green, Longman, Roberts & Green, 1865), 321, 324.
[155] Idem, *A System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles of Evidence, and the Methods of Scientific Investigation* (New York: Harper & Brothers, 1848), 463. For a history of such personifications, see Chapter 2.
[156] Vladimir Solovyov, *The Crisis of Western Philosophy (Against the Positivists)* [1874], trans. Boris Jakim (Hudson: Lindisfarne Press, 1996), 94. The same line of thought informed his *Critique of Abstract Principles* (*Kritika otvlechennykh nachal*, 1877–80).
[157] Lev Tolstoy, *Sobranie sochineniy, Vol. 21. Izbrannye dnevniki, 1847–1894* (Moskva: Khudozhestvennaya literatura, 1984), 247–248. I thank Varvara Kukushkina for the reference to this fragment.

the same Mill and Herbart, among others.[158] Another telling example is Mach, whose stubborn anti-atomism, which stemmed from his radical empiricism most fully expounded in *The Analysis of the Sensations* (*Die Analyse der Empfindungen und das Verhältnis des Physischen zum Psychischen*, 1886), was marked by a curious and often noticed paradox: "It is difficult to understand how the thinker who regarded the physical atom as a mere methodological fiction, failed to see the fictitious character of his own concept of 'element' which he confidently reified and made into a building block of which all our experience — in truth the whole world — is atomistically built."[159] This is explained by the simple yet insufficiently appreciated fact that the associationist psychology (sometimes called "atomistic" because the "idea" or "image" served in it as the atom of thought[160]), which was effectively embedded in empiricist philosophy, provided the fundamental conceptual spectacles, as it were, through which the workings of the mind were commonly viewed throughout the nineteenth century.[161]

Turning to another important tendency characterizing fin-de-siècle intellectual atmosphere, it should be noted that descriptivist epistemology appears to have served as one of the main vehicles for the widespread "recognition of the relativity of knowledge and of perception, all predicting public awareness of Einstein and Relativity," which was "absolutely necessary to the emergence of modernism."[162] The most thorough attempt to explore this problem to date may be found in Christopher Herbert's book *Victorian Relativity: Radical Thought and Scientific Discovery* (2001), which set out to show that the nineteenth century saw a revival of the relativistic philosophy of the ancient Greek sophist Protagoras (of which we know primarily from Plato's *Theaetetus*) with its principles that "nothing is one thing just by itself" and "man is the measure of all things."[163] Herbert found the former principle in virtually all of the figures mentioned earlier (and in many

[158] Stallo, *The Concepts and Theories in Modern Physics*, iii; Strong, "The Erkenntnistheoretiker's Dilemma," 109.
[159] Čapek, "Ernst Mach's Biological Theory of Knowledge," 172. Cf. Cassirer, *The Problem of Knowledge*, 102; Porter, "The Death of the Object," 140.
[160] In laying the foundations of associationist psychology, which was meant to reveal "the secret springs and principles, by which the human mind is actuated in its operations," David Hume directly referred to Newtonian mechanics (David Hume, *An Inquiry Concerning Human Understanding* [1748] (Oxford: Oxford University Press, 2007), 10). On Herbart's psychological Newtonianism, see Svetlikova, *Istoki russkogo formalizma*, 24.
[161] Another indicative example is Florensky himself, who on the one hand criticized "soulless" scientific psychology ("for it is true that people of our time have no soul, but instead there is only psychic flow, a cluster of associations, psychic dust"), but on the other — for lack of an alternative and unwillingness to look for it — actively used associationist conceptual language, see Florensky, *Sochineniya. Vol. 3(1)*, 113–118; cf. Svetlikova, *Istoki russkogo formalizma*, 56.
[162] Linda Dalrymple Henderson, "Modernism and Science," in *Modernism*, eds. Vivian Liska and Astradur Eysteinsson (Amsterdam and Philadelphia: John Benjamins Publishing Company, 2007), 384; Gillian Beer, *Open Fields: Science in Cultural Encounter* (Oxford and New York: Oxford University Press, 1996), 303.
[163] Christopher Herbert, *Victorian Relativity: Radical Thought and Scientific Discovery* (Chicago and London: University of Chicago Press, 2001), 4. It is worth mentioning that this subject is only tangentially addressed in the recent collective study on the history of relativism, cf. Martin Kusch, Katherina Kinzel, Johannes Steizinger, and Niels Wildschut, eds., *The Emergence of Relativism: German Thought from the Enlightenment to National Socialism* (London and New York: Routledge, 2019); on Herbert's book, see Ibid., 80–84.

others besides), from Mill and Bain to Mach and Stallo, whose book on the concepts in physics he called "the original example (or, let us say, the second, the first being Protagoras's lost treatise *On Truth*) of a work of philosophy in which the principle of relativity is given the character of a radical presiding dogma and serves as the basis for an entire, integrated view of the world."[164] However, the methodological clumsiness of Herbert's approach (based on "the principle that intellectual history with a claim to scientific rigor must abjure originary myths as far as possible"), noticed in several critical reviews,[165] seems to have precluded him from recognizing that the immediate engine of the revival of ancient relativism was empiricist philosophy and associationist psychology (mentioned only as an "adjunct of utilitarian philosophy"[166]), whose peripatetic motto *nihil est in intellectu quod non prius fuerit in sensu* reintroduced the third and the main principle of Protagoras — "knowledge is perception" (*Theaet.* 184b–186e) — not mentioned in the book at all.[167] Thus, the actualization of the idea that "nothing is one thing just by itself," which the psychologist Alexander Bain defined as "a great mental law [...] namely, the law of RELATIVITY" ("By this is meant that [...] every mental experience is necessarily *twofold*. [...] In every feeling there are two contrasting states; in every act of knowing, two things are known together"), went back to John Locke, who considered comparison of perceptions to be a fundamental cognitive procedure by virtue of which the very formation of ideas became possible.[168] Developed in France by the philosophers like Montesquieu and Étienne Bonnot de Condillac, this idea likely became the basis for the naturalist Comte de Buffon's oft-cited dictum that "we know nothing except by comparison" (*nous ne connaissons rien que par comparaison*).[169] It is not improbable that it was also the direct intellectual source of the orientation toward comparativism ("in the narrowest sense of the term, which is based on the placement of objects side by side") that Michel Espagne called "an epistemological attitude characteristic of the nineteenth century."[170]

Another and perhaps the most famous of Protagoras' principles, "man is the measure of all things" (also known as *homo mensura* dictum), has been a constant leitmotif in descriptionist literature, used to reinforce "the fact of the relativity of knowledge," as exemplified by Hans Kleinpeter's above-mentioned *Theory of Knowledge of Contemporary Natural Science* (1905):

164 Herbert, *Victorian Relativity*, 91.
165 Ibid., xii. See, e.g., Theodore M. Porter, review of *Victorian Relativity: Radical Thought and Scientific Discovery*, by Christopher Herbert. *Isis* 93, no. 2 (2002): 311–312.
166 Herbert, *Victorian Relativity*, 42.
167 Paul F. Cranefield, "On the Origin of the Phrase: *Nihil est in intellectu quod non prius fuerit in sensu*," *Journal of the History of Medicine and Allied Science*s 25, No. 1 (1970): 77–80.
168 Alexander Bain, *The Senses and the Intellect. Third edition* (New York: D. Appleton and Company, 1872), 8 (emphasis in original); Herbert, *Victorian Relativity*, 43. Cf. Melvin Richter, "Two Eighteenth-Century Senses of 'Comparison' in Locke and Montesquieu," *Jahrbuch für Recht und Ethik / Annual Review of Law and Ethics* 8 (2000): 385–406.
169 Ibid.; Georges Louis Leclerc de Buffon, *Oeuvres choisies, Vol. 2* (Paris: Librarie de Firmin Didot Frères, 1843), 61.
170 Michel Espagne, "Comparison and Transfer: A Question of Method," in *Transnational Challenges to National History Writing*, eds. Matthias Middell and Luis Roura (Basingstoke: Palgrave Macmillan, 2013), 37.

> That the truth of the relativity of all cognition can be given a universal significance is evident already from the verbal form of judgment; for a judgment can express only the mutual relation of two thoughts. [...] Bearing in mind that our experience, that is, the sphere of our consciousness, contains all those elements which in general can be cognized by us, we come to the conclusion that cognition is possible and conceivable only in relation to human experience. All other cognition is so meaningless that it does not even merit mention. It seems that this truth was first discovered by Protagoras, to whom belongs the famous dictum: "Man [is] the measure of all things," which was grossly perverted by Plato and all the philosophers that followed.[171]

This view was naturally accompanied by a tendency toward the "humanization" of science, transforming it from a matter of abstract reason into a fully embodied human enterprise,[172] the most prominent example of which among the descriptionist philosophies was the evolutionary biologism of Mach, who regarded scientific knowledge as a cognitive means of human adaptation to the environment and argued that it is precisely "our intimacy with nature [that] permits successful science."[173] As we saw above, the same idea was promoted by Edward Carpenter in his declaration that the true scientist must be "in close contact with Nature." Evidently stemming from eighteenth-century "sentimental empiricism,"[174] in the nineteenth century this humanized vision of science had several important sources. In Germany, it was rooted in the tradition of "romantic empiricism" (as the philosopher Dalia Nassar has recently called it) and especially in the anti-Newtonian approach to natural science developed by Johann Wolfgang von Goethe, who came to be Florensky's scientific master: "Looking back, I understand why, ever since I was a child, ever since I could barely read, I have had "Goethe and Goethe without End" in my hands — that is, of course, not Du Bois-Reymond's pamphlet [*Goethe und kein Ende*, 1882; translated into Russian as *Giote i Giote bez kontsa*, 1900], but Goethe himself. He has been my mental nourishment" (120–121).[175] Interestingly, in his 1892 address to the Goethe Society in Weimar, Hermann von Helmholtz maintained that the German "poet-scientist" directly anticipated the development of late nineteenth-century descriptionist epistemology, but this suggestion remains to be explored.[176]

[171] Kleynpeter, *Teoriya poznaniya sovremennogo estestvoznaniya*, 50.
[172] See, for instance, the chapter on "The Longing for a Humanization of Science" in Philipp Frank, *The Humanistic Background of Science*, eds. George A. Reisch and Adam Tamas Tuboly (Albany: State University of New York Press, 2021).
[173] Porter, "The Death of the Object," 141; Čapek, "Ernst Mach's Biological Theory of Knowledge."
[174] See Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago: The University of Chicago Press, 2002).
[175] Dalia Nassar, *Romantic Empiricism: Nature, Art, and Ecology from Herder to Humboldt* (New York: Oxford University Press, 2022). For a fuller historical overview of Goethe's scientific and philosophical endeavors, see Robert Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago and London: The University of Chicago Press, 2002), 407–502. Neither of these works pay much attention to the role of psychology, which had a direct bearing on Goethe's views on the scientific imagination (see Chapter 2). A more detailed discussion of Florensky's reception of Goethe is, unfortunately, beyond the scope of the present study.
[176] Hermann von Helmholtz, "On Goethe's Anticipation of Subsequent Scientific Researches" [1892], in *Selected Writings of Hermann von Helmholtz*, ed. and trans. Russell Kahl (Middletown: Wesleyan University Press, 1971), 479-500; cf. Jeffrey Barnouw, "Goethe and Helmholtz: Science and Sensation," in *Goethe and the Sciences: A Reappraisal*, eds.

In France, on the other hand, the most important forerunner of the latter was Auguste Comte, whose positivism was directly inspired by David Hume (Comte called him his "principle philosophical predecessor") and promoted a Humean methodological precept that science should abandon the search for causes of natural phenomena in favor of the study of descriptive laws, i.e., to move from explanation to description.[177] As will be discussed in more detail in the next chapter, Comte shared a markedly anthropocentric view of science, believing that "we only need to know what can affect us [and our senses], in a more or less direct way" (for which reason, on his account, astronomy had to confine itself to the study of our solar system, while the exploration of the universe at large was "necessarily forbidden to us," since "it is obvious that it offers us no real importance except for our insatiable curiosity").[178] It was this position that led Comte to proclaim the relativity of all knowledge as the main credo of positive philosophy: omitting the precedent of Protagoras, he prided himself on the originality of the idea that "everything is relative; that is the only absolute principle."[179]

The Resolution of the Crisis

At this point, we can finally return to Florensky and place ourselves in a position to understand how he was able to resolve his intellectual crisis. Throughout the autobiography, he repeatedly emphasized that the favorite tenet of his positivist father was the (apparently Comtean) "axiom of the relativity of all knowledge and all judgments. 'There is nothing absolute in the world,' was his constant dictum" (125).[180] In the somewhat cryptic passage that concludes *To My Children*, Florensky stated that it was this axiom of relativity that contained the resolution to his crisis:

> Meanwhile, the resolution came from somewhere I was not expecting it. Its source was the skepticism toward human doctrines and convictions that my father had absorbed and that I had internalized since childhood. [...] One day, suddenly, on its own accord, a question came up in me: "What about them? And with this question, the wall was breached. "What about *them*, all those who now exist in the world, who lived before me? They, the peasants, the savages, my ancestors, all mankind in general — have they lived and in fact [now

Frederick Amrine, Francis J. Zucker, and Harvey Wheeler (Dordrecht: D. Reidel Publishing Company, 1987) (1987), 74–78. Florensky likely knew this address in the Russian translation: [German fon] Gel'mgol'ts, *Gete i nauchnye idei XIX veka* (Sankt-Peterburg: Tipo-Litografiya Yu. Ya. Rimana, 1894).

[177] Mary Pickering, *Auguste Comte: An Intellectual Biography, Vol. 1* (Cambridge: Cambridge University Press, 1993), 312–313.

[178] Auguste Comte, *Cours de philosophie positive, Tome deuxième, contenant la philosophie astronomique et la philosophie de la physique* (Paris: Bachelier, 1835), 16.

[179] Pickering, *Auguste Comte,* 120, 312. Cf. Maria Baghramian and Annalisa Coliva, *Relativism* (London and New York: Routledge, 2020), 47.

[180] In which Florensky "often perceived religious sentiments, chiefly [...] a sense of man's nothingness, of his feebleness — both cognitive and moral" (89), implying a connection with the sinfulness of human nature, see Chapters 2 and 3.

> also live] without truth? Dare I say that all men have not had and do not have truth and therefore are not alive and not even human?" (189)

It is easy to miss the point of this passage. At first glance, it reproduces the anti-intellectualist conclusion that Tolstoy described in his *Confession*: "in addition to rational knowledge, which before had seemed to be the only knowledge, I was inevitably led to recognize a different type of knowledge, an irrational type, which all of humanity had: faith, which provides us with the possibility of living. As far as I was concerned, faith was as irrational as ever, but I could not fail to recognize that it alone provides humanity with an answer to the question of life, thus making it possible to live."[181] However, it should be emphasized again that for Florensky this kind of irrationalist fideism was not enough: "my experience was different in tone from Tolstoy's description. The latter was dominated by feeling [...], but my dying was rather intellectual. [...] The necessity of building thought was clear to me, and Tolstoy's amorphousness seemed [unsatisfactory]" (188). Based on the intellectual context outlined above, it seems that the essence of his solution was not so much a discovery of the value of faith as a realization of the relative and transient nature of inhuman scientific rationality: having been deceptively presented as universal, it turned out to have far less claim to the knowledge of the truth than the qualitatively different — and far more "human" — thinking of the ancient savage or the modern peasant. In all likelihood this realization did not come to him in the last year of the gymnasium, as one might surmise from the autobiography, but somewhat later, during his university studies. In addition to his mathematical specialty, Florensky actively attended courses in psychology and ancient philosophy, but whereas his debt to the latter has been repeatedly noted (since he subsequently made the history of ancient thought his main academic area of specialization), the influence of the former, as far as I know, has so far remained without any detailed attention.[182]

In 1901, as part of a seminar led by the prominent philosopher and psychologist Lev Lopatin, the longtime chairman of the Moscow Psychological Society, Florensky had occasion to familiarize himself, apparently for the first time, with John Stuart Mill's above-mentioned *System of Logic* and *An Examination of Sir William Hamilton's Philosophy*. Judging by the detailed synopsis entitled "Mill's Doctrine of the Inductive Origin of Geometrical Concepts," which he prepared for discussion at the seminar, Mill's psychologism provoked a sharp protest from him. He remarked that he "could not clearly understand the theories of Bain and Mill" concerning the empirical origin of the idea of space, defended the ideality of logic and mathematics (with

[181] Tolstoy, *Confession*, 60.
[182] Pyman, *Pavel Florensky: A Quiet Genius*, 31. Cf., e.g., Konstantin M. Antonov. "Russkaya religioznaya filosofiya i fenomenologiya religii: tochki soprikosnoveniya," *Religiovedcheskie issledovaniya* 5/6 (2011): 7–21.

references to Plato and Kant), and criticized Mill's view, which stemmed from the associationist framework, that "(logical) inconceivability is no criterion of impossibility," pointing out that "if it were so, then all Mill's work would go to waste: for this means that he rejects the laws of logic. And how then can one speak of any axioms, of any geometrical notions?"[183] The conclusion that Florensky drew was that "empiricism [...] should most justly be called *absolute nihilism*."[184] Before long, however, he completely changed his mind, eagerly embracing this "absolute nihilism" along with its relativity of logic, and started to use positivist ideas in a way that the authors of works on occult phenomena, such as the spiritualist Robert Dale Owen (whom he read as a child, 170), had done:

> The spiritual body usually remains inaccessible to human sight. It is seen only by those who have been endowed with the special, rare ability to "discern spirits." All those gifted with this ability can undoubtedly see the "spirit," i.e., the spiritual body animated by the soul. And this should not particularly surprise us. "Men have no right," says John Stuart Mill, "to take the limits of their own faculties as the immutable limit for every kind of existence in the universe."[185]

Later, in the drafts for his autobiography, Florensky noted that — in addition to Carpenter, Tolstoy, and Mach — his reevaluation of science was influenced by "Mill's phenomenologism," which he "did not assimilate positively, but used as a means of polemic to throw off the hateful yoke" of the scientific worldview (205).

Without going into a detailed examination of the possible causes of this shift, there are two relevant circumstances that may be mentioned here. On the one hand, in one of the letters from 1902, his father drew Florensky's attention to Ferdinand Brunetière's new article on "The Positivist Metaphysics" (*La Métaphysique positiviste*, 1902).[186] There, Brunetière not only convincingly showed that Auguste Comte was an epistemologist of descriptionism *par excellence*, but also pointed out that positivism — by virtue of its "theory of 'the relativity of knowledge'," which made "the totality of human experience [...] the criterion of truth" — was the key to all future metaphysics and hence the best foundation for a religious worldview: "it was not Kant, in truth, but rather Comte, who, in writing the lessons of his *Cours de philosophie positive*, wrote the *Prolegomena of All Future Metaphysics*."[187] It may be that it was this article that enabled Florensky to finally take a fresh look

[183] Pavel Florensky, "Uchenie Millya ob induktivnom proiskhozhdenii geometricheskikh ponyatiy" [1901], *Istoriko-matematicheskie issledovaniya* 3, no. 2 (1998): 55.
[184] Ibid., 64.
[185] Robert Del' Ouen, *Spornaya oblast' mezhdu dvumya mirami. Nablyudeniya i izyskaniya v oblasti mediumicheskikh yavleniy*, trans. K. Polyanskiy (Sankt-Peterburg, 1881), 240. On the specifically gifted individuals, see Chapter 2.
[186] Florensky, *Obretaya put'. Pavel Florensky v universitetskie gody, Vol. 2*, 64. On Brunetière and positivism, see Thomas Loué, "L'apologétique de Ferdinand Brunetière et le positivisme: un bricolage idéologique 'généreux et accueillant'," *Revue des sciences philosophiques et théologiques* 87, no. 1 (2003): 101–126.
[187] Ferdinand Brunetière, "La Métaphysique positiviste," *Revue des Deux Mondes* 11 (1902): 589–601. He was referring to Kant's *Prolegomena zu einer jeden künftigen Metaphysik* (1783), which, as is well known, reduced metaphysics to the

at his father's favorite epistemological principle. On the other hand, while attending Lopatin's lectures,[188] and continuing his reading in psychology, Florensky could easily stumble upon the idea that rational thinking by means of abstract concepts and laws of classical logic was not an epistemological ideal and a final lot of humanity, but only a transient historical stage of the development of mind, which was preceded by primitive imagistic thinking and which in the future could develop into something totally new. In the following chapter, I am going to take a closer look at this idea.

critical approach set forth in the *Critique of Pure Reason* (1781). On the comparison between Kant and Comte, see Chapter 2.

[188] Lev Lopatin, *Psikhologiya. Lektsii 1901–1902* (Moskva, 1902).

Chapter 2. The Relativization of Rationality: From Myth to the Fourth Dimension

Two Splits of Rationality

In their renowned history of the category of objectivity, Lorraine Daston and Peter Galison observed that due to "mid-nineteenth-century research in history, anthropology, philology, psychology, and, above all, sensory physiology, which underscored how very differently individuals reasoned, described, believed, and even perceived," in the early twentieth century a new understanding of objectivity emerged (they called it "structural objectivity"), which was invoked to emphasize "the aspects of scientific knowledge that survive translation, transmission, theory change, and differences among thinking beings due to physiology, psychology, history, culture, language, and [...] species."[189] This development had a direct influence on the formation of the twentieth-century philosophy of science, which effectively reestablished the familiar Enlightenment — and particularly Kantian — idea that rationality is transhistorical and universal, transcending even the boundaries of the humankind.[190] Daston and Galison illustrated it by a variety of examples: the pragmatist Charles Sanders Peirce argued that philosophical community "must not be limited, but must extend to all races of beings with whom we can come into immediate or mediate contact. It must reach, however vaguely, beyond this geological epoch, beyond all bounds"; the physicist Max Planck declared that "the system of theoretical physics demands validity not merely for the inhabitants of this earth, but also for the inhabitants of other planets"; the logical positivist Moritz Schlick imagined surgically created monsters whose sensory apparatus would be radically different from that of the human being, but who would nevertheless "come to establish exactly the same natural laws as we do."[191]

Later in the twentieth century this position led to what Fynn Ole Engler and Jürgen Renn labeled the "split of rationality," with which we have been grappling ever since: "We are still confronted with the split between the view, if not the vision of science as the best model of

[189] Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 256.

[190] This eighteenth-century view, which assumed the universality of reason "regardless of differences of time, place, race, and individual propensities and endowments" is aptly summarized in Arthur Lovejoy, *The Great Chain of Being: A Study in the History of an Idea* (Cambridge: Harvard University Press, 1936), 288–289. Since the idea of the plurality of worlds was a standard feature of modern cosmology (see Ibid., 99–143), this applied not only to humans but to all sorts of rational beings, be they angels or extraterrestrials; this was the view held by Immanuel Kant, among others: "Although Kant was firmly convinced of the existence and physical diversity of nonhuman rational beings, he assumed that this diversity made no difference to their character as rational beings: whether they were rational Martians or rational angels, reason was reason everywhere in the universe" (Lorraine Daston, *Against Nature* (Cambridge: MIT Press, 2019), 1).

[191] Daston and Galison, *Objectivity,* 254, 257, 296. I will briefly return to these examples in the last section of this chapter.

rationality available to us, generalizable to other spheres of human activity as well, and the view of science as a deeply contingent, historically shaped human enterprise as any other, an enterprise that we can only practice, administer or describe."[192] It is not commonly noticed, however, that this situation, largely brought about by twentieth-century sociological treatment of scientific knowledge, was preceded by another and somewhat more fundamental split of rationality, which seems to have consisted in its relativization.[193] As I suggested in the previous chapter, it stemmed primarily from nineteenth-century psychologism, which provided the epistemological foundation for all the disciplines mentioned by Daston and Galison (some of which will be discussed below). And it was precisely psychologism that allowed Pavel Florensky to overcome his intellectual crisis, insofar as it helped him to recognize the reputedly universal but manifestly flawed scientific rationality not as the only possible option, but as a historically transient epistemological "yoke" from which it was possible — and even necessary — to get rid of. At this point, at least two other distinct yet interrelated options opened before him.

On the one hand, Florensky became deeply interested in what historically preceded modern rationality and continued to exist in its shadow — namely, primitive or, as he called it, "all-human" and "immediate" thinking, free of "scientific prejudices" and operating not with abstract concepts but with concrete, individual images. As we shall see, it was also often referred to as "mythical thinking," since it was seen as the source of mythology. In one of his first articles, Florensky wrote that "for scientific analysis [myth] is genuinely a mere set of words, a primitive, semi-senseless philosophy of primordial thinking. [...] But for immediate consciousness, myth [...] is the basis of all comprehension of reality."[194] Subsequently, it was precisely from the "psychological fact" of immediate perception that he deduced his proof of the possibility of miraculous, magical, and occult phenomena, all of which were rejected by scientific consensus in the process of secularization and disenchantment of the world: "Suppose there are no fairies and mermaids, but there is a perception of them. Let there be no power of spells and incantations, but there is a belief in them. Both to me and to you a fact is given — the perception and worldview of a sorcerer. It is this fact that we must deal with."[195] Furthermore, he maintained that a modern

[192] Fynn Ole Engler and Jürgen Renn, "Two Encounters," in *Shifting Paradigms: Thomas S. Kuhn and the History of Science,* eds. A. Blum, K. Gavroglu, C. Joas, & J. Renn (Berlin: Edition Open Access, 2016), 146.

[193] I touch upon the transition from nineteenth-century psychologism to twentieth-century sociologism in the Conclusion.

[194] Pavel Florensky, *Sochineniya, Vol. 1*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 1994), 194. On Florensky's interest in mythology, see Vladislav Ushakov, "Neomifologizm P. A. Florenskogo," *Istoriko-filosofskiy ezhegodnik* 28 (2013): 338–352.

[195] Pavel Florensky, *Sochineniya, Vol. 3(2)*, eds. igumen Andronik (Trubachev), P. V. Florensky, and M. S. Trubacheva (Moscow: Mysl', 2000), 147–148. For an overview of the problem of disenchantment, see Jason Ā. Josephson-Storm, *The Myth of Disenchantment: Magic, Modernity, and the Birth of the Human Sciences* (Chicago and London: Chicago University Press, 2017).

civilized person could still "understand the inner life of the ancient man" and "penetrate the immediate worldview of the peasant," for which purpose it was only "necessary to renounce intellectual views, [...] preconceived schemes and innumerable scientific theories."[196] In other words, to do what he himself had done in his youth by abandoning the scientific worldview. When he became a lecturer in Ancient Greek philosophy at the Moscow Theological Academy, in order to elucidate the worldview of Thales of Miletus (who asserted that water was the fundamental basis of being), he suggested to his students the following procedure:

> Let us try to find out for ourselves the psychology of this attitude towards the world, for which we will again turn to our usual method, "pure experience,"[197] i.e., let us try to get away from our philosophical and other assumptions and look at the world with simple eyes, without the colored glasses put on us by the nineteenth and twentieth centuries. We will try to surrender to the perception of the world and, if possible, put nothing extraneous into it. And since we are talking about water, we will look at water. [...] Suppose we stand on the bank of a brook. Look how it curves. How conscientiously it chooses its way between the rocks. [...] Tell me, doesn't the brook live? Doesn't it have a soul? Clearly, the water is animated, for the soul is the beginning of life and the beginning of spontaneous movements. [...] Do not think that I am speaking to you, as it were, poetically, or metaphorically and rhetorically. Far from it. I am conveying as realistically as possible the perception of the stream, the sea, etc., that I myself have and that anyone who has grown up on the shore of the sea has. These impressions of the sea from childhood are indelibly imprinted on my soul for the rest of my life. Even now, when I close my eyes, I see a vast blue sea, and I feel that it is alive with a kind of peculiar life, that it is not only the cunning mechanics of molecules, but something more than that. Whether this is true in fact or not, I can't decide now. I am passing on to you the direct perception, the immediate fact of my own psychic life. And, of course, in the ancient man, who was not corrupted by theories, this feeling was immeasurably more powerful and deeper.[198]

As we saw in the previous chapter, it was this perception of animated nature that he attributed to himself as a child, before it was repressed by mechanistic scientific rationality (and as the next chapter will show, this interest in the sea was not without certain ideological connotations).

On the other hand, copious reading of occult and mystical literature, such as the popular *Philosophy of Mysticism* (*Die Philosophie der Mystik*, 1885) by Carl du Prel, assured Florensky of the possibility of a transformed kind of thinking that would transcend the bounds of space and time (i.e., Kantian forms of sensibility) and the Aristotelian laws of logic along with them.[199] Here it should be noted once again that Florensky fairly early on embraced the idea that the key element and the "first picture" of the Christian worldview was the story of the fall of man, which served

[196] Florensky, *Sochineniya, Vol. 3(2)*, 148.
[197] This expression most likely referred to the empiriocriticism of Richard Avenirius as set forth in his *Critique of Pure Experience* (*Kritik der reinen Erfahrung*, 1888–1890).
[198] Pavel Florensky, *Iz istorii antichnoy filosofii*, ed. igumen Andronik (Trubachev) (Moscow: Akademicheskiy proekt, 2015), 339–340.
[199] On the importance of Du Prel for Florensky, see Pavel Yushin, "The Cover of the Journal *Makovets* and Pavel Florensky's World Picture," in *In Anderen Zeiten/In Other Times: Zeitdiskurse im Wandel/Changing Discourses of Time across Human History*, eds. Brisca Hohenwald, Neele Illner, and Jürgen Renn (Berlin: Frank und Timme Verlag, 2022), 183–184. For a discussion of Florensky's challenge to the laws of logic, see Pawel Rojek, "Pavel Florensky's Theory of Religious Antinomies," *Logica Universalis* 13 (2019): 515–540.

as a plausible explanation for the frailty of the human reason and the concomitant relativity of knowledge, time and again asserted in contemporary epistemological literature:

> If sin exists (and the first half of faith is in the recognition that it does in fact exist), then our entire being, just like the whole world, is fragmented. Taking as our starting point one corner of the world or our own rational mind, we have no reason to expect that we will get the same result we would have gotten if we had started from another corner. [...] The existence of a multitude of dissonant schemes and theories, which are equally conscientious but proceed from different starting points, is the best proof that there are cracks in the world. Reason itself is fragmented and split, and only the purified God-bearing mind of saintly ascetics is somewhat more *whole*. In this mind, the healing of the fissures and cracks has begun; the sickness of being is being cured; the wounds of the world are being healed.[200]

It seems that such a view of scientific rationality was fairly commonplace in contemporary anti-scientistic Christian writings, where Florensky might have read, for example, the following: "it may be that the laws of logic which hold us in a clutch are only a disease of being, a defect of being itself, as if the result of the fall into sin. [...] the iron necessity and regularity of nature is only its disease; the crust that has covered the body of the world and so infected empirical science."[201] Meanwhile, besides the minds of Christian saints and ascetics that were supposedly freed from the corruption of sin, the most important example of the transformed future state of the human mind was the so-called "four-dimensional" thinking associated with the idea of the fourth dimension of space, which was immensely popular at the turn of the century.[202] As has been repeatedly discussed by scholars, Florensky was also fascinated by this idea.[203] However, as far as I know, neither the psychological reasons behind this fascination nor the fact that it was likely motivated by the writings of Sergei Glagolev, Florensky's teacher mentioned in the previous chapter, have been observed. Not only did Glagolev constantly stress the relativity and limitations of human knowledge, drawing his arguments from contemporary descriptionist literature (and repeating the Protagorean *homo mensura* dictum), but he also pointed out that in the future humanity must develop the "ideal thinking," where cognition would be carried out "neither in words, nor in images, nor in symbols, much less in [...] general concepts," but in a direct "contemplation of

[200] Pavel Florensky, *The Pillar and Ground of the Truth: An Essay in Orthodox Theodicy in Twelve Letters* [1914], trans. Boris Jakim (Princeton, Oxford: Princeton University Press, 1997), 118. Cf. Gans Kleynpeter, *Teoriya poznaniya sovremennogo estestvoznaniya na osnove vozzreniy Makha, Stallo, Klifforda, Kirkhgofa, Gerttsa, Pirsona i Ostval'da*, trans. R. Lemberk (Sankt-Peterburg: Shipovnik, 1910), 52–52. For a history of the close relationship between epistemology and original sin, see Peter Harrison, *The Fall of Man and the Foundations of Modern Science* (New York: Cambridge University Press, 2007).

[201] Cited in Pavel Yushkevich, *Novye veyaniya (Ocherki sovremennykh religioznykh iskaniy)* (Sankt-Peterburg: "Obshchestvennaya pol'za," 1910), 4–5.

[202] See Linda Dalrymple Henderson, *The Fourth Dimension and Non-Euclidean Geometry in Modern Art. Revised Edition* (Cambridge and London: MIT Press, 2013); Corinna Treitel, *A Science for the Soul: Occultism and the Genesis of the German Modern* (Baltimore and London: The Johns Hopkins University Press, 2004); Elizabeth L. Throesch, *Before Einstein: The Fourth Dimension in Fin-de-Siècle Literature and Culture* (London, New York: Anthem Press, 2017); Mark Blacklock, *The Emergence of the Fourth Dimension: Higher Spatial Thinking in the Fin de Siècle* (New York: Oxford University Press, 2018).

[203] See Yushin, "The Cover of the Journal *Makovets*," 160–161, 168–177 (and the bibliography listed there).

reality" outside space and time.[204] Florensky directly paraphrased Glagolev, whom he obviously read very carefully,[205] and the notion of a future state of cognition was also reiterated in his works more than once (see below).

Both of these ideas, mythical and four-dimensional thinking, gained prominence in the second half of the nineteenth century and clearly belonged to the same intellectual context, but the connection between them, so far as I know, has never been studied.[206] With no claim to comprehensiveness and relying on a limited range of sources, in this chapter I will try to reconstruct some elements of their shared history, which must be taken into account in order to understand both Florensky's own position and the fin-de-siècle crisis of rationality at large.

Mythical Thinking and the Scientific Imagination

It is more convenient to begin with the less studied of the two, which to my knowledge has become the subject of historical analysis only once. In a fairly short but insightful article, the historian of ancient science Leonid Zhmud' critically examined the idea that the mind of "primitive" ancient people, by virtue of which mythology emerged, was qualitatively different from the mind of the "civilized" ones, which engendered scientific rationality.[207] Criticizing it from the standpoint of modern psychology, which clearly demonstrates that cognitive abilities of people living in premodern cultures are the same as in modern Europeans,[208] Zhmud' pointed out the surprising popularity of the concept of "mythical thinking" among prominent Soviet scholars: from the notorious linguist Nikolai Marr and his brilliant protégé, philologist Olga Freidenberg to the semioticians Yuri Lotman and Boris Uspensky (and the list of names could be easily expanded).[209]

[204] Sergei Glagolev, *Po voprosam logiki* (Khar'kov: Tipografiya gubernskogo pravleniya, 1910), 216.
[205] Ibid., 215; cf. Pavel Florensky, *Sochineniya. Vol. 3(1)*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 2000), 148.
[206] Although some similarities have been observed, cf. Tatjana Miciç, "Mythical Paradigms of the Avant-garde and its Era" (PhD diss., Univerzita Karlova, 2009), 32–45.
[207] Leonid Zhmud', "On the Concept of 'Mythical Thinking'," *Hyperboreus* 1 (1994/1995): 155–169.
[208] Zhmud cited the conclusion of American psychologists Michael Cole and Sylvia Scribner, who stated in 1974 that "there is no evidence for different kinds of reasoning processes such as the old classic theories alleged — we have no evidence for a 'primitive logic'. *We are unlikely to find cultural differences in basic components of cognitive processes*. While we cannot completely rule out this possibility, there is no evidence, in any line of investigation that we have reviewed, that any cultural group wholly lacks a basic process such as abstraction, or inferential reasoning, or categorisation" (cited in Ibid., 166). For a more up-to-date discussion of this problem, which reaches essentially the same conclusion, see Geoffrey Lloyd, *Cognitive Variations: Reflections on the Unity and Diversity of the Human Mind* (Oxford: Clarendon Press, 2007), 151–176.
[209] For example, the idea of primitive mythical thinking had a very prominent place in the theoretical pursuits of the director Sergei Eisenstein, see Oksana Bulgakowa, "Sergei Eisenstein's System Thinking: Influences and Inspirations," *Cultural Science Journal* 13, no. 1 (2021): 85–100.

More importantly, Zhmud' set out to explore the genesis of this concept, which was meant to explain the absurdities and oddities of mythology that had long been the subject of theoretical debate among scholars,[210] and located it in the positivist tradition, highlighting several elements of the nineteenth-century intellectual culture that allowed it to take root.[211] First, the "law of three stages" of humanity's intellectual development, postulated by Auguste Comte in the first volume of his influential *Course of Positive Philosophy* (*Cours de Philosophie Positive*, 1830), according to which the first — "theological" — stage was "characterized by an extremely low level of knowledge and vividly expressed passions," which gave rise to the primary forms of religion: fetishism, polytheism, and monotheism.[212] Second, the biological theory of recapitulation already referred to in the first chapter, which simultaneously reinforced the Comtean view of intellectual evolution and turned the old comparison of primitive humans with children into a veritable scientific fact.[213] Third, "a peculiar intellectualism (coming probably from eighteenth-century philosophy) with which many scholars approached myth," best exemplified by the British founder of anthropology Edward Tylor, who was strongly influenced by Comte and viewed myth as a kind of primitive science.[214] According to Zhmud', these factors, coupled with the almost exclusive reliance on written second-hand evidence (that is, the lack of experience of direct interaction with premodern cultures), led in the second half of the nineteenth century to the crystallization of the concept of mythical thinking, which was

> from the very beginning based on a confusion of quite different notions: *how* a man thinks, i.e. the character of his cognitive processes, and *what* he thinks and in what he believes, i.e., the sphere of his ideas and *Weltanschauung*. The intellectualization of a myth and its transference into the sphere of cognitive processes led to a situation where thinking and faith in mythological fictions were equated with one another. Strictly speaking, the whole complex of ideas connected with mythological thinking has been based on this confusion up to the present.[215]

As Zhmud' proceeded to show, at the beginning of the twentieth century this intellectualist understanding of myth came under severe criticism, giving way to a focus on its roots "in the emotional, the volitional, and the unconscious sphere of the human mind," while the notion that basic cognitive features are common to the whole of humanity began to be established anew.[216]

[210] For an overview of these debates, see, e.g., Bruce Lincoln, *Theorizing Myth: Narrative, Ideology, and Scholarship* (Chicago and London: University Of Chicago Press, 2000). I would like to thank Boris Maslov for the reference to this book.
[211] The following paragraph is based on Leonid Zhmud', "On the Concept of 'Mythical Thinking'," *Hyperboreus* 1 (1994/1995): 156–158.
[212] See Mary Pickering, "Auguste Comte and the Return to Primitivism," *Revue Internationale de Philosophie* 52, no. 203 (1998): 51–77.
[213] See Chapter 1.
[214] As discussed in Edward B. Tylor, *The Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom. Vol. 1* (London: John Murray, 1871).
[215] Zhmud', "On the Concept of 'Mythical Thinking'," 158.
[216] Ibid., 158–159.

But when the concept of mythical thinking was almost ready to pass into the dustbin of history, it was developed anew and powerfully propagated by the French philosopher and ethnologist Lucien Lévy-Bruhl, the life-long adherent of positivism, whose investigations into the so-called "prelogical" primitive though were directly inspired by Comte's ideas.[217] In the introduction to his first book on *Mental Functions in Inferior Societies* (*Les fonctions mentales dans les sociétés inférieures*, 1910), he even designated the latter as "the initiator of a positive science of the mental functions."[218] It was thanks to Lèvy-Bruhl's writings, which were quickly translated into Russian under the patronage of Nikolai Marr, that mythical thinking became a particularly enduring feature of Soviet intellectual culture.[219]

A notable lacuna in Zhmud's account is the putative reference to the "peculiar intellectualism" inherited from eighteenth-century philosophy, which was apparently a key factor in the formation of the concept of mythical thinking. In what follows, I will elaborate on this suggestion by showing that a crucial role in the intellectualization of mythology was played by the new views regarding the role of the imagination in the cognitive process, which were part and parcel of both eighteenth- and nineteenth-century empiricism and psychologism. To understand why it became possible to see myth, traditionally considered to be a product of poetic imagination, as a kind of primitive science, it is necessary to turn to the history of the relationship between science and imagination.

An important point of departure here is the revival of Epicurean philosophy in the seventeenth century, which was a key moment in the development of both views on the nature of myth and on the faculty of imagination.[220] This period saw the re-emergence of the theory of the origin of religion from a sense of fear, famously suggested by Lucretius in *De Rerum Natura* (V. 1218–1221; VI. 82–91) and expressed in Statius' verse "Fear first made gods in the world" (*Primus in orbe deos fecit timor*; Theb. III, 661): "When men saw an eclipse or a comet, they at once feared for the future, recognizing this as a portent of divine indignation. Thunder filled men with great terror because in their ignorance of rational causes they could only interpret the horrendous sounds as indications of God's wrath."[221] Lucretius' fear theory was based on Epicurean psychology, and the

[217] Ibid., 159–161. On Lèvy-Bruhl intellectual debt to Comte, see Warren Schmaus, "Lévy-Bruhl, Durkheim, and the Positivist Roots of the Sociology of Knowledge," *Journal of the History of the Behavioral Sciences* 32, no. 4 (1996): 430–436.
[218] Lucien Lèvy-Bruhl, *How Natives Think* [1910], trans. Lilian A. Clare (New York: Washington Square Press, 1966), 6.
[219] Zhmud', "On the Concept of 'Mythical Thinking'," 161–169.
[220] For the general account of this revival, see Catherine Wilson, *Epicureanism at the Origins of Modernity* (Oxford: Oxford University Press, 2008). However, she does not discuss mythology and only tangentially touches on the history of the imagination.
[221] Frank Manuel, *The Eighteenth Century Confronts the Gods* (Cambridge: Harvard University Press, 1959), 35. See also the essay on the fear of gods ("La crainte des dieux") in Philippe Borgeaud, *Exercices d'histoire des religions: comparaison, rites, mythes et émotions*, eds. Daniel Barbu et Philippe Matthey (Leiden- Boston: Brill, 2016), 312–330. I would like to thank Ilona Svetlikova for bringing my attention to this subject.

main role therein was played by the faculty of imagination, which was responsible for the causal explanation of phenomena that struck primitive men because it produced mental images of polytheistic deities that were perceived as reality.[222] As Jean Starobinski pointed out, the rediscovery of this conception in the seventeenth and eighteenth centuries had a cardinal influence on the development of thought about mythology: "Myths were no longer seen as something secondary and derivative but as the *primary* human response to fears of their dreams, to grandiose natural events, to everything *awesome*."[223]

Meanwhile, an important point of philosophical discussion at that time was the dispute between René Descartes and Pierre Gassendi, which among other topics concerned the relationship between reason and imagination.[224] While the rationalist Descartes advocated a clear separation between the two, the empiricist Gassendi, one of the most important proponents of early-modern Epicureanism, argued that "the imagination is not distinguished from the intellect," and "there is in us only a single faculty by means of which we generally know all things."[225] The adoption of a new view of the nature of myth did not necessarily imply agreement with Gassendi's position, however. To take one notable example, Bernard Fontenelle, who wrote a short treatise *Of the Origin of Fables* (*De l'origine des fables*, 1724) that gave an important impetus to the study of mythology in the eighteenth century, simultaneously followed the Lucretian fear theory and sided with Descartes' view of the intellect. In a characteristic admonition addressed to his contemporaries, Fontenelle highlighted the opposition between imagination and reason as follows:

> Although we are incomparably more enlightened than those whose crude mentality invented the fables in all good faith, we easily recover the same outlook that made these fables so agreeable to them. They glutted themselves on them because they believed them, and we indulge ourselves with just as much pleasure but without believing in them; and nothing could better prove that imagination and reason have rarely any dealing with one another, and that things concerning which reason is fully disabused lose nothing of their appeal to the imagination.[226]

A different point of view, which seems to have had a decisive influence on the whole subsequent history of our subject, was offered by Adam Smith in his *History of Astronomy*, one of the first early-

[222] David Sedley, "Lucretius on Imagination and Mental Projection," *Aitia* 10 (2020), http://journals.openedition.org/aitia/7606.
[223] Unfortunately, I could not access the original French version of this essay, therefore I cite the authorized Russian translation: Zhan Starobinskiy, "'Mify' i 'mifologiya' v XVII–XVIII vekakh," in Idem, *Poeziya i znanie: Istoriya literatury i kul'tury. Vol. 1*, trans. Sergey Zenkin (Moskva: Yazyki slavyanskoy kul'tury, 2002), 100 (emphasis in original).
[224] Wilson, *Epicureanism at the Origins of Modernity*, 2–3, 121–123.
[225] Cited in Pierre Duhem, *The Aim and Structure of Physical Theory*, trans. Philip P. Wiener (Princeton: Princeton University Press, 1954), 87.
[226] Bernard Fontenelle, "Of the Origin of Fables" [1724], in *The Rise of Modern Mythology, 1680–1860*, eds. Burton Feldman and Robert D. Richardson (London: Indiana University Press, 1972), 17; Starobinskiy, "'Mify' i 'mifologiya' v XVII–XVIII vekakh," 101.

modern histories of science (written sometime before 1748, but not published until 1795).[227] As is well known, Smith was a good friend of David Hume and drew heavily on his philosophical ideas, which in turn were largely inspired by the same Epicureanism (and particularly Gassendi, "the foreign parent of British empiricism").[228] Here it should be recalled that, following John Locke, Hume maintained that all human knowledge is based on sense perceptions, but introduced an important distinction between two kinds of them: "impressions" were the result of a direct reaction to external stimuli, while "ideas" or "images" were taken to be their "faint copies" that remained in memory. The process of thinking was supposed to operate exclusively on these kinds of mental copies of sense impressions, linked together by means of what came to be known as the laws of association, of which Hume distinguished three: "RESEMBLANCE, CONTIGUITY in time or place, and CAUSE and EFFECT."[229] Notably, he called them the "universal principles" governing the operations of the imagination, which, as the faculty of forming mental images, was at the heart of Hume's psychologistic epistemology: it occupied a central place in the acquisition of knowledge, including — thanks to the corresponding principle of association — causal knowledge.[230] The basic assumption was that there is no imageless thought, and conversely, that all abstract thought starts with concrete images.[231] This view marked the emergence of the paradigm of associationist psychology that reigned until the beginning of the twentieth century and, as I suggested in the previous chapter, had a tremendous influence on the intellectual history of this entire period.

[227] Rachel Laudan, "Histories of the Sciences and Their Uses: A Review to 1913," *History of Science* 31 (1993): 7–8.
[228] Wilson, *Epicureanism at the Origins of Modernity*, 3. Cf. Ryu Susato, *Hume's Sceptical Enlightenment* (Edinburgh: Edinburgh University Press, 2015), 15–17, 29f.
[229] David Hume, *A Treatise of Human Nature* [1740]. *A Critical Edition, Vol. 1: Texts*, eds. David Fate Norton and Mary J. Norton (Oxford: Clarendon Press, 2007), 13; Idem, *An Inquiry Concerning Human Understanding* [1748] (Oxford: Oxford University Press, 2007), 16–17. While the phrase "association of ideas" was first used in the fourth edition of Locke's *Essay Concerning Human Understanding* (1700), the principles themselves date back to Aristotle's treatise *On Memory* (*De memoria et reminiscentia*), see Howard C. Warren, *A History of the Association Psychology* (New York: Charles Scribner's Sons, 1921), 23–28; cf. Frances A. Yates, *The Art of Memory* [1966] (London: The Bodley Head, 2014), 47–49. It is therefore worth noting that associationism may have been partly the product of the reception of the obscure Greek tradition of the classical art of memory, which emphasized memory for words ("the images in which are to be formed in accordance with the Aristotelean theory of association") and the founder of which was said to be Democritus (who's atomism, as is well known, influenced both Epicurus and Lucretius), see Idem, *Selected Works, Vol. 9. Renaissance and Reform: The Italian Contribution* (London and New York: Routledge, 1983), 62–64. Moreover, Democritus seems to have been the first to employ the fear theory, see Nickolas P. Roubekas, *An Ancient Theory of Religion: Euhemerism from Antiquity to the Present* (London and New York: Routledge, 2017), 35–37. I hope to look more closely into this topic in the future.
[230] This was the basis of Hume's critique of causality (which gave an oft-cited key impetus to Kant's critical philosophy): "He does not explain our associations of ideas from causality, but conversely attributes the latter to the former: with the effect, according to his contemporary critics, of dissolving causality altogether" (Susato, *Hume's Sceptical Enlightenment*, 44).
[231] This assumption also went back to antiquity, particularly to the same Democritus (with his theory of "eidola") and Aristotle. It came under severe psychological criticism only at the end of the nineteenth century through the work of Oswald Külpe's Würzburg School of *Denkpsychologie*, see Ilona Svetlikova, *Istoki russkogo formalizma: Traditsiya psikhologizma i formal'naya shkola* (Moskva: Novoe Literaturnoe Obozrenie, 2005), 57.

In his *History of Astronomy*, Smith adapted this new Humean framework to the history of science (i.e., natural philosophy), linking it to the Aristotelian idea that philosophy was born out of a sense of wonder.[232] In the methodological introduction preceding the main historical part, he described the process that is quite familiar to any researcher today. When we encounter something for which we cannot find a suitable idea or image, we experience the sentiment of wonder, which disorients us and irritates our imagination, prompting it to start searching for an appropriate explanation:

> The memory cannot, from all its stores, cast up any image that nearly resembles this strange appearance. The imagination and memory exert themselves to no purpose, and in vain look around all their classes of ideas in order to find one under which it may be arranged. They fluctuate to no purpose from thought to thought, and we remain still uncertain and undetermined where to place it, or what to think of it. It is this fluctuation and vain recollection, together with the emotion or movement of the spirits that they excite, which constitute the sentiment properly called *Wonder* [...]. What sort of a thing can that be? What is that like? are the questions which, upon such an occasion, we are all naturally disposed to ask.[233]

The same thing, Smith observed, happens when we are dealing not with a single object but with "a succession of objects which follow one another in an uncommon train or order," that is, with natural processes. The observation of the regular behavior of objects is deposited in our minds in the form of corresponding "associations of their ideas" (or images), our imagination becomes accustomed to them, and we stop giving it much thought. But if we happen to observe some strange process that interrupts the usual chains of associations (Smith gave the example of the interaction between a magnet and a piece of iron, which occurs without a visible intermediary and is therefore surprising), imagination again finds itself at a loss and seeks to fill the resulting gap: "The supposition of a chain of intermediate, though invisible, events, which succeed each other in a train similar to that in which the imagination has been accustomed to move, and which link together those two disjointed appearances, is the only means by which the imagination can fill up this interval, is the only bridge which, if one may say so, can smooth its passage from the one object to the other."[234] According to Smith, it was precisely this psychological mechanism that launched the history of natural philosophy, beginning with the ancient man's fear and wonder at the sight of irregular natural phenomena (exactly those of which Lucretius wrote: "Comets,

[232] Which at the time had been losing its former appeal, see Lorraine Daston and Katherine Park, *Wonders and the Order of Nature, 1150–1750* (New York: Zone Books, 1998), 326–327. It is worth noting that, according to Smith, it was not wonder which induced "'confusion and giddiness' in small doses and 'lunacy and distraction' in large" (Ibid., 326), but rather the exhausted imagination itself, see Adam Smith, *Essays on Philosophical Subjects*, eds. W. P. D. Wightman and J. C. Bryce (Indianapolis: Liberty Fund, 1982), 34–35, 43–44.
[233] Ibid., 39 (emphasis in original).
[234] Ibid., 40–42.

eclipses, thunder, lightning, and other meteors"), for the causal explanation of which his imagination produced images of primordial deities, either angry or merciful:

> That they proceed from some intelligent, though invisible causes, of whose vengeance and displeasure they are either the signs or the effects, is the notion of all others most capable of enhancing this passion [of Wonder], and is that, therefore, which he [savage man] is most apt to entertain. [...] The sea is spread out into a calm, or heaved into a storm, according to the good pleasure of Neptune. Does the earth pour forth an exuberant harvest? It is owing to the indulgence of Ceres. Does the vine yield a plentiful vintage? It flows from the bounty of Bacchus. Do either refuse their presents? It is ascribed to the displeasure of those offended deities. [...] Hence the origin of Polytheism, and of that vulgar superstition which ascribes all the irregular events of nature to the favour or displeasure of intelligent, though invisible beings, to gods, daemons, witches, genii, fairies.[235]

Here, returning to the context of the emergence of the idea of mythical thinking as described by Zhmud', it should be pointed out that Smith's *History of Astronomy*, along with Hume's philosophy, was a key influence on the positivism of Auguste Comte: he stated that it had "a more positive character than the other productions of the Scottish philosophy, if one excludes the works of Hume."[236] Above all, Smith provided him with a working model for the history of science and laid the foundation for his "law of three stages," the first of which was directly inspired by Smith's description of polytheism (which Comte supplemented with the concept of fetishism introduced in Charles de Brosses' *Du culte des deux fétiches*, 1760). He also suggested to Comte that "the elementary germ of positive philosophy is quite as primitive, at bottom, as that of theological philosophy," and stimulated his interest in astronomy, about which he lectured and which he considered the primary positive science.[237] According to Lèvy-Bruhl, "Comte like[d] to quote a passage from Adam Smith, where that philosopher remarks that in no time and in no country do we find a god of Weight," proving the point that primitive imagination is concerned only with irregular and wonderful phenomena.[238] This is also where Comte got the notion of the fundamental role of imagination in scientific inquiry, which was baked into his theory of hypothesis: the "scientist was not a passive, mechanical observer as the [Baconian] empiricists believed"; like the ancient fetishist who made primitive "theological hypotheses," the positivist scientist "first had to use his imagination and come up with an explanatory theory simply to be able to make an observation."[239] This juxtaposition was not accidental: unlike some of his predecessors and followers (such as Charles de Brosses and Herbert Spencer who denied ancient people intelligence

[235] Ibid., 48–49.
[236] Mary Pickering, *Auguste Comte: An Intellectual Biography, Vol. 1* (Cambridge: Cambridge University Press, 1993), 306.
[237] Ibid., 308–9, 335–336. Cf. Bernadette Bensaude-Vincent, "L'astronomie populaire, priorité philosophique et projet politique," *Revue de Synthèse* 112, no. 1 (1991): 49–59.
[238] Lucien Lévy-Bruhl, *La Philosophie d'Auguste Comte* (Paris: Félix Alcan, 1900), 49.
[239] Pickering, *Auguste Comte,* 567.

and curiosity[240]), Comte was fascinated by primitive thought and "argued that fetishism should reemerge in positivism. There was a certain symmetry and circularity to history. The highest stage of civilization was in effect a return to the beginning."[241] Thus he recommended using the imagination in other instances as well, again obviously inspired by Smith: "One example of the possible use of this new method in biology might be the placement of 'purely fictitious organisms,' which one hopes to discover later, between organisms already known, to make the biological series more homogeneous, continuous and regular."[242] Therefore, Comte's philosophy — along with those of Johann Wolfgang von Goethe and Giambattista Vico (rediscovered in the late 1820s) — constituted an important line of nineteenth-century thought about scientific epistemology that did not sever its ties with the imagination.[243] It still awaits a detailed study, which may shed some new light on the history of both the natural[244] and the human[245] sciences during this period.

In light of the foregoing discussion, it seems fairly reasonable to conclude that one of the key grounds for the formation of the concept of mythical thinking was the psychologistic notion of the fundamental role of imagination in the process of cognition: it was this framework that allowed to intellectualize myth and see it as a product not of purely poetic fancy, but of a peculiar sort of primitive thinking (the one that operated with concrete images, linked by the laws of association, rather than with the abstract concepts bounded by the Aristotelian laws of logic) and hence a sample of primitive science. It is therefore hardly surprising that the pioneering

[240] See Gustav Jahoda, *Crossroads between Culture and Mind: Continuities and Change in Theories of Human Nature* (Cambridge: Harvard University Press, 1993), 34–35, 110–111.

[241] Pickering, "Auguste Comte and the Return to Primitivism," 57.

[242] Idem, *Auguste Comte,* 568. Since "série" was a keyword in Comte's philosophical program, one wonders whether the novel nineteenth-century taste for serialization was not also prompted by the reign of associationist psychology, cf. Nick Hopwood, Simon Schaffer, and Jim Secord, "Seriality and Scientific Objects in the Nineteenth Century," *History of Science* 48 (2010): 252.

[243] It is telling that in her otherwise excellent article on the history of scientific imagination Lorraine Daston makes no mention of either Comte or Vico and interprets Goethe's attitude towards imagination rather one-sidedly: Lorraine Daston, "Fear & Loathing of the Imagination in Science," *Daedalus* 127, no. 1 (1998): 73–95. On Goethe and imagination, see, for instance, Carlos Cornejo, "From Fantasy to Imagination: A Cultural History and a Moral for Psychology," in *The Psychology of Imagination: History, Theory, and the New Research Horizons*, eds. Brady Wagoner, Ignacio Brescó de Luna, and Sarah H. Awad (Charlotte: Information Age, 2017), 3–46. In a recent investigation of "romantic empiricism," there is no detailed discussion of either imagination or psychology, see Dalia Nassar, *Romantic Empiricism: Nature, Art, and Ecology from Herder to Humboldt* (New York: Oxford University Press, 2022).

[244] I will confine myself to pointing out that, to the best of my knowledge, so far the attempts to explain a puzzling "respect toward visual mental images" among nineteenth-century chemists and physicists have ignored the tradition of psychologism, erroneously attributing it to the isolated influences of the philosophy of Immanuel Kant or William Hamilton, see Alan J. Rocke, *Image and Reality: Kekulé, Kopp, and the Scientific Imagination* (Chicago and London: The University of Chicago Press, 2010), 324–340.

[245] For instance, I suppose that Carlo Ginzburg's observations concerning the explication of the "evidential paradigm" "in the decade 1870–80" (Ginzburg, "Clues: Roots of an Evidential Paradigm," 102), which was based on the employment of the logical operation that Charles Sanders Peirce named abduction, must be seen in the context I have outlined above, as it was directly connected to the use of imaginative hypotheses. Suffice it to mention that Peirce himself claimed that "the true maxim of abduction is that which Auguste Comte endeavored to formulate" in his theory of hypothesis, see Charles Sanders Peirce, *Selected Philosophical Writings, Vol. 2 (1893–1913)* (Bloomington and Indianapolis: Indiana University Press, 1998), 225.

anthropologist Edward Tylor, one of the most famous proponents of this view, expressed it in the already familiar language of associationist psychology. He described "the ordinary state of imagination among ancient and savage men" as being close to "the raving fanatic or the sick in fever," explaining the origin of myth by the intensity of "mythical imagination" along with "the thirst to know the causes operating in every event," and of magic by the faulty associations of ideas: "Man, while still in a low intellectual state, having begun to associate in thought those things which he found in experience to be related in reality, mistakenly reversed this action and concluded that the association in thought must imply a similar association in reality."[246] Tylor was followed by another pioneering figure, James Frazer, who formulated his laws of "magical logic" by analogy with the laws of association: "Magical thinking is based on two principles. The first of them says: the like produces the like, or the effect is like its cause. According to the second principle, things which once came into contact with each other continue to interact at a distance after direct contact ceases. The first principle may be called the law of likeness, and the second the law of contact or contamination."[247]

The crowning achievement of this line of thought, however, came in the work of the Italian ethnologist Tito Vignoli titled *Myth and Science* (*Mito e scienza*, 1880). Proceeding on the same associationist principles and convinced of the universality of the mechanism of creation of imaginative images endowed with causal power, Vignoli described it as an evolutionary reflex for which he coined the term "entification."[248] In a manner that harkened back to the Epicurean tradition, he related human intelligence to the animal one (both respond to frightening stimuli by their "entification," that is, by projecting imaginary causes in the form of animated entities) and presented "entification" as the "eternal law of evolution of intelligence" and the "origin of both myth and science," with the latter evolving from the former.[249] This book was well known in its day, both in Europe and in the Russian Empire, but its particular historical significance lies in the crucial role it played in the intellectual formation of the art historian Aby Warburg, as brilliantly

[246] Tylor, *The Primitive Culture*, 116, 315, 168.
[247] Cited in Svetlikova, *Istoki russkogo formalizma*, 98. These principles were based on the two main laws of association elaborated in Alexander Bain's *The Senses and the Intellect* (1855): "the law of Similarity" and "the law of Contiguity," see Ibid., 87–93.
[248] Tito Vignoli, *Myth and Science. An Essay* (New York: D. Appleton and Company, 1882), 153–154. In essence, it was an attempt to put the phenomenon of the "personification of abstractions," of which John Stuart Mill had previously written (see Chapter 1), into evolutionary perspective: "men, as well as animals, begin by thinking and feeling in a mythical way, owing to the intrinsic constitution of their intellectual life; and while animals never emerge from these psychical conditions, men are gradually emancipated from them, as they become able to think more rationally, thus finding redemption, truth, and liberty by means of science" (Ibid.).
[249] Ibid., 9, 33. For a more detailed exposition, see Giacomo Borbone, Funzione del mito e funzione della scienza nel positivismo atipico di Tito Vignoli," in *Annali della Facoltà di Scienze della Formazione – Università degli Studi di Catania* 18 (2019), 35-54.

described by his successor Ernst Gombrich.[250] Warburg, whose art historical work also drew on the associationist psychological tradition, had suffered from phobias and anxiety attacks throughout life, and he was therefore particularly gripped by "the central role assigned [by Vignoli] to the emotion of fear in the process of projection" and by "Vignoli's vision of human evolution as a victory of rationality over irrational fears":

> The fear of the animal or the primitive is due to a faulty projection of a potent cause or will into any observed movement and this projection of a cause, which Warburg came to call *Ursachensetzung* ("positing of causes"), became one of the cornerstones of his thought. The very motto of his collected fragments towards a psychology of art reflects this preoccupation: "You live and do me no harm" ("Du lebst und tust mir nichts"). We project life into the images of art but we need not fear them; they remain at a distance.[251]

One late result of the reflections inspired by Vignoli's book, which recalls Smith's *History of Astronomy* and its subsequent reception in the positivist writings,[252] can be found in Warburg's unpublished article posthumously titled by Gombrich as "Manet's 'Luncheon on the Grass.' The Formative Function of Pagan Elemental Deities in the Development of the Modern Sentiment of Nature (*Manets Déjeuner sur l'herbe. Die vorprägende Funktion heidnischer Elementargottheiten für die Entwicklung modernen Naturgefühls*, 1929).[253] Tracing the transformation of the central motif of Édouard Manet's famous painting, the mythological image of a nymph first found in antiquity, Warburg pointed out the connection between this transformation and the development of the modern view of nature governed by scientific laws:

> Between the Judgement of Paris on the pagan sarcophagus and Manet's Déjeuner sur l'herbe a fundamental change has occurred in the conception of causality in nature. The completely impersonal character of immanent causality in natural events has chased from the sky the wrangling council of divinities with all their human foibles. The council of seven planets, Rulers of Fate, seems as virulent as ever in the unbroken tradition of astrology but the great Olympian gods were no longer worshipped once they had been archaeologically sterilised.[254]

As the ending of this fragment indicates, Warburg was still somewhat preoccupied by the idea that the "survivals" (Tylor's key term) of superstitious primitive mentality continue to haunt the modern rational mind, as they haunted him personally: in 1918 his work on astrological imagery led to an acute psychosis, which resulted in him having to spend almost five years in Ludwig

[250] Ernst Gombrich, *Aby Warburg: An Intellectual Biography* (London: The Warburg Institute, 1970), 68–72.
[251] Ibid., 71.
[252] Cf. the fragments by Camille Flammarion and Henri Poincaré cited in Ilona Svetlikova, Maria Fesenko, and Nikita Kalinovsky, "Nebo i zakony: astronomiya, astrologiya i pozitivizm na rubezhe XX v.," *Filosofiya. Zhurnal Vysshey shkoly ekonomiki* 3, no. 4 (2019): 95–97.
[253] For a discussion of the concept of *Naturgefühl*, see Chapter 3.
[254] Aby Warburg, "Manet and Italian Antiquity," *Bruniana & Campanelliana* 20, no. 2 (2014): 467.

Binswanger's psychiatric sanatorium in Kreuzlingen.[255] In this respect, Warburg was intimately bound to the line of thought dating back to Plato that — in the words of his junior colleague Edgar Wind — harbored "a sacred fear of the imagination," which "lies in wait as the most powerful enemy" and "breaks out against all civilizing restraints like a savage who takes delight in grimacing idols."[256] More or less the same concerns guided Pavel Florensky's parents when they forbade him to read fairy tales and tried to "educate his mind free from the survivals of human history, squarely on the scientific worldview."[257]

Florensky himself obviously represented exactly the opposite view. Although he wrote about his fear of the spirits of nature with reference to the same Lucretian fear theory,[258] he was fascinated by superstitious primitive thought (not unlike Comte, but to a much greater extent) and simply adored all things mystical and occult. To all appearances, he earnestly believed in the existence of otherworldly beings: for example, one of his former classmates at the Moscow Theological Academy, whom he had for a time helped with the studies and supported emotionally, was described in Florensky's memoirs as a veritable *upyr'* (a vampire from Slavic folklore) that sucked "vital energy" out of him.[259] Furthermore, he was eagerly engaged in astrology, about the "renaissance" of which he spoke to his students,[260] as well as other esoteric practices such as self-hypnosis and yoga, which were combined with Christian asceticism: during his time at the Academy he reportedly slept on "a bed of bare boards with a log instead of a pillow."[261] It is not surprising, therefore, that in spite of Florensky's priestly status, some of his contemporaries remembered him as an extraordinarily enigmatic figure:

> He was a man quite unlike any other. "A clever and cruel monastery priest" — thus one who had been closest to him described him later, in exile. And he would add: "There was something creepy about him." I

[255] Gombrich, *Aby Warburg*, 215–216. It was likely Warburg's interest in astrology and primitive mentality, which determined the selection of books in his renowned research library, that led the philosopher and intellectual historian Ernst Cassirer to become interested in the problem of mythical thinking: his essay on "The Form of the Concept in Mythical Thinking" (1922), published in the *Studien der Bibliothek Warburg* series, became the foundation for the entire second volume of the *Philosophy of Symbolic Forms* (1925). These works decisively broke with the preceding psychological tradition and translated the problem of mythical thinking into the language of neo-Kantian philosophy, turning myth into a form of understanding and structuring the world in accordance with the unfamiliar but essentially rational conceptual apparatus, some of the features of which Cassirer attempted to describe. Deliberately omitted in Zhmud's account (Zhmud' "On the Concept of 'Mythical Thinking'," 155, note 1), they are nevertheless essential for understanding the reception of this concept in the Soviet context, where Cassirer's work was read through Nikolai Marr's linguistics combined with Lèvy-Bruhl's ethnology, resulting in a partial retranslation from the neo-Kantian back into the psychological language, cf. Izrail' Frank-Kamenetskiy, "Pervobytnoe myshlenie v svete yafeticheskoy teorii i filosofii," *Yazyk i literatura* 3 (1929): 70–155.

[256] Edgar Wind, *Art and Anarchy* (London: Faber and Faber, 1960), 2–3.

[257] See Chapter 1.

[258] See Chapter 3.

[259] Florensky, *Iz moey zhizni*, 310–316.

[260] Idem, *Sochineniya, Vol. 3(2)*, 365, 374, 379, 408, 490–491.

[261] Idem, *Iz moey zhizni*, 314. Cf. J. Alexander Ogden, "Russian Modernity Meets Yoga," in *Reframing Russian Modernism,* ed. Irina Shevelenko (Madison, London: University of Wisconsin Press, 2018), 223–244.

> should put it more exactly: "something awesomely creepy," demoniac or diabolical, and yet holy. It is difficult to put this impression into words. [...] I felt that Florensky possessed immense spiritual experience and was endowed with hypnotic power. His own asceticism was beyond doubt. It was manifest that he had undergone a complete and thorough training in "religious intellectual practice," possibly following the Russian Orthodox monastic tradition, but more probably also in other ways. [...] He lived in his own closed, ascetic, intensely intellectual world and in the world of his secret "spiritual exercises." He never talked about it, and when I questioned him he would give some evasive answer or none at all. Yet I had good reason to assume that he at times engaged in Yogic exercises and was well acquainted with Hindu mysticism.[262]

The relevant context explaining why a Christian priest might have had a vivid interest in Hindu (i.e., Aryan) mysticism will be laid out in the following chapter. For now, let us move on to the discussion of one of Florensky's favorite esoteric ideas — that of the fourth dimension.

The Fourth Dimension and "The Extension of Our Senses"

There are many studies devoted to the history of the idea that in addition to the known three dimensions of space there is also a mysterious fourth spatial dimension potentially accessible to comprehension and experience, but none of them, to my knowledge, have pointed out its crucial connection to the context described above. As is well known, its emergence was prompted by the development of non-Euclidean geometry in the first half of the nineteenth century.[263] Importantly, from the philosophical point of view, it was originally an empiricist project aimed at undermining Immanuel Kant's view of the axioms of Euclidean geometry as expressions of the transcendental form of sensibility and, consequently, of their universal and necessary character.[264] The mathematician Nikolai Lobachevsky, steeped in contemporary anti-Kantian debates, adhered to the empiricist epistemology, and it was precisely this philosophical equipment that helped him rebel against Euclid and develop his alternative "imaginary geometry."[265] Lobachevsky's discovery was first published in a paper "On the Principles of Geometry" (*O nachalakh geometrii*, 1929), a year before the first volume of Comte's *Course of Positive Philosophy* (1930) came out. Although there was

[262] Leonid Sabaneeff, "Pavel Florensky — Priest, Scientist, Mystic," Russian Review 20, no. 4 (1961): 312–313. Cf. the memoir of one of his students from the Moscow Theological Academy: "I was walking along Vifanskaya (now Komsomolskaya) Street toward the railroad line. [...] Suddenly the figure of Florensky in his usual black cassock appeared from around the corner of Valovaya Street. [...] There was something mysterious in his whole appearance. [...] Florensky's footsteps were hardly audible in the icy silence, and it seemed that he was not walking, but slowly flying in the midst of a dazed sleeping world. At that moment I saw not the familiar professor whose lectures I had listened to with such enthusiasm, but a mysterious magician from the ancient country of Mitzrayim, flying away into a distance unknown to us... (Sergey Volkov, *Poslednie u Troitsy: Vospominaniya o Moskovskoy dukhovnoy akademii (1917–1920)* (Sankt-Peterburg: Dmitriy Bulanin, 1995).

[263] The standard account may be found in Henderson, *The Fourth Dimension*, 101–143.

[264] See, e.g., Ernst Cassirer, *The Problem of Knowledge: Philosophy, Science, and History since Hegel*, trans. William H. Woglom and Charles W. Hendel (New Haven: Yale University Press, 1950), 21–46.

[265] Alexander Vucinich, "Nikolai Ivanovich Lobachevskii: The Man Behind the First Non-Euclidean Geometry," *Isis* 53, no. 4 (1962): 474–476.

apparently no direct connection between these works, their authors were nevertheless united by important intellectual presuppositions rooted in their shared adherence to the empiricist tradition,[266] the understanding of which is necessary to fully appreciate the rise and appeal of the idea of the fourth dimension (and of other occult conceptions besides).

One of these tacit presuppositions was most aptly pointed out by the neo-Kantian philosopher Ivan Lapshin, whose works are replete with insightful remarks on intellectual history.[267] Comparing Kant and Comte, he highlighted the latter's unconscious tendency to conflate what the former distinguished as the supersensible (*Übersinnliches*) and the unobservable (*Nichtsinnliches*), or metaphysical (logically contradictory) and "metapsychical" (unimaginable due to the limitations of sense perception).[268] Thus Comte was inclined to recognize as metaphysical — that is, unknowable[269] — exactly that which was not directly accessible to the senses: too remote in space (he infamously argued that we shall never know the chemical composition of the stars), too remote in time (the origin of organisms), too small or subtle in space (the luminiferous aether), and too fleeting in time (psychological processes). "The study of psychically elusive or insensible phenomena seems to Comte 'profondement contradictoire.' Consequently, in the psychically inaccessible he sees the logically impossible."[270] Lapshin found an explanation for this tendency in Comte's understanding of logic as part of anatomy and physiology, which he had developed under the influence of the physiologist Xavier Bichat.[271] Furthermore, he registered the same habit of thought in other prominent positivists like John Stuart Mill and Henry Thomas Buckle — and also in Lobachevsky, who for this very reason undertook to experimentally "test the axioms of geometry by measuring astronomical triangles," i.e. the shape of physical space.[272] What is at stake here are the effects of the same empiricist tradition, which through its predominance in psychology

[266] This affinity was noticed and elaborated upon by a student at Kazan University, Lobachevsky's alma mater, who claimed that Comte was the first philosopher to raise the question of the empirical origin of geometrical axioms, see Nikolai Reingardt, *Neevklidova geometriya i positivizm* (Kazan': Tipografiya I. S. Perova, 1897). On Comte's criticism of Euclidian geometry and Newtonian space, see Boris A. Rosenfeld, *A History of Non-Euclidean Geometry: Evolution of the Concept of a Geometric Space*, trans. Abe Shenitzer (New York: Springer-Verlag, 1988), 199–201. It is worth noting that another candidate for discovering the empirical nature of geometrical axioms was the sophist Protagoras, see Theodore Gomperz, *Greek Thinkers: A History of Ancient Philosophy, Vol. 1* [1896], trans. Laurie Magnus (London: John Murray, 1901), 455.

[267] Among other things, he was the author of an incredibly rich book on the problem of scientific imagination, see Ivan Lapshin, *Filosofiya izobreteniya i izobretenie v filosofii: Vvedenie v istoriyu filosofii* [1922] (Moscow: Respublika, 1992).

[268] Idem, *Zakony myshleniya i formy poznaniya* (Sankt-Peterburg: Tipografiya F. Bezobrazova i Ko, 1906), 162–169. For a more detailed discussion of this distinction in Kant, see Rae Langton, *Kantian Humility: Our Ignorance of Things in Themselves* (Oxford: Clarendon Press, 1998), 186–204.

[269] Later, Herbert Spencer made such metaphysical "Unknowable" an important element of his system, thus leaving the possibility of religion, see Bernard Lightman, *The Origins of Agnosticism: Victorian Unbelief and the Limits of Knowledge* (Baltimore: Johns Hopkins University Press, 1987), 68–90.

[270] Lapshin, *Zakony myshleniya*, 165–166.

[271] Ibid., 166. On Comte's self-attested debt to Bichat, whom he considered "his main scientific predecessor" (along with Hume and Franz Joseph Gall), see Pickering, *Auguste Comte*, 305.

[272] Lapshin, *Zakony myshleniya*, 166–167.

largely determined the epistemological views throughout the nineteenth century. The possibility of conducting an empirical test on space (previously considered either an attribute of nature itself or, after Kant, an ideal form of sensibility) was not suggested by the emergence of non-Euclidean geometry, as it is sometimes understood.[273] Rather it was the other way around: the very idea of the possibility of such a test emerged from the empiricist critique of Kantianism, which was based simultaneously on the psychologization of the transcendental and on the premise that all conceptual structures must necessarily take root in experience (thus Lobachevsky stated that all "concepts must be learned by the senses — the inborn ones must not be trusted").[274]

Despite Comte's rejection of psychology as a scientific discipline, his views on logic as part of anatomy and physiology were fully in line with what historians of philosophy usually call psychologism: until the beginning of the twentieth century, when the Kantian conception of Aristotelian logic as an ideal form was resuscitated by the neo-Kantians and Edmund Husserl, it was widely believed that since logical inferences are carried out by thinking, they must be described as psychological — and ultimately physiological and biological — processes.[275] This, in turn, served as the foundation for the positivist principle of the relativity of knowledge, which was based precisely on the specificity of the human organism and the limitations of its senses. Lèvy-Bruhl, whose version of mythical thinking was characterized by the same conflation between the metaphysical and the metapsychical,[276] accurately pointed out the philosophical pedigree of this relativistic outlook:

> Comte takes up here an idea dear to the philosophers of the eighteenth century, and in particular to Diderot. If our organization was different, the data that our science draws up would be different. With more organs, we would perhaps grasp the kinds of phenomena of which we have no idea. Let us suppose that our species is blind: astronomy would not exist for it. […] Science is thus relative, in this sense, to our organization, which is itself relative to the environment in which we live.[277]

[273] See, for example, Henderson, *The Fourth Dimension*, 115.
[274] Cited in Rosenfeld, *A History of Non-Euclidean Geometry*, 208.
[275] See Rolf George, "Psychologism in Logic: Bacon to Bolzano," *Philosophy & Rhetoric*, 30, no. 3 (1997): 213-242. A standard account of philosophical psychologism and its early twentieth-century demise can be found in Martin Kusch, *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (London and New York: Routledge, 1995). It is all the more curious that it was not the Hegelian Johann Eduard Erdmann who first used the term "psychologism," as Kusch maintained (Ibid., 98–99), but Auguste Comte himself, see Jean-François Braunstein, "The French Invention of 'Psychologism' in 1828," *Revue d'histoire des sciences* 65, no. 2 (2012): 197–212.
[276] Towards the end of his life, having publicly renounced his conception of primitive mentality, Lèvy-Bruhl acknowledged that throughout his career "he was not careful to distinguish logical contradictions from physical impossibilities" (Schmaus, "Lévy-Bruhl, Durkheim, and the Positivist Roots of the Sociology of Knowledge," 428).
[277] Lévy-Bruhl, *La Philosophie d'Auguste Comte*, 83–84. This is almost a literal paraphrase of Auguste Comte, *Traité philosophique d'astronomie populaire* (Paris: Carilian-Goeury et V. Dalmont, 1844), 19–20.

Eighteenth-century empiricists, who believed, as the physiologist Pierre Jean Georges Cabanis did, that "physical sensibility is the source of all the ideas,"[278] were indeed interested in the epistemological implications of the relativity of the senses: some in the absence of those already present, like Denis Diderot in his *Letter on the Blind* (*Lettre sur les aveugles à l'usage de ceux qui voient*, 1749), others in the yet unknown new ones, like Voltaire in the *Micromégas* (1759) with its Sirian inhabitants boasting of a thousand senses.[279] The important nineteenth-century novelty, however, was that such interests were now informed by a new biological conception according to which the environment (or "milieu") completely determined the development of an organism and its cognitive capacities. Introduced by Jean-Baptiste Lamarck in the late eighteenth century, it had a strong influence on contemporary intellectual life.[280] While Comte did not adopt it in the strictly biological sense, sticking to the older "preformationist" view that "an organism's nature was fixed and unmodifiable through contact with the external world," it influenced his naturalized conception of intelligence as "nothing more than the functional relationship an embodied organism had with its environment."[281] In the second half of the nineteenth century, this biologically oriented epistemology was embraced by philosophers like Herbert Spencer and Ernst Mach, making it the basis of the descriptionist image of science.[282] An important point to note here is that all of these positivist thinkers seemed to think that the form of human "organization" was final, that "the process of adjustment of the human cognitive functions [to the nature of reality] was basically completed and that, minor modifications apart, no basic revision of the nineteenth-century picture of reality would be required."[283] Yet the possibility remained that if the senses could be altered, the whole picture of reality would be different as well — and this possibility was duly noted by some attentive contemporaries. In his 1861 critical essay on the problem of the plurality of worlds, which continued to be the subject of a lively debate throughout the nineteenth century,[284] the philosopher Nikolai Strakhov, a close friend and correspondent of Leo Tolstoy, attacked Comte on this very issue:

[278] Cited in Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago: The University of Chicago Press, 2002), 4.
[279] Here it is interesting to mention Lapshin's observation that "the idea of the possibility of special senses in some creatures was first expressed, it seems, by the ancient atomists. [...] In modern philosophy it is revived by Gassendi (Lapshin, *Zakony myshleniya*, 259).
[280] John Tresch, *The Romantic Machine: Utopian Science and Technology after Napoleon* (Chicago, London: University of Chicago Press, 2012), 4ff. Comte largely contributed to its popularization, being one of the first to systematically use the term "milieu" in the new sense, see Leo Spitzer, "Milieu and Ambiance," in Idem, *Essays in Historical Semantics* (New York: S. F. Vanni, 1948), 210–216.
[281] Ryan McVeigh, "Organism and Environment in Auguste Comte," *History of the Human Sciences* 34, no. 3-4 (2021): 6–7.
[282] Milič Čapek, "Ernst Mach's Biological Theory of Knowledge," *Synthese* 18, no. 2/3 (1968): 171–191.
[283] Ibid., 188.
[284] See Michael J. Crowe, *The Extraterrestrial Life Debate, 1750–1900: The Idea of the Plurality of Worlds from Kant to Lowell* (Cambridge: Cambridge University Press, 1986).

> Incidentally, Auguste Comte, the philosopher who tries to limit human knowledge and believes that we can know nothing about the stars, boldly accepts the new senses and, therefore, asserts his right to inhabit the most distant worlds with inhabitants having a life different from ours. [...] But is this argument valid? Of course, Comte is quite right in saying that acquiring a new sense would reveal new facts to us, but it does not follow from this that new senses could exist. If they were possible, it would be very good to acquire them, but if they are not there at all, there is no need to praise them and no reason to reach for them. [...] Generally speaking, one can only be deprived of that which really exists; one can only acquire that which really exists, so one may be deprived of one of our really existing senses — one may also acquire it if it has been lost. But from this point no logic can reach the conclusion that there are still many unknown senses. If we are deprived of them, it may be for a very simple and good reason — because they do not exist at all.[285]

Strakhov proceeded from the assumption that the human organism is "a godlike perfection and possesses the fullest system of the senses," and therefore strongly — and apparently consciously since he was an active opponent of spiritualism[286] — underestimated the possibility of speculation about other senses. He would not have liked what came next.

As a matter of fact, the idea of the fourth dimension was a product of just such a speculation. The standard way of explaining it was first put forward by the renowned mathematician Carl Friedrich Gauss, who conceived of the possibility of non-Euclidean geometry as early as 1824 (likewise trying to test it empirically[287]) and at the same time believed in the intelligent inhabitants on the moon and other planets, even suggesting some possible ways of contacting them.[288] According to his biographer, Gauss invited his students to imagine intelligent creatures living on a two-dimensional plane ("like infinitely attenuated book-worms in an infinitely thin sheet of paper") and hence having no idea of the third dimension, concluding by analogy that there may exist a fourth dimension that is likewise inaccessible to our human senses.[289] In print, this "dimensional analogy" first appeared in a humorous story by Gustav Theodor Fechner entitled

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[285] Nikolay Strakhov, *Mir kak tseloe: Cherty iz nauki o prirode* (Sankt-Peterburg: Tipografiya K. Zamyslovskogo, 1872), 247–248.

[286] Ibid., 213–214. On Strakhov, Tolstoy, and spiritualism, see Michael Gordin, "Tolstoy Sees Foolishness, and Writes: From *On Life* to *Fruits of Enlightenment*, and Back Again," in *A Critical Guide to Tolstoy's* On Life*: Interpretative Essays*, ed. Inessa Medzhibovskaya (DeLand: Tolstoy Studies Journal, 2019), 109–113.

[287] Henderson, *The Fourth Dimension*, 115.

[288] Either by light signals transmitted with the help of the heliotrope (the instrument he invented in 1821), or by erecting, on the planes of Siberia, "a giant figure in the shape of the 'windmill' diagram used in Euclid's demonstration of the Pythagorean theorem" (Crowe, *The Extraterrestrial Life Debate*, 205–208). Curiously, the apocryphal proposition about Pythagoras' theorem implies that Gauss had not yet supposed that the inhabitants of other planets could have developed a different, non-Euclidean geometry. It was apparently the case of Gauss that Strakhov tried to recall while proving the idea that the laws of Newtonian mechanics and the theorems of Euclidean geometry "are valid everywhere without exception": "A highly ambitious project of communication with the inhabitants of the Moon was once built on this idea. Some scientist, probably German, suggested to some government, probably the Russian one, that some geometrical drawing, such as the drawing of Pythagoras' theorem, should be depicted by bright lights over large spaces somewhere. The inhabitants of the moon, who probably rejoiced at the discovery of this theorem no less than Pythagoras himself and may also have sacrificed a hundred moon bulls to the gods for it, would no doubt recognize the drawing and kindly answer us with another drawing. The scientist seems to have added that if this method had failed, that is, if it turned out that the inhabitants of the moon did not know geometry, we would at least be convinced that they were not worth getting acquainted with" (Strakhov, *Mir kak tseloe*, 223).

[289] Henderson, *The Fourth Dimension*, 101, 115.

"The Space Has Four Dimensions" (*Der Raum hat vier Dimensionen*, 1846) and was then used by Hermann von Helmholtz in his popular lecture "On the Origin and Meaning of Geometric Axioms" (*Über den Ursprung und die Bedeutung der geometrischen Axiome*, 1876), in the wake of which it finally captured the attention of both professional and lay public.[290] Notably, while Helmholtz used the Kantian term "intuition" (*Anschauung*) to refer to sense perception, his argumentation was based on the empiricist model that established a direct link between impression and image, which led him to tacitly take "imaginability as proof of perceptual possibility."[291] Though he tried to distinguish non-Euclidean space, which the mind could intuit and imagine, from the fourth dimension, which it could not, his use of the dimensional analogy led him to connect the existence of the latter with the character of the human senses: "As all our means of sense-perception extend only to space of three dimensions, and a fourth is not merely a modification of what we have, but something perfectly new, we find ourselves by reason of our bodily organization quite unable to represent a fourth dimension."[292]

The impossibility of imagining something completely new was a standard leitmotif in psychological literature: "The constructive activity of the imagination is limited to experience; it can only combine what is given by experience; there is no absolutely new construction."[293] At the same time, definitions of the scientific imagination emphasized that it "deals with images that our senses would obtain under other conditions of observation that are actually inaccessible to us. If these conditions were attainable, they would make subject to sensual observation what is now accessible only to the scientific imagination."[294] With this context in mind, it becomes understandable why Charles Howard Hinton, the main fin-de-siècle proponent of the idea of the fourth dimension and "four-dimensional thinking," recommended developing the latter precisely by training the faculty of imagination.[295] For this purpose he devised his famously cumbersome

[290] Ibid., 112. On its British reception, see Blacklock, *The Emergence of the Fourth Dimension*, 32–40.
[291] Without acknowledging its intellectual origins, this premise was pointed out in Wayne H. Stromberg, "Helmholtz and Zoellner: Nineteenth-Century Empiricism, Spiritism, and the Theory of Space Perception," *Journal of the History of the Behavioral Sciences* 25 (1989): 373. As a side note, I would like to mention that the same applied in the case of Goethe, in whose philosophical vocabulary *Anschauung* was a favorite word: the *Goethe-Wörterbuch* lists about 770 entries in total, see Iris Hennigfeld, "Anschauung, Anschauen (Intuition)," *Goethe-Lexicon of Philosophical Concepts* 2, no. 2 (November 5, 2021), https://goethe-lexicon.pitt.edu/GL/article/view/49. This seems to be the reason why Goethe initially believed his archetypal plant (*Urpflanze*) to be quite real and perceivable, until the poet Friedrich Schiller, a faithful Kantian, explained to him otherwise, see Robert Richards, *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe* (Chicago and London: The University of Chicago Press, 2002), 423–425.
[292] Hermann von Helmholtz, *Popular Lectures on Scientific Subjects*, trans. E. Atkinson (New York et al.: Longmans, Green, and Co., 1908), 64.
[293] Georgy Chelpanov, "Voobrazhenie," in *Entsiklopedicheskiy slovar',* eds. F. A. Brokgauz and I. A. Efron (Sankt-Peterburg: Tipo-Litografiya I. A. Efrona, 1892), 185.
[294] Nikolay Lyubimov, *Istoriya fiziki. Opyt izucheniya logiki otkrytiy v ikh istorii. Ch. 2. Period srednevekovoy nauki* (Sankt-Peterburg: Tipografiya V. S. Balasheva i Ko, 1894), 152. Cf. Lapshin, *Filosofiya izobreteniya i izobretenie v filosofii*, 103.
[295] Charles Howard Hinton, "On the Education of the Imagination," in Idem, *Scientific Romances. Second Series* (London: Swan Sonnenschein, 1896), 3–22.

method of handling and memorizing multicolored cubes, which stemmed from Friedrich Wilhelm August Fröbel and the tradition of the German empiricist *Anschauungspädagogik*.[296] Just as playing with Fröbel's "gifts" was supposed to develop the senses, cultivate the imagination, and "foreshadow in the mind of the child" its future ethical and spiritual "evolution,"[297] Hinton's cube system was intended to provide a glimpse into "a new era of thought," characterized by a new hyperspace philosophy and new relativistic morality. Notably, in both cases the ability to imagine something served as proof that it could become a matter of experience.

It is important to highlight the details of Hinton's argument. Relying on the widespread notion that there are as many types of mental images as there are senses (so that they can be not only visual, but also auditory, tactile, motor, and so on[298]), he suggested "that, just as an object may be brought before the consciousness by an act of imaginary vision, so an imaginary sensation of touch may be produced":

> I have tried a great many experiments with this aim, but have not succeeded in getting beyond rudimentary indications of such a possibility. From this point of view it might be worth while to inquire whether those extraordinary manifestations which are reported to take place through what are called "mediums," may not be the result of a brain organization of incomparably greater delicacy and efficiency in this respect than that of ordinary people. If this were so, it would be difficult to set any limits to the results which might be achieved by such persons, if their powers were disciplined and brought under the control of their will.[299]

There was nothing particularly odd about such a reference to "extraordinary" people. Professional scientists, like the eminent psychiatrist Jean-Martin Charcot, explained miraculous phenomena like "faith healing" as an effect of mental images produced by specifically organized individuals: "the *miraculeuses* generated mental images internally from what Charcot called the brain's 'center of ideation.' Those images acted powerfully on the senses, thereby altering physical symptoms — pain vanished, a paralyzed limb became functional once again, blindness gave way to sight."[300] For many, like for Hinton, there could be no better confirmation not only of the power of imagination but also of the veracity of extrasensory abilities, the examples of which abounded since the time of Franz Anton Mesmer.[301] Nineteenth-century literature was filled with descriptions of romantic

[296] Blacklock, *The Emergence of the Fourth Dimension*, 121–122. On this pedagogical tradition, see Tobias Teutenberg, *Die Unterweisung des Blicks: Visuelle Erziehung und visuelle Kultur im langen 19. Jahrhundert* (Bielefeld: Transcript Verlag, 2019).
[297] James L. Hughes, *Froebel's Educational Laws for All Teachers* (New York: D. Appleton and Company, 1897), 32.
[298] Svetlikova, *Istoki russkogo formalizma*, 45.
[299] Hinton, "On the Education of the Imagination," 8. On the connection between tactile and motor sensations with the fourth dimension, see Linda Dalrymple Henderson, "The Image and Imagination of the Fourth Dimension in Twentieth-Century Art and Culture," *Configurations* 17, no. 1 (2009): 144.
[300] Katrin Schultheiss, "The Internal Image: Mind and Brain in the Age of Charcot," *Modern Intellectual History* 18, no. 1 (2021): 2–3.
[301] On the legacy of mesmerism in the nineteenth century, see Robert Darnton, *Mesmerism and the End of the Enlightenment in France* (Cambridge and London: Harvard University Press, 1968), 126–159.

somnambulists, mediums, and other "human subjects of 'sensitive' nature,"[302] who by virtue of their special physiological organization were supposedly capable of transcending the bounds of space and time, contacting intangible spirits, and performing many other incredible feats.

Scholars have repeatedly drawn attention to the tendency to view and use mediums and clairvoyants as tools of scientific inquiry during this period,[303] but have not, as far as I know, pointed out that the origins of this tendency most likely lay in the Lamarckian view of intelligence discussed above, which regarded "machines and tools [...] as new organs modifying humans' relation to their environment."[304] Explicitly formulated at the very end of the second volume of Alexander von Humboldt's widely read *Kosmos* (1847), where he claimed that the "creation of new organs or instruments of observation augments the intellectual, and often also the physical powers of man," this idea was picked up in Herbert Spencer's *Principles of Psychology* (1855) and then famously developed in Ernst Kapp's *Elements of a Philosophy of Technology* (*Grundlinien einer Philosophie der Technik. Zur Entstehungsgeschichte der Cultur aus neuen Gesichtspunkten*, 1877) under the name of "organ projection" (*Organprojektion*), according to which technical inventions were outward projections of parts of the human body — the hammer being the projection of the fist, the camera obscura of the eye, and so on.[305] This organicist view of the nature of technology became exceedingly popular at the turn of the twentieth century, both in Europe and in the Russian Empire, turning into an enduring part of the modernist intellectual culture.[306] Among other contemporary writings, it was popularized by the German physicist Otto Wiener's lecture on *The Extension of our Senses* (*Die Erweiterung unserer Sinne*, 1900), to which Ivan Lapshin drew attention as he concluded his observations on the mental habits of the positivists, ironically noting that "the enormous advances of modern science in the field of measuring instruments, 'the extension of our senses,' may give rise to futile dreams concerning the realm of the supersensible," i.e. metaphysical.[307] Judging by his perceptive remarks on the psychological affinity between

[302] Richard Noakes, *Physics and Psychics: The Occult and the Sciences in Modern Britain* (Cambridge: Cambridge University Press, 2019), 34.
[303] Idem, "'Instruments to Lay Hold of Spirits': Technologizing the Bodies of Victorian Spiritualism" in *Bodies/Machines*, ed. Iwan Rhys Morus (London: Bloomsbury Academic, 2002), 125–164; Wouter J. Hanegraaff, "Magnetic Gnosis: Somnambulism and the Quest for Absolute Knowledge," in *Die Enzyklopädik der Esoterik: Allwissenheitsmythen und universalwissenschaftliche Modelle in der Esoterik der Neuzeit*, eds. A. B. Kilcher und P. Theisohn (Paderborn: Wilhelm Fink, 2010), 259–275.
[304] Tresch, *The Romantic Machine,* 5.
[305] Alexander von Humboldt, *Cosmos: Sketch of a Physical Description of the Universe. Vol. 2.*, trans. Edward Sabine (London: Longmans & Murray, 1854), 358 (cited in Tresch, *The Romantic Machine*, 80–81); Herbert Spencer, *Principles of Psychology* (London: Longman, Brown, Green, and Longmans, 1855), 461–462; Ernst Kapp, *Elements of a Philosophy of Technology: On the Evolutionary History of Culture* [1877], trans. Lauren K. Wolfe (Minneapolis and London: University Of Minnesota Press, 2018). Notably, in the introduction to his work, Kapp also invoked the authority of Protagoras (Ibid., 8).
[306] See, for instance, Jeffrey Herf, *Reactionary Modernism: Technology, Culture, and Politics in Weimar and the Third Reich* (New York: Cambridge University Press, 1984), 157–158. On the Russian context, see Oksana Sedykh and Maksim Khamenkov, "Organoproektsiya: russkiy kontekst," *Filosofiya nauki i tekhniki* 21, no. 1 (2016): 132–151.
[307] Lapshin, *Zakony myshleniya*, 168.

empiricism and mysticism, Lapshin must have been well aware that in fact, of course, it did give rise to precisely such dreams.[308] This is what happened with the idea of the fourth dimension: shortly after the publication of Helmholtz's lecture, its existence was "experimentally confirmed" by the astronomer Johann Karl Friedrich Zöllner, who used the medium Henry Slade as his scientific instrument.[309]

Pavel Florensky's reasoning grew out of this intellectual context, with which he was intimately familiar. He devoted detailed chapters of his unfinished philosophical compendium *At the Watersheds of Thought: The Elements of a Concrete Metaphysics* (*U vodorazdelov mysly: Cherty konkretnoi metafisiki*, 1917–1922) to the ideas of "the extension our senses" and "organ projection," where he argued that it was possible for humanity to restore the perceptual and cognitive capacities lost after the fall of man (thereby circumventing Nikolai Strakhov's objection that one may acquire only those senses that have been lost).[310] Characteristically, Florensky's descriptions of the incredible sensitivity of modern scientific instruments in comparison to normal human senses (a prominent example here, as in some other authors, was Friedrich Paschen's galvanometer, which was "about 10,000 times more sensitive than the eye and ear"[311]) were constantly juxtaposed with instances of extrasensory abilities borrowed from esoteric literature. Demonstrating the ability of extraordinarily organized individuals to grasp what is inaccessible to the most sophisticated instruments — as in the cases of the refined "pressure sensitivity in so-called mind-readers" and the "extremely acute sense of smell" in hysterical people — they essentially proved Ferdinand Brunetière's point that Florensky might have encountered back in 1902: the positivist principle of the relativity of knowledge, based on the relativity of the senses, was the key to all future metaphysics, including Christian metaphysics.[312] In 1904, arguing for the possibility of Christian mysticism, Florensky referred to "sensitives, visionaries, seers — people with a special organization," who have a special "eucharistic instinct" (*flair eucharistique*) and "can identify sacred things of all kinds — relics, consecrated objects and, especially, the Holy Gifts."[313] One example of such a human instrument was the German visionary Anne Catherine Emmerich:

> The light invisible to others and the special shades of that light enabled her to distinguish among outwardly identical objects not only the Holy Gifts, but also all that the Church has blessed with its sacraments,

[308] "It is curious to note the general illusion of conceivability of the content of [logically] contradictory judgment among the representatives of empiricism and mysticism: both here and there the common source of illusion is in the indistinct juxtaposition of the contradictory elements of representation: it is equally observed in [John Stuart] Mill, [...] and in the mystics (Ibid., 265). Lapshin appended to his book a lengthy essay entitled *On Mystical Knowledge and the "Universal Sense"* (*O misticheskom poznanii i "vselenskom chuvstve"*).

[309] Stromberg, "Helmholtz and Zoellner"; Treitel, *A Science for the Soul*, 3–17.

[310] Florensky, *Sochineniya. Vol. 3(1)*, 373–421; Yushin, "The Cover of the Journal *Makovets,*" 187, note 62.

[311] Florensky, *Sochineniya. Vol. 3(1)*, 400.

[312] See Chapter 1.

[313] Florensky, *Sochineniya. Vol. 1*, 179.

> especially the remains of saints and relics. The ordinariness of such perceptions, attested to by many scholars, led one of Emmerich's friends to call her a sacrometer.[314]

The same logic underpinned Florensky's speculations about "four-dimensional" or "synthetic" vision, which he regarded as a model of how saints and mystics see the world: "Whole vast periods of world history, or even the whole universe, sometimes gather before the spiritual eye in a single focus. [...] This is how the life of the world, in its entirety, is perceived."[315] He admitted the secular "methods of distillation of new capabilities," suggested by Hinton and popularized in Russia by Pyotr Uspensky, to be effective, but considered them "unnatural" and "violent" to the "spiritual organism," defining the fourth dimension as "the depth of the world, which can be perceived only by a righteous soul."[316] And while this perception of the world's primordial wholeness had as yet remained the preserve of "the purified God-bearing mind of saintly ascetics" and Christian mystics, in the future it was bound to become the domain of all:

> We are completely deprived of the ability to see and recognize the four-dimensionality of the world. The multiplicity of similar objects can then be explained by their projectivity: it is a three-dimensional projection of a single four-dimensional object. But the moment our eyes are opened, and the world appears deep, we will see the forest as a single creature and all the horses as a single super-horse, and mankind as Auguste Comte's *Grand Être*, Kabbala's *Adam Kadmon*, or Friedrich Nietzsche's *Ubermensch*.[317]

Since I have dealt with this conception and some of its sources elsewhere, I will not elaborate on it here.[318] Instead, I would like to reiterate that the origin and subsequent popularity of the idea of the fourth dimension were apparently predicated on the tendency to mix the metaphysical and the metapsychical (as Ivan Lapshin put it), which stemmed from the widespread empiricist assumptions rooted in nineteenth-century psychologism and positivism. In all probability, herein lay the intellectual origin of the "slippage" from abstract algebra to descriptive geometry in which Elizabeth Throesch saw the origin of the idea of the fourth dimension.[319] Moreover, it seems to shed considerable light on the interest of late nineteenth-century scientists in exploring the realm

[314] Ibid., 180.
[315] Idem, *Sochineniya. Vol. 3(2)*, 114–115.
[316] Ibid., 100, 104.
[317] Ibid., 108.
[318] Yushin, "The Cover of the Journal *Makovets*," 168–177.
[319] Elizabeth L. Throesch, *Before Einstein: The Fourth Dimension in Fin-de-Siècle Literature and Culture* (London, New York: Anthem Press, 2017), 22–23.

of the transcendental empirically, which was afforded by its psychologization,[320] and the general fascination with all things invisible and occult that characterized the culture of the fin de siècle.[321]

It was especially powerfully encouraged by Wilhelm Röntgen's discovery of X-rays in late 1895, because of which, according to John Heilbron, "the stock of physics inflated so sharply that the charge of [...] bankruptcy lost its color."[322] For many, however, it provided the best confirmation of the limitations of the old scientific worldview, offering a clear illustration of the idea that human knowledge is relative and that there exists a whole "unseen world" beyond our senses. In 1897, the chemist William Crooks, president of the Society for Psychical Research, gave a speech published in French under the title "On the Relativity of Human Knowledge" (*De la relativité des connaissances humaines*), where he argued that "the human creature," which "represents the most perfect thinking and acting machine yet evolved on this earth" and is often considered (as in the case of Strakhov cited above) "the perfection of beauty and grace," is in fact "entirely conditioned by the strength of gravitation on this globe."[323] In discussing how a change in environment would produce "marked changes in the structure of human beings" and hence in their perceptual capacities, he invited his audience to perform virtually the same thought experiment that Carl Friedrich Gauss had previously proposed to his students: to imagine a "homunculus" living on a cabbage-leaf, "of such microscopic size that molecular forces which in common life we hardly notice [...] become for him so conspicuous and dominant that he can hardly believe, let us say, in the universality of gravitation"; or, conversely, "the opposite extreme, and consider how Nature would present itself to human being of enormous magnitude."[324] In a detailed demonstration of the idea (already formulated by Comte) that natural sciences like physics and chemistry, developed by such *homunculi* and *colossi*, "would differ most remarkably from our own" and produce theories deemed impossible from our "too terrestrial" point of view, Crooks concluded as follows:

[320] Treitel, *A Science for the Soul*, 20–24. To mention just one example, it was apparently this psychologistic presupposition that informed the thought of Frederick Myers, who replaced the problematic category of the "supernatural" with that of the "supernormal" (where he included any "faculty or phenomenon which goes beyond the level of ordinary experience, in the direction of evolution, or as pertaining to a transcendental world") and thereby "opened up for an entirely new order of explanations" (Egil Asprem, "Parapsychology: Naturalizing the Supernatural, Re-Enchanting Science," in *Handbook of Religion and the Authority of Science*, eds. Jim R. Lewis and Olav Hammer (Leiden: Brill, 2011), 639–640). Florensky relied on Myers, see Florensky, *Sochineniya. Vol. 1*, 179.

[321] See, e.g., Linda Dalrymple Henderson, "The Forgotten Meta-Realities of Modernism: Die Uebersinnliche Welt and the International Cultures of Science and Occultism," in *Glass Bead*, no. 0 (2016), http://www.glass-bead.org/article/the-forgotten-meta-realities-of-modernism.

[322] John L. Heilbron, "Fin-de-Siècle Physics," in *Science, Technology, and Society in the Time of Alfred Nobel*, eds. Carl Gustaf Bernhard, Elisabeth Crawford, and Per Sörbom (New York: Pergamon Press, 1982), 61.

[323] William Crookes, "Address by the President," in *Proceedings of the Society for Psychical Research, Vol. 12* (London: Kegan Paul, Trench, Trubner, and Co., 1897), 339–340. Cf. Henderson, "Modernism and Science," 391; Noakes, *Physics and Psychics,* 145–146.

[324] Ibid., 340–346.

> Need I do more than point the obvious lesson? If a possible — nay, reasonable — variation in only one of the forces conditioning the human race — that of gravitation — could so modify our outward form, appearance, and proportions, as to make us to all intents and purposes a different race of beings; if mere differences of size can cause some of the most simple facts in chemistry and physics to take so widely different a guise; if beings microscopically small and prodigiously large would simply as such be subject to the hallucinations I have pointed out — and to others I might enlarge upon; — is it not possible that we, in turn though occupying, as it seems to us, the golden mean, may also by the mere virtue of our size and weight fall into misinterpretations of phenomena from which we should escape were we or the globe we inhabit either larger or smaller, heavier or lighter? May not our boasted knowledge be simply conditioned by accidental environments, and thus be liable to a large element of subjectivity hitherto unsuspected and scarcely possible to eliminate?[325]

It was on this positivist postulate of relativity that his further arguments concerning the possibility of telepathy and other occult phenomena were based, which were then carried up and developed by many like-minded persons in the early twentieth century. Florensky was only one of them, but his example allows us to grasp the patterns of ideas that have hitherto eluded proper research attention. Examining them in more detail is a task for another time.

Coda: Parrish and Boccioni

As stated at the beginning, in this chapter I have tried to delineate some important elements of the common intellectual background that produced the notions of mythical and four-dimensional thinking. While I have thus far refrained from mentioning Charles Darwin's theory of evolution to emphasize the earlier sources of relativization of rationality rooted in the empiricist tradition, it had of course greatly reinforced them. As Antonio Aliotta observed, the "very theory of evolution which had at first sight appeared to prove the mechanical method afresh, and to give [scientific rationality] a new weapon, helped rather to depreciate its value and to shake its foundations":

> Regarded in the light of evolution, was the world what the mechanical theory had held it to be, an eternal persistence of unchangeable substances, an eternal repetition of necessary movements subject to unchangeable laws; or was it rather a perennial becoming, an incessant renewal of forms which cannot be foreseen, and which cannot therefore be subject to the rigid necessity of determinism? [...] Not *sub specie aeternitatis*, but *sub specie generationis* is the motto of modern logic.[326]

Developing previous intuitions about the historicity of rationality that had been present in Comte and Spencer, the new application of evolutionary theory to the development of the human mind gave rise in the second half of the nineteenth century to a considerable body of literature on mental

[325] Ibid., 347.
[326] Antonio Aliotta, *The Idealistic Reaction Against Science*, trans. Agnes McCaskill (London: Macmillan and Co., 1914), xxi, 179.

evolution.[327] In this context, mythical and four-dimensional thinking could be placed on opposite sides of evolutionary history, while modern scientific rationality appeared to be only an intermediate stage between the two. A particularly apt example of such a view may be found in the psychologist Pavel Kapterev's book *From the History of the Soul: Essays on the History of the Mind* (*Iz istorii dushi: Ocherki po istorii uma*, 1890). Long before Lèvy-Bruhl, it offered a detailed description of the characteristics of primitive "imagistic" thinking, "which seems to us extremely ludicrous, antithetical, impossible."[328] There, imagination prevailed over reason: it could operate only with individual concrete images that formed strange associations, did not involve logical processes, and was not capable of producing abstract concepts. The ability of abstract thinking and logical reasoning that developed later on was the result not of cultural development — as we would currently say — but of mental evolution: "It was not Aristotle who taught the Greeks the syllogistic art, but rather the syllogistic thinking of the Greeks inspired Aristotle with the theory of the syllogism."[329] However, according to Kapterev, we should not assume "that the present logical thinking, and with it imagistic thinking, is an eternal ideal for the human mind in general:"

> Once it did not exist, now it does, and no one can guarantee that in the future new mental processes and techniques, probably more perfect and subtle than ours, will not be formed in place of the present logical processes and techniques of the imagination. Perhaps our present methods and rules of thought will appear to later mankind, to our remote descendants, as a kind of stone axes, and they will try with the same difficulty and effort to enter into the spirit of our worldview, to understand its meaning, to grasp its connecting thread, with which we now grasp the worldview of the rudest savages. What is very difficult for us now, what requires long and tedious thinking, will be easy and simple for later generations, will be a self-evident truth, [...] our present logic will become for our distant descendants what the laws of association are for us, but their real logic will be different, new, which will be as much superior to ours as ours is superior to the laws of association. And then a new heaven and a new earth will be created by the human mind, which at present we are not able to imagine.[330]

This utopian reflection on the future state of the human mind naturally concluded with the reference to the theory of the fourth dimension, in connection with which "thinking in the forms of time, space, causality, and related categories is supposed to be abolished, there will be a new logic, which — teleological or some other[331] — it is very difficult to judge at this time. The expression 'eternal truth' will appear as a beautiful, but hardly true and even completely false metaphor."[332] It was apparently this kind of relativization of rationality that sowed the epistemological anxiety which led various turn-of-the-century thinkers to develop arguments in

[327] See Robert J. Richards, *Darwin and the Emergence of Evolutionary Theories of Mind and Behavior* (Chicago and London: The University of Chicago Press, 1987).
[328] Pavel Kapterev, *Iz istorii dushi: Ocherki po istorii uma* (Sankt-Peterburg: Tipografiya Uchilishcha Gluhonemyh, 1890), 193.
[329] Ibid., 253.
[330] Ibid., 252–3.
[331] On the fourth dimension and teleological causality, see Yushin, "The Cover of the Journal *Makovets*," 190.
[332] Kapterev, *Iz istorii dushi*, 254.

favor of "structural objectivity," as described by Lorraine Daston and Peter Galison. In this context, the meaning of both Moritz Schlick's thought experiment concerning monsters (who, despite different sensory physiology, would establish exactly the same scientific laws as normally organized humans) and Max Planck's argument concerning extraterrestrials (for whom our system of theoretical physics must be valid as well) become somewhat more clear — apparently, they must be read as answers to speculations about the relativity of scientific knowledge akin to those of William Crookes with his *homunculi* and *colossi*. The very title of Planck's article is revealing, as it opposed the positivist slogan "from the absolute to the relative" (*de l'absolu au relatif*) with the antithetical one: "From the Relative to the Absolute" (*Vom Relativen zum Absoluten*, 1924).[333]

Many modernist artists, on the other hand, welcomed this relativization. It is well known that both myth and the fourth dimension have served as crucial resources of artistic inspiration during this period, and so it is not unreasonable to suppose that their historical connection may also have been reflected in contemporary art. As an example of this, consider the following two images, the hypothetical connection between which, as far as I could find, has not been observed: Maxfield Parrish's illustration of the mythical Phoenician prince Cadmus and Umberto Boccioni's famous sculpture of a striding athletic nude (fig. 1 and 2). On the one hand, their similarity may be explained by a direct connection: we know that Boccioni, himself a long-time commercial illustrator, took inspiration from magazine illustrations and popular art, so it is not wholly improbable that he might have stumbled upon Parrish's work in *Collier's* during one of his trips around Europe.[334] On the other, to recall Aby Warburg's work discussed above, one could perhaps offer a morphological explanation, pointing out that both depictions of a striding male nude clad in flowing drapery realize the same "pathos formula" (*Pathosformel*),[335] which may be traced back to the iconography of Cadmus slaying the Ismenian Serpent as found on ancient Roman coins.

[333] Cited in Thomas Loué, "L'apologétique de Ferdinand Brunetière et le positivisme: un bricolage idéologique 'généreux et accueillant'," *Revue des sciences philosophiques et théologiques* 87, no. 1 (2003): 101. On Planck's opposition to positivism (in connection with his famous dispute with Ernst Mach), see John L. Heilbron, *The Dilemmas of an Upright Man: Max Planck and the Fortunes of German Science* (Cambridge and London: Harvard University Press, 1996), 47–60.
[334] Niccolò D'Agati, "Fox-Hunt Garbage: Umberto Boccioni and British Illustration," *Print Quarterly* 36, no. 1 (2019): 31–44.
[335] On this concept, see Carlo Ginzburg, *Fear, Reverence, Terror: Five Essays in Political Iconography* (Calcutta: Seagull Books, 2017), vii–xvi.

Fig. 1. Maxfield Parrish, *Cadmus Sowing the Dragon's Teeth*. Illustration for *Collier's: The National Weekly*. October 31, 1908. Oil on canvas. From: Adam Green, ed., *Affinities: A Book of Images* (London: Volume, 2022), plate 88.

Fig. 2. Umberto Boccioni, *Spiral Expansion of Muscles in Action*. 1912–1913. Plaster. From: Arthur Jerome Eddy, *Cubists and Post-Impressionism* (Chicago: A. C. McClurg, 1919), 208–209.

However, since the proper art historical analysis is decidedly beyond the scope of this chapter, I would like to simply draw attention to the way in which they seem to represent the two modes of relativization of rationality that have been its subject. Unlike Parrish, about whose intentions fairly little is known (although we can assume that, depicting a subject from Greek mythology, he was hardly ignorant of its popular psychological explanation), Boccioni's artistic objectives are well documented. As one of the pioneers of Italian futurism, he aimed to offer his audience an example of a future four-dimensional vision, which was explained in a way fairly similar to that of Hinton.[336] Viewing the sculptural figure from different angles, the viewer was supposed to connect in his mind the images of its constituent forms and thus discern "the 'continuity' or evolution of bodily activity in space and time": "As these images accumulate in our imagination, we are invited to 'construct ideally' the expansion of the pulsing forms beyond the athlete's 'relative' movement, so that we, too, might join the artist in intuiting" what Boccioni called "the synthetic continuity" of motion in the fourth dimension.[337] If Parrish's illustration depicted a concrete mythological image, Boccioni's sculpture took this image and stripped it of all individual features, turning it into an abstraction of pure motion and dynamism. In the first case, we have before us a product of imagistic thought, while in the second one — a presumable specimen of the four-dimensional vision, in which abstraction becomes paradoxically visible. Apparently, this is roughly how the likes of Florensky and Glagolev conceived of the coming "ideal thinking" and "synthetic" vision, which was to be carried out not in images and abstract concepts, but in a direct "contemplation of reality" (where all of mankind is seen as Auguste Comte's *Grand Être*, and all of the individual Phoenician princes as a single four-dimensional nude).[338] If this seems paradoxical to us, it is by virtue (or rather vice) of the fallen nature of human reason and the constraints of modern scientific rationality. The latter, meanwhile, had some conspicuous racial characteristics, and this is the issue that I will address in the next chapter.

[336] See Linda Dalrymple Henderson, "Italian Futurism and 'The Fourth Dimension'," *Art Journal* 41 (1981): 320–322.
[337] Mark Antliff, "The Fourth Dimension and Futurism: A Politicized Space," *The Art Bulletin* 82, no. 4 (2000): 726; Henderson, "Italian Futurism," 322.
[338] Florensky's own attempt to depict such a vision is discussed in Yushin, "The Cover of the Journal *Makovets*."

Chapter 3. "Two Experiences of the World"

The Racialization of Scientific Rationality

It is not entirely clear when and how Pavel Florensky began to believe that "there are only two experiences of the world"[339] and think of himself as an Aryan that resists the malevolent influence of the Semites. Perhaps, like with the positivist idea of the relativity of knowledge, he picked up his first anti-Semitic sentiments from his father, who used to say ("in hours of particular gloom, with pain, and as if he himself feared his words"): "Equality, equality... and yet we (i.e., Russia) will be eaten up by the Jews. They are a people with whom we will yet have to deal with" (93). In the reminiscences on his childhood, Florensky also mentioned a neighboring family of Jewish revolutionaries, the name of one of whose members, Yankel' (Yiddish diminutive of Jacob), became associated in his mind with everything horrible: "Poison [*Yad*] — Yankel' — the color blue — copper salt — blue faces — corpses: all together these ideas were knitted in my thoughts into one continuous web of horror" (113, 138). Besides, the very word "Jew" appeared to him alien and "eerie" (114), which was quite characteristic of the late Russian Empire that saw the Jew as the exemplary "other."[340] As for racial theory, it seems that no special source was required. As the historian Léon Polyakov remarked, "at the end of the nineteenth century, the Aryan theory had achieved pride of place among men of learning alongside the theory of spatial aether," and so one could pick it up from virtually anywhere.[341] Eventually, as several scholars have convincingly shown, Florensky — like many of his friends and contemporaries, including the modernist poets Andrei Bely and Alexander Blok[342] — came to share an intensely anti-Semitic attitude, viewing many ills of contemporaneous life, and secular modernity itself, as the result of Jewish influence.[343]

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339 Pavel Florensky, *Sochineniya. Vol. 3(1)*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 2000), 61–62.

340 See Eugene M. Avrutin, "Racial Categories and the Politics of (Jewish) Difference in Late Imperial Russia," *Kritika: Explorations in Russian and Eurasian History* 8, no. 1 (2007), 24ff.

341 Léon Poliakov, *The Aryan Myth: A History of Racist and Nationalist Ideas in Europe*, trans. Edmund Howard (New York: Basic Books, 1971), 2.

342 Mikhail Bezrodnyy, "O 'yudoboyazni' Andreya Belogo," *Novoe literaturnoe obozrenie* 28 (1997): 100–125; Ilona Svetlikova, *The Moscow Pythagoreans: Mathematics, Mysticism, and Anti–Semitism in Russian Symbolism* (New York: Palgrave Macmillan, 2013); Arkady Blumbaum, "Civilization, Irony, Neurasthenia: Anti-Semitic Discourse in the Writings of Aleksandr Blok," in *Reframing Russian Modernism.* ed. Irina Shevelenko (Madison, London: University of Wisconsin Press, 2018), 172–196.

343 On his anti-Semitism and its various philosophical, political, and historical contexts, see Michael Hagemeister, "Wiederverzauberung der Welt: Pavel Florenskijs Neues Mittelalter," in *Pavel Florenskij – Tradition und Moderne: Beiträge zum Internationalen Symposium an der Universität Potsdam, 5. bis 9. April 2000*, Hgg. Norbert Franz, Michael Hagemeister and Frank Haney (Frankfurt am Main: Peter Lang, 2001), 21–41; Dominic Rubin, *Holy Russia, Sacred Israel: Jewish-Christian Encounters in Russian Religious Thought* (Brighton: Academic Studies Press, 2010), 294–334; Svetlikova, *The Moscow Pythagoreans*, 124–126; Idem, "Ob ideologii 'Obratnoy perspektivy' Pavla Florenskogo," in *Russkaya intellektual'naya revolyutsiya 1910–1930kh godov: Materialy mezhdunarodnoy* konferentsii *(Moskva, RANHiGS, 30–31*

In this chapter, I intend to add a few extra touches to this picture, focusing on how anti-Semitism informed Florensky's attitude toward the scientific worldview, which he understood as "the soul of Western culture, the very heart of Europe" (150). As I suggested in the first chapter, it was precisely racial assumptions that lay behind his retrospective interpretation of his intellectual crisis: for instance, behind the reference to his experience of "hypnosis from books and the people around that everything is explainable" (205) one can clearly discern the widely shared image of Jews as hypnotizers epitomized by the character of Svengali.[344] Some other instances of this kind will be pointed out later, but before doing so I should emphasize again that, as in other cases, Florensky was not the exception but rather an illustrative example of the way in which a person of the turn of the century might have thought. The previously described process of the biologization and humanization of science naturally prompted the idea of its racialization, whereas beliefs in its moral and cognitive failures left no doubt as to which race was to blame. These failures corresponded directly to two of the most popular anti-Semitic tropes: on the one hand, about the immorality and selfishness of the Semites, and on the other, about their exaggerated rationalism and propensity for abstract thinking.[345] I will touch on these tropes below.

Moreover, to the best of my knowledge, it has not yet been observed that the very metaphor of the "bankruptcy of science" may have been originally endowed with connotations related to economic anti-Semitism and the image of the Jews as bankers, moneylenders, financiers, and the main agents of capitalism. Both the writer Paul Bourget who seem to have coined this metaphor and his friend Ferdinand Brunetière who made a crucial contribution to its popularization were Catholic anti-Dreyfusards and manifestly disliked Jewish people.[346] In addition, Bourget and Brunetière were alumni of the prestigious Parisian Lycée Louis-le-Grand, which had a legacy connected to the Society of Jesus that was known for its anti-Semitic tendencies — as Edouard Drumont, the author of the infamous tract *Jewish France* (*La France juive*, 1886) declared, "everyone knew that the Jesuits took no one of Jewish blood" and hence represented the only Aryan haven safe from the Semitic "infiltration."[347] This fact did not escape the attention of Max Nordau, a staunch champion of scientism and the ideologue of Zionism, who in his likewise

oktyabrya 2014 g.), eds. S. N. Zenkin and E. P. Shumilova (Moscow: Novoe literaturnoe obozrenie, 2016), 123–139. For an expression of an alternative apologetic view, see Avril Pyman, "Pavel Florensky: Afterthoughts to a Biography," in *Pavel Florenskij tra Icona e Avanguardia*, ed. M. Bertelé (Venice: Terra Ferma Edizioni, 2015), 32–34.

344 Daniel Pick, *Svengali's Web: The Alien Enchanter in Modern Culture* (New Haven: Yale University Press, 2000).

345 Sander Gilman, *Smart Jews: The Construction of the Image of Jewish Superior Intelligence* (Lincoln and London: The University of Nebraska Press, 1996).

346 See Antoine Compagnon, *Connaissez-vous Brunetière? Enquête sur un antidreyfusard et ses amis* (Paris: Seuil, 1997).

347 Thomas P. Anderson, "Édouard Drumont and the Origins of Modern Anti-Semitism," *The Catholic Historical Review*, 53, no. 1 (1967): 34.

infamous *Degeneration* (*Entartung*, 1892–1893) pointed out that the slogan about the bankruptcy of science was an invention of the reactionary French Jesuits:

> The Jesuits invented the phrase "bankruptcy of science," and their pupils repeat it after them, because it includes a plausible explanation of their pietistic mooning, the real organic causes of which are unknown to them, and for that matter would not be understood if they were known. "I return to faith, because science does not satisfy me," is a possible statement. It is even a superior thing to say, since it presupposes a thirst for truth and a noble interest in great questions. On the contrary, a man will hardly be willing to confess, "I am an enthusiastic admirer of the Trinity and the Holy Virgin because I am degenerate, and my brain is incapable of attention and clear thought."[348]

As is well known, Nordau's bid for the idea of degeneration did not pay off. Moreover, it played against him: since in the popular anti-Semitic imagination the Jews were degenerates *par excellence*, "accusations of degeneration began to fly back upon him."[349] In this context, Nordau's self-righteous "scientific philistinism"[350] must have been seen as further evidence of a hypertrophied Semitic rationalism — and therefore of the bankruptcy of Jewish science. Ultimately, this racialization of scientific rationality became a fact of the history of the Third Reich, where degenerate Jewish science was persecuted, while a more intuitive "Aryan science" was called upon to take its place.[351] It is hardly necessary to conceal, invoking concern for historical anachronism, that what follows is a discussion of the seeds of this grievous history, even though the seeds do not account for the tree.

The Sentiment of Nature

Florensky's anti-Semitism, being a modification of traditional Christian anti-Judaism, was closely linked to his Biblical view of history, which also included the history of science. But before turning to the latter, it is necessary to dwell on a concept that seems to have played a pivotal role in his thought: the concept of the "sentiment of nature" (*chuvstvo prirody*, *le sentiment de la nature*, *Naturgefühl*), which in the early twentieth century was often regarded as a corollary to the history of science and art. A reader of the corresponding entry in *Meyers Großes Konversations-Lexikon* could learn that *Naturgefühl*, which entailed "the receptivity for the beautiful, the sublime and for the hidden lawfulness of nature," was equally well developed among ancient peoples, then fell into

[348] Max Nordau, *Degeneration* (London: William Heinemann, 1898), 113–114.
[349] Daniel Pick, *Faces of Degeneration: A European Disorder, C. 1848–1918* (Cambridge: Cambridge University Press, 1989), 25.
[350] Ibid., 26.
[351] Alan D. Beyerchen, *Scientists Under Hitler: Politics and the Physics Community in the Third Reich* (New Haven and London: Yale University Press, 1977), 126–140.

decline with the advent of Christianity ("insofar as its proclaimers portrayed nature as afflicted with the curse [of sin]"), and began to come back to life from the Renaissance onwards, particularly under the influence of new astronomical discoveries that "had demonstrated the effectiveness of the earthly laws of nature up to the most distant celestial spaces."[352] On this account, the sentiment of nature was devoid of pronounced racial overtones and served to reinforce the Enlightenment view of intellectual history, the Copernican revolution being its crucial point. Not only did Florensky refuse to accept the latter, which I will touch on in the conclusion, but he used the notion of the sentiment of nature in a diametrically opposite, emphatically counter-Enlightenment way.

In an article on Florensky's art historical treatise *Reverse Perspective* (*Obratnaya perspektiva*, 1919) — technically analogous to Erwin Panofsky's later *Perspective as Symbolic Form* (*Die Perspective als "symbolische Form,"* 1927) but heavily ideologically charged — Ilona Svetlikova pointed out that his claims about the "anti-artistic" character of the Jews (whom he considered the main culprits behind the spread of the "unnatural" linear perspective in European art) were based on the tradition of thinking about the attitude toward nature as an important manifestation of racial sentiment of nature, which, as she suggested, may have been popularized in the second half of the nineteenth century due to Alexander von Humboldt's *Kosmos* (1845-1862).[353] In its second volume (1847), noting that "the vividness of the feeling with which nature is regarded, and the form in which that feeling manifests itself, are influenced by the particular character of race," Humboldt discussed the difference between "Arianic or Indo-Germanic" and "Semitic or Aramean" races: the former exhibited "vivid sense of natural beauty" and "adoring veneration of nature," whereas the latter regarded nature "not as self-subsisting, or glorious in her own beauty, but ever in relation to a higher, an over-ruling, a spiritual power."[354] Humboldt seemed to admire both of these attitudes equally, not giving preference to one or the other. But since the uses of "the Aryan theory nearly always involved a value-judgement in favour of the Aryans,"[355] both the authors who preceded Humboldt and those who followed in his wake usually lent observations of this kind a markedly anti-Semitic undertone. For example, the German literary scholar Alfred Biese, whose book on *The Development of the Sense of Nature* (*Die Entwicklung des Naturgefühls bei den Griechen und Römern*, 1882) Florensky cited in his bibliography on the subject,[356] claimed that the Aryans are in

[352] S. a., "Naturgefühl," in *Meyers Großes Konversations-Lexikon. Band 14* (Leipzig, 1908), 456.
[353] Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 135–136. See also short appendix on "The Sentiment of Nature" in Svetlikova, *The Moscow Pythagoreans*, 172–174.
[354] Alexander von Humboldt, *Cosmos: Sketch of a Physical Description of the Universe. Vol. 2.*, trans. Edward Sabine (London: Longmans & Murray, 1854), 38, 43-44.
[355] Poliakov, *The Aryan Myth*, 2.
[356] Pavel Florensky, *The Pillar and Ground of the Truth: An Essay in Orthodox Theodicy in Twelve Letters* [1914], trans. Boris Jakim (Princeton, Oxford: Princeton University Press, 1997), 528, note 488.

"a cordial communion with the phenomenal world," while for the Jews nature is no more than "a book in which one can read of the wonderful deeds of [...] God" and therefore they are not capable "of sinking into nature with sympathetic feeling, loving it for its own sake."[357]

As Arkady Blumbaum has shown in an as-yet unpublished article, the origins of this opposition may be traced back to Georg Wilhelm Friedrich Hegel's early works of the Frankfurt period (1797–1800) when he was preoccupied with the problem of religion.[358] Proceeding from the characteristic German philhellenism that originated with Johann Joachim Winckelmann,[359] Hegel contrasted the polytheism of the Greeks, who were in close and loving communion with a deified nature, and the monotheism of the Jews, in which this communion was destroyed by the historical trauma of the Flood: in Judaism, God was seen as transcendent to the world, while nature was regarded as "godless" and dangerous, purely material force that needed to be subdued.[360] At the same time, importantly, Hegel clearly transposed the features of the Greek religion of love and freedom onto Christianity, which was a religion of love *par excellence*. Once the stable opposition between Aryans (Indo-Europeans) and Semites (who were perceived as an Asian people foreign to Europe) was formed,[361] this view contributed to the nineteenth-century de-Semitization and Aryanization of Christianity that culminated in Houston Stewart Chamberlain's notorious *Foundations of the Nineteenth Century* (*Die Grundlagen des neunzehnten Jahrhunderts,* 1899), which spent more than a hundred pages proving the Aryan origins of Christ.[362] It is worth noting that this magnum opus on the perennial strife between Aryans and Semites was quite popular in the Russian Empire, being of interest to Leo Tolstoy, among others, and Florensky (who considered Christianity an Aryan religion) certainly knew it as well.[363] A century before Chamberlain, in his unpublished *Life of Jesus* (*Das Leben Jesu*, 1795) Hegel portrayed him "not as divine redeemer, but as the preacher of a pantheism of 'love' countering the ethic of 'domination' practiced by the Jews":

> The Jews were hostile to a "Nature" (meaning both human nature and the world of nature) that they could not understand and to which they could relate only by possessing and dominating it. But it was this very lust

[357] Al'fred Bize, *Istoricheskoe razvitie chuvstva prirody (Die Entwickelung des Naturgefühls)*, trans. D. Korobchevskij (Sankt-Peterburg: "Russkoe Bogatstvo," 1890), 12–13. Cited in Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 136.
[358] Arkady Blumbaum, "Kontury odnoy traditsii: ariets, semit i priroda (Vokrug polemiki Aleksandra Bloka i Akima Volynskogo ob iudaizme Geyne)" (unpublished manuscript, February 20, 2023), typescript. I would like to thank Professor Blumbaum for kindly allowing me to read the manuscript prior to its publication.
[359] Suzanne L. Marchand, *Down from Olympus. Archaeology and Philhellenism in Germany 1750–1970* (Princeton: Princeton University Press, 1996), 7–16ff.
[360] Blumbaum, "Kontury odnoy traditsii," 14.
[361] Besides Polyakov, *The Aryan Myth*, see Stefan Arvidsson, *Aryan Idols: Indo-European Mythology as Ideology and Science* (Chicago and London: The University of Chicago Press, 2006).
[362] It was published separately in Russian as Kh'yuston Chemberlen, *Yavlenie Khrista* (Sankt–Peterburg, 1906).
[363] Léon Poliakov, *The History of Anti-Semitism, Volume 4: Suicidal Europe, 1870–1933*, trans. George Klin (Philadelphia: University of Pennsylvania Press, 1977), 80–82; Svetlikova, *The Moscow Pythagoreans*, 35–36.

> for power and domination, this materialistic denial of emancipating love, that made the Jews servile and unloved beings. By rebelling against a Nature that was essentially beneficent, the domination-seeking Jews had willfully blinded themselves to Christ's natural gospel of love and freedom.[364]

Developed in roughly the same vein in Hegel's influential *Lectures on the Philosophy of History* (*Vorlesungen über die Philosophie der Weltgeschichte,* 1822–1830, posthumously published in 1837), this idea of Semitic alienation from nature resonated widely and began to acquire additional details, steadfastly contrasted with the Aryan (Greek or Christian) sentiment of nature. I will focus on a few of those that were related to the subject of natural science.

One such detail was the notion of Jewish egoism, an important role in the formulation of which was earlier played by Johann Gottlieb Fichte's *Contribution to the Rectification of the Public's Judgment of the French Revolution* (*Beiträge zur Berichtigung der Urteile des Publicums über die französische Revolution*, 1793), which "proclaimed [...] a revolutionary mythology of Judaism as the supreme expression of self-interest, the secular equivalent of the original sin from which mankind had to be redeemed."[365] In the middle of the nineteenth century this idea found vivid expression in Ludwig Feuerbach's *Essence of Christianity* (*Das Wesen des Christentums*, 1841), the eleventh chapter of which contrasted Jewish monotheism, which involved "a view of nature as an object of arbitrary selfishness, reducing nature only to a means to an arbitrary end," with the polytheism of the Greeks, who lived in union with nature and valued it for its own sake. It was because of this attitude toward nature that "the Greeks had aesthetic and theoretical sensibilities that led them to develop art and science" — in contrast to the Jews, who "became a practical and utilitarian people, exploitative of nature and interested only in profiting from it."[366] It should be noted here that Feuerbach's view of polytheism as the source of intellectual creativity ("The polytheistic sentiment, I repeat, is the foundation of science and art"[367]) was clearly based on the idea of the beginning of positive science in imagistic primitive thinking, which I discussed in the second chapter. It seems to have been usually interpreted as specifically Aryan: although Aryans and Semites sometimes swapped places in the role of creators of the sciences and arts, the rational conservatism of the latter was generally opposed to the imaginative creativity of the former. The aforementioned "anti-artistic" character of the Jews stemmed from their exaggerated rationalism — it was believed that they could only copy and analyze, but not create.

[364] Paul Rose, *German Question/Jewish Question: Revolutionary Antisemitism in Germany from Kant to Wagner* (Princeton: Princeton University Press, 1990), 110–111.
[365] Ibid., 131.
[366] Cited in Bruce Lincoln, *Theorizing Myth: Narrative, Ideology, and Scholarship* (Chicago and London: University Of Chicago Press, 2000), 57; cf. Blumbaum, "Kontury odnoy traditsii." 16–17.
[367] Lincoln, *Theorizing Myth,* 57.

This was reinforced by the notion that the Semites were a race devoid of mythology, believed to be the product of the deification of nature by the Aryans, which was explicitly formulated in Ernst Renan's influential *General History and Comparative System of Semitic Languages* (*Histoire générale et système comparé des langues sémitiques*, 1855):

> Hence the characteristic trait that the Semites never had a mythology. The clear and simple way in which they conceive of God as separate from the world, not generating, not being generated, not having any like, excluded those great divine poems in which India, Persia, and Greece developed their fantasies, and which were only possible in the imagination of a race that left the limits of God, humanity, and the universe undecided. Mythology is pantheism in religion, and the spirit furthest removed from pantheism is undoubtedly the Semitic spirit.[368]

It seems that the widespread fin-de-siècle view of science as a sort of mythology — promoted by Ernst Mach's offhand remark about "the Encyclopedists' worldview" as "a mechanistic mythology not far removed from the animistic mythology of the ancient religions" — and "a new superstition [...] which has replaced all others," was coupled with this racial characteristic.[369] From this perspective, it appeared that science was the only kind of mythology that the rational Semites managed to create, and whose fictitious nature was best seen by the Aryans. Thus, for example, Emili Medtner, a great admirer of Aryan theory (and Chamberlain specifically), wrote: "Since one cannot dispense with the myth in philosophy, its open symbolical recognition, as in the Hindus [i. e., Aryans], is better than its sham banishment and secret emergence under the guise of despotic dogmatic superstitious <?> authority."[370]

The features of this scientific mythology expressly indicated that they were manifestations of the racial features of the Semites, which in turn were associated with their environment. Although such geographical determinism itself went back to eighteenth-century climatic theory and, more specifically, to Johann Gottfried von Herder, who held that "environment shapes the content of myths and together they form the nature of the Volk,"[371] its nineteenth-century popularization in relation to the Aryans and Semites was indebted to French scholars, specifically the same Renan and the historian Edgar Quinet. In his book *On the Genius of Religions* (*Du Génie des religions*, 1842), Quinet pointed out that unlike the Aryans, to whom deities were revealed in the

[368] Ersnt Renan, *Histoire générale et systèmes comparés des langues sémitiques* (Paris: L'Imprimerie impériale, 1863), 6–7; cited in Blumbaum, "Kontury odnoy traditsii," 20.
[369] Florensky, *Sochineniya. Vol. 3(1)*, 103; Ferdinand Brunetière, "La Métaphysique positiviste," *Revue des Deux Mondes* 11 (1902): 581 (cf. "there is hardly today an idol more tyrannical, nor a superstition more acclaimed or more widespread than that of 'Science,'" Ibid.); Aleksey Losev, *Dialektika mifa* [1930] (Moskva: Mysl', 2001), 139–144. This view was apparently founded on the complex of ideas about myth, imagination, and science discussed in Chapter 2.
[370] Svetlikova *The Moscow Pythagoreans*, 48, note 102.
[371] Lincoln, *Theorizing Myth,* 56.

manifold phenomena of nature, "the jealous god" of the Jews revealed himself to them where nature was absent, namely in the desert of Judea:

> Where did he want to appear? In the desert, that is, in a place where nature is absent, where the world comes to a standstill, where there is nothing to rival it, where no one dwells but himself, where his shadow is his only companion. [...] This is the natural home of the jealous god. Everywhere in the distance, nature torn apart, sacrificed, the universe gone, no river, no spring to worship, no wood, no metal to make a simulacrum; not even a voice, save that of lightning; but everywhere the face of Jehovah, alone shining in the void of immensity, the Spirit alone standing in the midst of his invisible temple. And the race of men who must nurture this revelation in their hearts, where were they born? In the desert. Who were the patriarchs who received it? Arabs of the desert. Who is the Moses who renewed it? A desert shepherd. Where do the tribes receive their forty-year education? In the midst of the stones of Arabia, these people engrave in their heart of stone the teachings of the desert. The desert always appears on the horizon, when you pronounce the name of Jehovah. He is its genius, its eternal inhabitant.[372]

This idea was adopted and popularized by Renan, who claimed that it was the desert that revealed to mankind the idea of infinity, which is especially characteristic of the Semites: "the desert is monotheistic; sublime in its immense uniformity, it first revealed to man the idea of the infinite, but not the feeling of that incessantly creative life that a more fertile nature has inspired in other races."[373] Later, in his equally impactful *Life of Jesus* (*Vie de Jésus*, 1864), another important contribution to the de-Semitization of Christianity, Renan answered the question of how the Jewish people managed to produce "the greatest jewel of humankind" in the same way: it became possible "because Jesus did not live in the 'Semitizing' desert. Everything of value that the Jews have created, according to Renan, has its origins in northern Galilee. Jesus was a Jew, but a Jew raised in the green, flourishing north, not in the desert of Judea":

> The north alone created Christianity; Jerusalem, on the contrary, is the true fatherland of relentless Judaism, which, founded by the Pharisees and set down in writing by the Talmud, traveled through the Middle Ages and has reached us today. An exquisite natural setting contributed in forming this spirit that is much less severe, less bitterly monotheistic, if I dare say so, which imprinted on all the dreams of Galilee an idyllic and charming aspect. The saddest landscape in the world is perhaps the region near Jerusalem. Galilee, on the contrary, was a very green, very shady, very happy land, the true land of the Song of Songs and the songs of the beloved. During the two months of March and April, the countryside is thick with flowers, with an excess of incomparable colors. […] In no other land in the world do the mountains unfold with more harmony or inspire more lofty thoughts. Jesus appears to have particularly liked them.[374]

All of this has several important implications related to the theme of this chapter. It was easy to conclude that the idea of infinite space, crucial to modern natural science, as well as the invention of the linear Renaissance perspective in art (both of which Florensky demonstrably loathed), were

[372] Edgar Quinet, *Du Génie de la religion* (Paris: Charpentier, 1842), 365–366; cited in Blumbaum, "Kontury odnoy traditsii," 18–19.
[373] Renan, *Histoire générale*, 6; cited in Blumbaum, "Kontury odnoy traditsii," 19–20. Cf. Valentino Petrucci, "'Le désert est monothéiste': La topographie religieuse de Renan," in *Renan en Orient*, eds. Jean Balcou, Jean Glasser, and Sophie Guermès (Rennes: Presses universitaires de Rennes, 2022), 169–176.
[374] Arvidsson, *Aryan Idols*, 114.

the work of the rational Jewish mind. Moreover, the same was true of the very anti-anthropocentric orientation of modern science toward the study of the general and the universal, relying on abstract conceptual thinking and excluding everything individual, as discussed in the first chapter. Semitic thinking was thought to be focused on the abstract unity of God and directed toward the infinite, whereas Aryan was preoccupied with the particulars, the singularities, and the individualities that comprised the multiplicity of nature.[375] It is interesting that the calls for scientists to be closer to nature that we have seen voiced by the likes of Edward Carpenter and Ernst Mach closely matched (consciously or not) the descriptions of ancient savages living in perfect harmony with nature, a striking example of which can be found in Renan's *Future of Science* (*L'Avenir de la science*, 1848; published only in 1890):

> Who can, in our reflective state, with our metaphysical refinements and our now crude senses, rediscover the ancient harmony that existed then between thought and sensation, between man and nature? On that horizon, where heaven and earth merge, man was god and god was man. [...] Sensitivity (sympathy for nature, *Naturgefühl*, as Friedrich Schlegel puts it) was then all the more delicate as rational faculties were less developed. The savage has a perspicacity and curiosity that astonish us; his senses perceive a thousand imperceptible nuances, which escape the senses, or rather the attention, of civilized man. Unfamiliar with nature, we see only uniformity where nomadic or agricultural peoples have seen many individual originalities. We must admit that early man had an infinitely delicate tact, which enabled him to grasp, with a finesse of which we no longer have any idea, the sensitive qualities that were to serve as a basis for naming things. The faculty of interpretation, which is simply an extreme sagacity for grasping relationships, was more highly developed in them; they saw a thousand things at once.[376]

Florensky described his childhood in a similar way, pointing to the extraordinary development and sensitivity of his senses, which allowed him to notice things that others (and especially adults) could not see. In this context, the many descriptions of nature in his autobiography, chief among which were the sea and the mountains, with which he felt a close kinship and which reportedly taught him to think philosophically, become somewhat more understandable: "My later religious-philosophical convictions came not from philosophical books, which, with few exceptions, I have always read little and quite reluctantly, but from childhood observations and, perhaps most of all, from the character of the landscape to which I was accustomed" (74). On the one hand, Quinet directly contrasted the Semitic desert with the Aryan ocean: "Capricious, tumultuous, it was from its bosom that the changing gods of India and Greece were to emerge"; following him, Renan added that the nomadic Semites had always stayed away from the coast and had an "aversion to the sea."[377] On the other hand, as was widely known, the cradle of the Aryan race was the

[375] This point is stressed in Blumbaum, "Kontury odnoy traditsii." 20–21, note 23.
[376] Ernst Renan, *L'avenir de la science: pensées de 1848* (Paris: Calmann Lèvy, 1890), 168–169.
[377] Cited in Valentino Petrucci, "'Le désert est monothéiste'," 169–170.

mountains (although the exact location tended to vary).[378] It is also curious to note that the mountains, which in the nineteenth century began to be regarded as sublime and fascinating under the influence of romantic taste, were often seen as the place where "a person feels reality particularly intensely."[379] Thus, Florensky described his experience of being on top of the mountains as follows: "A perfect harmony is felt. Consciousness is ecstatically expanded, and there is no longer a definite boundary between me and external existence. [...] Here, on the mountains, one experiences an astral escape from oneself, but not painful and inappropriate to the environmental conditions as below, but legitimate and full of joy" (176). Moreover, he reported that looking at rock strata as a child taught him to see time as the fourth coordinate of space, that is, gave him intuitions of the fourth dimension (74).[380] With this in mind, one cannot rule out the possibility that even the most insignificant details may have been endowed with the same racial meaning. The decisive moment of Florensky's intellectual crisis, when he realized the futility of Jewish scientific knowledge, occurred just when he was resting on the mountainside.

The Loss of "True Science" and the Establishment of Enlightenment

These brief observations provide some insight into what Florensky wrote about modern intellectual history and the history of science. Particularly valuable details about exactly how he imagined their beginnings may be found in his theological treatise *The Pillar and Ground of the Truth (Stolp i utverzhdenie istiny*, 1914). As I mentioned in the previous chapters, the biblical idea of the fall of man, which in the nineteenth century acquired a pronounced Aryan character,[381] was of crucial importance to Florensky — and in this respect he was a faithful disciple of the counter-

[378] S. a., "Ariytsy," in *Entsiklopedicheskiy slovar'*, eds. F. A. Brokgauz and I. A. Efron (Sankt-Peterburg: Tipo-Litografiya I. A. Efrona, 1890), 104–105. Cf. Renan's description of the incomparable mountains of Galilee cited above; Florensky was well acquainted with Renan's works, including his *Vie de Jésus,* see Florensky, *The Pillar and Ground of the Truth,* 433, note 15; 517–518, note 401.

[379] Rodzher Smit, *Chuvstvo dvizheniya: Intellektual'naya istoriya*, trans. N. Zhutovskaya and N. Rogovskaya (Moskva: Kogito-Tsentr, 2019), 30. For a classic study of this topic, see Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite* (Seattle and London: University of Washington Press, 1997).

[380] This association between mountains and the fourth dimension was later (and seemingly independently) developed by Andrei Bely, another adherent of the Aryan theory, who planning to write an article on the "Philosophy of Mountains" (*Philosophiya gor*), see Aleksandr Lavrov and Dzhon Mal'mstad, eds., *Andrei Bely i Ivanov Razumnik. Perepiska* (Sankt-Peterburg: Atheneum; Feniks, 1998), 637–639.

[381] Cf: "The myth of the fall into sin, it is true, is found at the beginning of the first book of Moses, but apparently it got there nominally, for the Jews did not understand it and it found no application in their system. He who does not transgress the law is, in their view, sinless" (Kh'yuston Chemberlen, *Yavlenie Khrista.* (Sankt–Peterburg, 1906), 78). One could read the same in Arthur Schopenhauer's *Parerga und Paralipomena* (1851): "The center and heart of Christianity consist of the doctrine of the Fall, original sin, the depravity of our natural state, and the corruption of man according to nature. Connected with this are intercession and atonement through the Redeemer, in which we share through faith in him. But Christianity thus shows itself to be pessimism and is, therefore, diametrically opposed to the optimism of Judaism […] (cited in Arvidsson, *Aryan Idols*, 149–150).

Enlightenment tradition.[382] He subscribed to the "belief that man was originally more whole than he is now, and that only self-assertion was the cause of his fragmentedness."[383] The "perversion" of man's relationship with God has "turned inside out" both himself and all of "creation" (i. e. natural world) closely connected with his prelapsarian body.[384] As a result, "our entire being, just like the whole world," became "fragmented"; human "[r]eason itself is fragmented and split."[385] The only remedy is Christian "love," understood as a variant of Platonic Eros[386], which implies "the instinctive striving [...] to reunite what has been divided."[387] As mentioned before, Florensky used Orthodox "saintly ascetics" as a prime example of this kind of unifying love: in their minds, "the healing of the fissures and cracks has begun; the sickness of being is being cured; the wounds of the world are being healed."[388] This is because they exercise a specific Christian "mysticism of the heart": when the ascetic concentrates on his heart (identified by Florensky with the solar plexus[389]) and delves deep into himself, he reconnects with the world of nature and returns to "the paradisal state [...] [already] in this life, prior to the universal transformation of the world."[390] In other words, back to the state of Adam before the Fall (which, among other things, involved epistemological perfection: the ability "to penetrate the nature of things," subsequently lost[391]). Thus, relying on the combination of primitivist ideas discussed in the first chapter, Florensky associated Christianity with the capacity of returning to the childhood of humanity, when it was still one with nature and therefore possessed full knowledge of it.[392] This kind of view, based on the idea of primeval monotheism, could be found in various sources: for instance, in Victor de

[382] "What the entire Enlightenment has in common is denial of the central Christian doctrine of original sin, believing instead that man is born either innocent and good, or morally neutral and malleable by education or environment […] It is the powerful reaffirmation of this Pauline and Augustinian doctrine that is the sharpest single weapon in the root and-branch attack on the entire Enlightenment by the French counter-revolutionary writers Maistre, Bonald and Chateaubriand, at the turn of the [nineteenth] century" (Isaiah Berlin, "The Counter-Enlightenment," in Idem, *The Proper Study of Mankind: An Anthology of Essays*, eds. Henry Hardy and Roger Hausheer (London: Chatto & Windus, 1997), 264).
[383] Florensky, *The Pillar and Ground of the Truth*, 128-129.
[384] Ibid., 133-134; cf. 198.
[385] Ibid., 118.
[386] The basic idea of this interpretation, widespread at the turn of the twentieth century and based mainly on Aristophanes' famous speech, was clearly formulated by Florensky's protégé, Alexei Losev: "We used to be whole beings. Now we are divided into pieces, and we are overcome by a passion for lost wholeness" (Aleksei Losev, *Bytie — imya — kosmos* (Moskva: Mysl', 1993), 49).
[387] Florensky, *The Pillar and Ground of the Truth*, 128.
[388] Ibid., 118.
[389] It is important to mention here that Florensky looked at Christian ascetics through the lens of romantic physiology, see Yushin, "The Cover of the Journal *Makovets*," 178–186.
[390] Florensky, *The Pillar and Ground of the Truth*, 199.
[391] S. a., "Pervorodnyj grekh," in *Enciklopedicheskij slovar'. Vol. 23* (Sankt–Peterburg: Tipo–Litografiya I. A. Efrona, 1898), 173.
[392] Pavel Florensky, *Sochineniya. Vol. 2* (Moskva: "Mysl'", 1996), 535–536.

Laprade's book on the sentiment of nature, known to Florensky, which began with a description of Adam's ideal knowledge.[393]

The ancient period of human history, when people "grew up" and thus forgot the true Christian God, was characterized by polytheism and paganism. Invoking the now-familiar theory of the origin of primitive religion from a sense of fear, Florensky used it to explain the fact that the ancient pagans could not yet regain the original knowledge of the natural world:

> Fear and trembling surrounded man. The very gods were demonic, and the connection with the gods, *re-ligio*, was essentially reduced to *deisidaimonia*, to the fear of gods, or rather, to the fear of demons. [...] *Timor fecit primos deos*, and ancient man secretly felt that he was worshipping not gods but demons. [...] Shackled with fear, ancient man could direct all his energies at the "skin" of things and at the reproduction of this "skin." The character of ancient art shows that ancient man did not at all love the "soul" of things and was afraid of getting beneath the "skin," for there he found chaos and terror. [...] Here, only a formal science is possible: geometry, astronomy in part, and so on. But real science is impossible, for how can one investigate chaos, and who would dare to pierce it with a scrutinizing gaze? [...] Even Aristotle's independent mind did not venture far beyond this fundamental element of ancient religion. Love between gods and man, as between heterogeneous beings, is impossible, asserts the Stagirite. Love is impossible! That is the consciousness that antiquity had of its God-understanding.[394]

The point is that ancient man had no *Naturgefühl*.[395] Only with the introduction of Christianity — which had inherited the teaching of Plato, "the Christian before Christ," who first "revealed to us [...] the mystery of love"[396] — the "creation received its religious significance, [...] only with the advent of Christianity was room made for the 'sentiment of nature,' for love of man, and for the science of creation that comes out of that."

> Two feelings, two ideas, two presuppositions were necessary for the possibility of the appearance of science: first, a feeling and idea whose content was the lawlike *unity of creation* [...]; second, a feeling and idea which affirmed the *genuine reality of creation* as such. Only these two feelings and ideas made it possible to pierce the reality of creation with a fearless, direct gaze, to approach this reality with trust, and to love it joyously. [...] The unity of creation is not an indifferent unity of chaotic elements but an organic unity of orderedness. That is the precondition of science. [...] If we take the "sentiment of nature" to mean a relation to creation itself, not to its forms, if we see in this sense more than an external, subjectively aesthetic admiration of "the beauties of nature," this sense is then wholly Christian and utterly inconceivable outside of Christianity, for it presupposes the sense of the reality of creation.[397]

From this point of view, natural science was closely connected to the feeling of love for nature, understood not as "aesthetic admiration" of its external side corrupted by sin, but as the ability to

[393] Victor de Laprade, *Le sentiment de la nature avant le christianisme* (Paris: Didier, 1866), i–xiv; Florensky, *The Pillar and Ground of the Truth,* 528, note 488.
[394] Florensky, *The Pillar and Ground of the Truth*, 201–202.
[395] The immediate source of this idea was probably Vladimir Kozhevnikov, whom Florensky valued as a historian of ideas and to whom he repeatedly referred in his writings, see Vladimir Kozhevnikov, *Nravstvennoe i umstvennoe razvitie rimskogo obshchestva vo II veke* (Kozlov: Tipografiya V. M. Frish, 1874), 95–97.
[396] Pavel Florensky, *Sochineniya. Vol. 3(2)*, eds. igumen Andronik (A. S. Trubachev), P. V. Florensky, and M. S. Trubacheva (Moskva: Mysl', 2000), 155. Al'fred Ful'e, *Lyubov' po Platonu*, trans. N. Gerasimov (Moskva: Tovarishchestvo skoropechatni A. A. Levenson, 1898), 13.
[397] Florensky, *The Pillar and Ground of the Truth*, 200-203, 210. Translation modified.

see its inner unity coupled with the desire — Platonic Eros — to reunite the fragmented world.[398] The early Christians, the first converts who became "like children," were able to immerse themselves in the life of nature and therefore "contemplated with pious joy the unity and harmonious order of the world."[399] But, anticipating the reader's perplexity, Florensky asked, "Why did the first Christians not create a science?" The answer was simple:

> Because they did not have the time or the energy for it, just as, in general, a Christian who has devoted himself wholly to ascesis has no time or energy for science, even if he is the only one with the necessary prerequisites for true science. Later, this development of a Christian science was hindered by purely historical obstacles, obstacles that, in general, would not allow science to develop under any religious faith.[400]

Unfortunately, he did not explain directly what "purely historical obstacles" prevented the development of this "true science." But by now the answer is quite clear — it was the influence of Jewish rationalism.

The direct opposite of the Christian ascetic, for Florensky, was the figure of the "rationalist intellectual." The former "considers the existing order not 'natural' but a perversion of nature," yet "loves the world with a true love and [...] mercifully tolerates the dirt that has settled on the world [after the Fall]." The latter, in his turn, "'loves' in words the whole world and considers everything 'natural.' But in practice he hates the whole world in its concrete life and would like to destroy it, in order to replace it with the concepts of his rational mind, i.e., with, in essence, his self-assertive I":

> And he has an aversion to all that is "natural," for the natural is alive and therefore it is concrete and cannot be stuffed into a concept. But the rationalist intellectual wishes to see only the artificial everywhere, to see everywhere not life but formulas and concepts, his own formulas and concepts. The 18th century, which was the century of the intelligentsia *par excellence* and which was not unjustifiably called the "Age of Enlightenment" (an "enlightenment" of the intelligentsia type, to be sure), set as its goal: "Everything artificial, nothing natural!" Artificial nature in the form of manicured gardens, artificial language, artificial mores, artificial (revolutionary) statecraft, artificial religion. The ultimate in this striving for artificiality and mechanicity was attained by design by the greatest representative of the intelligentsia, Kant, in whom — from his habits of life to the highest principles of his philosophy — there was nothing natural, and could be nothing natural. If you will, this mechanization of all of life has its own — horrible — grandiosity, the spirit of the fallen Lucifer. Nevertheless, all these contrivances are, of course, supported only by whatever creativity they can steal from God-given life. And one must say the same thing about the contemporary improvers of Kant.[401]

[398] Florensky could find a description of the connection between scientific knowledge and love in the works of the French philosopher Alfred Fouilliée, who stated that "the real object of the scientific study of the world is [...] love" (Ful'e, *Lyubov' po Platonu*, 7–8).
[399] Florensky, *The Pillar and Ground of the Truth*, 207.
[400] Ibid., 206.
[401] Ibid., 215–216.

Following the train of thought launched by Fichte's aforementioned *Contribution to the Rectification of the Public's Judgment of the French Revolution*, which portrayed "Judaism as the supreme expression of self-interest, the secular equivalent of the original sin from which mankind had to be redeemed," Florensky claimed that "the Jewish question" was "the central question of world history."[402] Apparently, in his mind, this ideological invention of the German philosopher found logical justification (not anticipated by Fichte himself) in his metaphysics.[403] The image of the Jews spread in anti-Semitic literature as of a selfish and treacherous people (Fichte's "a state within a state") who are "in constant war" with the rest of humanity, stubbornly trying to subordinate it to their own will and to impose on it their own view of the world, served as an exact illustration for Florensky's definition of "the root of all sins":

> Sin is the element of the disharmony, decay, and decomposition of spiritual life. [...] Sin lies in the disinclination to leave the state of self-identity, the identity "I = I," or more precisely, "I!" [...] All particular sins are only variants or manifestations of the stubborn self-immersion of selfhood. In other words, sin is the power of the protection of oneself as oneself that makes the person a "self-idol." [...] Sin is the fundamental striving of I by which I becomes firm in its isolation and makes of itself the unique point of reality.[404]

This construction was supported by a variety of other anti-Semitic clichés: the connection between the Jews and the "fallen Lucifer" (i.e., Satan), Semitic idolatry and inclination toward materialism, as well as the alleged spread of nervous diseases (especially "neurasthenia") by the Jews, which found a convenient explanation in the tradition that recognized excessive self-love and egoism as the metaphysical source of all illnesses.[405]

A more detailed story of the "war" of the Jews against humanity that unfolded in Florensky's historical imagination can be sketched by means of his lectures delivered at the Moscow Theological Academy in the mid-1920s. In ancient times this war was started by the Pharisees, "the best part of Jewish society, the most intelligent and devoted to the interests of the Enlightenment" of its representatives, who had taken "the path of idolatry, self-worship [...] renounced God, and [their] heart became insensitive to the effects of divine grace. And therefore, when God Himself appeared, the Pharisees, blinded by idol images, did not understand it and hated Him as the destroyer of their ostentatious kingdom."[406] As any reader of encyclopedias

[402] Rose, *German Question/Jewish Question,* 131; Pavel Florensky, "Predislovie," in *Izrail' v proshlom, nastoyashchem i budushchem* (Sergiev Posad: Izdanie "Religiozno–filosofskoj biblioteki," 1915), 5. In this anti-Semitic collection, for which Florensky wrote an anonymous preface, an excerpt from Fichte's *Contribution* entitled "Jewry" was published next to a piece by Chamberlain.
[403] On Florensky and Fichte, see Yushin, "The Cover of the Journal *Makovets*," 184–186.
[404] Florensky, *The Pillar and Ground of the Truth*, 129, 132.
[405] Hagemeister, "Wiederverzauberung der Welt," 105; Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 137.
[406] Florensky, *Sochineniya. Vol. 3(2)*, 478.

would know, the Pharisees, whose name "comes from the Hebrew word meaning to excommunicate, to separate," were not only prideful, hypocritical, and "the worst enemies of Christ" and thus, from a certain point of view, of humanity as a whole.[407] They laid the foundation for Rabbinic Judaism and thus, as was emphasized in contemporary anti-Semitic literature, "spread their teachings to all Jewry."[408] The struggle against them was suspended in the Middle Ages — when, in Florensky's words, "they [Aryans] knew how to deal with them"[409] — and resumed after the Renaissance, which he called the era of the "revival of Pharisaism" that bears "two names in the modern parlance: naturalism and humanism."[410] One of the most important sources of Florensky's views on the Renaissance, as far as I can tell, was the Orthodox theologian Ivan Petropavlovsky, the author of a book entitled *A Look at the Meaning and Worth of the Dominant Direction in the New Cultural History of Humanity* (*Vzglyad na smysl i dostoinstvo gospodstvuyushchego napravleniya v novoy kul'turnoy istorii chelovechestva*, 1898).[411] Its core message was that Renaissance humanism, which has been the wellspring of modernity, as well as of all the modern "philosophical worldviews" (particularly naturalism, materialism, and positivism), is directly responsible for all contemporary troubles and evils.[412] The cause was the humanist orientation toward "man's self-legislation," associated by Petropavlovsky with the Kantian idea of autonomy, which inverted the natural relationship between man and God:

> In contrast to the religious direction, which defines the development of life out of God, through God, and for God, humanism regards the task of man as a fully independent development of the spirit, independent of any higher power [...] out of himself, through himself and for himself: this is the formula in which humanism expresses itself clearly and concisely. [...] The autonomy of man is the idea of humanism, the pride of its teaching, in which the French historian Michelet sees the "discovery of man" achieved by humanism. [...] The humanist view of man [...] has only the natural consequence of recognizing human nature in its present state as *unconditionally normal* [...] and of resolutely rejecting in it the so-called hereditary sinfulness or depravity, the consequence of the fall of our forefathers, as taught by our Christian religion.[413]

Besides Jules Michelet, who coined the expression "the discovery of the world and of man" in the eighth volume of his *History of France* (*Histoire de France*, 1855), the main object of polemic here was, of course, Jacob Burckhardt's immensely influential *The Civilization of the Renaissance in Italy* (*Die Cultur der Renaissance in Italien*, 1860), whose second chapter opened with a description of the

[407] S. a., "Farisei," in *Bibleyskaya entsiklopediya, Vol. 4* (Moskva: Tipografiya A.I. Snigerevoy, 1892), 723–724.
[408] Aleksei Shmakov, *Evrei v istorii* [1907] (Moskva: VOG–Svekrasaf, 2011), 116.
[409] Cited in Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 125.
[410] Florensky, *Sochineniya. Vol. 3(2)*, 469.
[411] In 1912, most of its tenets were recounted in an anonymous pamphlet entitled *Humanism*, which was compiled by Florensky's close friend, Mikhail Novoselov, see Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 126.
[412] On the European context of this image of the Renaissance, see Martin A. Ruehl, *The Italian Renaissance in the German Historical Imagination, 1860–1930* (Cambridge: Cambridge University Press, 2015).
[413] Ivan Petropavlovskiy, *Vzglyad na smysl i dostoinstvo gospodstvuyushchego napravleniya v novoy kul'turnoy istorii chelovechestva* (Moskva, 1898), 12, 25–26, 28.

awakening of individual consciousness and at the same time the division between the subjective and the objective:

> In the Middle Ages both sides of human consciousness — that which was turned within as that which was turned without — lay dreaming or half awake beneath a common veil. The veil was woven of faith, illusion and childish prepossession, through which the world and history were seen clad in strange hues. Man was conscious of himself only as a member of a race, people, party, family or corporation — only through some general category. In Italy this veil first melted into air; an objective treatment and consideration of the state and of all the things of this world became possible. The subjective side at the same time asserted itself with corresponding emphasis; man became a spiritual individual, and recognized himself as such.[414]

Apparently, from the point of view of the likes of Petropavlovsky and Florensky, this could be interpreted in a twofold way. On the one hand, Burckhardt's account corresponded directly to how the fall of man was described: "Man's first awakening from this dream, when he separated himself from nature and developed into a self-aware person, is described in the Hebrew account as falling away from God."[415] On the other hand, it was explicitly reminiscent of Immanuel Kant's philosophy that redefined and promoted the terminology of objective and subjective, which was consistent with contemporary histories of modern philosophy that traced its development "from the Renaissance to Kant."[416] Accordingly, in Florensky's interpretation the Renaissance appeared as an era of the awakening of "Pharisaic psychology," which "whitewashed" the fallen human nature (under the name of humanism) and with it the nature of the outside world (under the name of naturalism), dividing them into the spheres of the subjective and the objective.[417] This historical line was picked up by the Enlightenment that proclaimed the cult of reason — understood by Florensky not only as a product of the Fall but practically as the epitome of Satan[418] — and reached its peak during the French Revolution, which definitively affirmed the "'rights of man and nature,' that is, their autonomy; in relation to whom? Obviously, in relation to God."[419] The Kantian philosophy, considered the culmination of humanism and associated with Semitism,[420] helped to permanently fix this autonomy in the human mind, that is, to make it "impossible to think otherwise": "All Kantian philosophy is the consolidation of these positions by means of

[414] Jacob Burckhardt, *The Civilization of the Renaissance in Italy*, trans. C. G. C. Middlemore (London: Penguin Books, 1990), 98. For a detailed discussion of Burckhardt's reception, see Ruehl, *The Italian Renaissance.*

[415] Geynrikh Eyken, *Istoriya i sistema srednevekovogo mirosozertsaniya* (Sankt–Peterburg: Tipografiya M. I. Akinfieva, 1907), 57.

[416] Cf. the title of Wilhelm Windelband *The History of Modern Philosophy in its Connection with the General Culture and the Special Sciences. Vol. 1: From the Renaissance to Kant* (*Die Geschichte der neueren Philosophie in ihrem Zusammenhange mit der allgemeinen Cultur und den besonderen Wissenschaften dargestellt. Bd. 1: Von der Renaissance bis Kant,* 1878). On the Kantian terminology and its European reception, see Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 205–216.

[417] Florensky, *Sochineniya. Vol. 3(2)*, 469.

[418] Cf.: "Sin itself is something wholly rational. It is wholly according to the measure of rationality. It is rationality in rationality, or devilry, for the Devil-Mephistopheles is naked rationality" (Idem, *The Pillar and Ground of the Truth*, 133).

[419] Idem, *Sochineniya. Vol. 3(2)*, 475.

[420] Svetlikova, "Ob ideologii 'Obratnoy perspektivy'," 128–129.

epistemology."[421] All of this led Florensky to the conclusion mentioned at the beginning of this chapter:

> [U]ltimately, there are only two experiences of the world — the universal experience and the "scientific" experience, i.e. the Kantian one, just as there are only two attitudes to life — internal and external, just as there are two types of culture — contemplative-creative and predatory-mechanical. It all comes down to the choice of one or the other, [...] and then everything is determined as scripted, with complete consistency.[422]

It is hardly surprising that such a Manichaean point of view prompted one to abandon the most basic beliefs associated with the reviled scientific worldview. In conclusion, I will briefly address Florensky's dispute with one of the most fundamental modern scientific theories — heliocentrism.

[421] Florensky, *Sochineniya. Vol. 3(2)*, 475.
[422] Idem, *Sochineniya. Vol. 3(1)*, 61–62.

Conclusion

"There Are No Stars"

As I have tried to show throughout this thesis, although Pavel Florensky was probably one of the most ardent opponents of modernity and the "scientific worldview" associated with it, he was far from alone — and similar sentiments were not foreign even to those who were professionally engaged in the historiography of the latter. In a recent reflection on the twentieth-century narratives that laid the foundation for the discipline of the history of science, Lorraine Daston observed that some of them were curiously "tinged with melancholy and nostalgia for the Middle Ages, variously imagined as more enchanted, more rational, or more gemütlich than modernity."[423] Edwin Burtt's *Metaphysical Foundations of Modern Physical Science* (1924), Alfred North Whitehead's *Science and the Modern World* (1925), Alexandre Koyré's *From the Closed World to the Infinite Universe* (1957) — in all of these classics, "the overall mood was one of clenched-teeth romanticism: there was no reversing modernity; modern science represented a gigantic intellectual leap forward, yet the price paid for progress had been the sacrifice of beauty and a sense of belonging in the universe."[424] Such sentiments were not confined to the historians of science either. Another characteristic example is that of the philologist Leo Spitzer, the author of brilliantly erudite yet quite emotionally charged studies in historical semantics. Writing about the history of the concept of environment, Spitzer admired the "warmth and vitality" of the enclosed ancient cosmos, deploring the fact that some contemporary historians (specifically his colleague Arthur Lovejoy) did not share his attitude and tended to see "fetters where Antiquity and the Middle Ages had seen only protection and caressing goodness."[425] On the other hand, the modern image of a universe based on Newtonian mathematical physics, in which "man is alone in an infinite chilly cosmos traversed by innumerable forces of attraction, in a universe run according to rigid laws and ruled over by a God who bears no relation to man," was characterized as "essentially bleak" and psychologically unhealthy.[426] "Thus it is not difficult to understand that a Goethe should defy this system," he pointed out, adding that the German poet failed to go all the way: "Of course, if Goethe had been absolutely consistent, he should also have objected to the heliocentric world-system of Copernicus, and have insisted on making man the measure of the universe [...]."[427]

[423] Lorraine Daston, "The History of Science and the History of Knowledge," *KNOW: A Journal on the Formation of Knowledge* 1, no. 1 (2017): 136.
[424] Ibid., 137.
[425] Leo Spitzer, "Milieu and Ambiance," in Idem, *Essays in Historical Semantics* (New York: S. F. Vanni, 1948), 196, 199.
[426] Ibid., 206, 225.
[427] Ibid., 206, 277, note 40. On Goethe's famous confrontation with Newton, see Myles W. Jackson, "A Spectrum of Belief: Goethe's 'Republic' versus Newtonian 'Despotism'," *Social Studies of Science* 24, no. 4 (1994): 673–701.

Most likely unbeknownst to Spitzer (b. 1887), his generation produced just such "a Goethe" who dared to oppose the Copernican system head-on. One of the pinnacles of Florensky's opposition to scientific rationality was his slim book entitled *Imaginaries in Geometry* (*Mnimosti v geometrii*, 1922), the last section of which contained an argument against heliocentric cosmology that concluded with a full "vindication of the Ptolemaic-Dantean world system": it reaffirmed "the medieval notion of the finitude of the world," endorsed the image of "a fixed Earth and a firmament revolving around it as one solid body," and proclaimed the existence of Christian heaven.[428] This infamous démarche (which led to Florensky's arrest and exile) and its main literary and scientific sources, among them Dante Alighieri's *Divina Commedia* and Albert Einstein's theory of relativity, have been the subject of much scholarly discussion.[429] It has not yet been noticed, however, that its originality lay not so much in its anti-Copernicanism itself — back in 1900, Florensky's future teacher Sergei Glagolev remarked on the existence of numerous contemporary "individuals, undoubtedly highly educated, who either denied the Copernican theory outright or had been collecting arguments against it for decades"[430] — but in its sheer radicalism. One characteristic detail has been preserved in the memoir written by the émigré musicologist Leonid Sabaneeff, Florensky's classmate and long-time acquaintance. Recalling their conversations, he wrote that Florensky "mostly [...] talked about his cosmic ideas and fantasies, which he set forth with great animation, at times ecstatically. They were often so bold and challenging that I consider it my duty as a scholar to transmit them to posterity":

> His initial theory of the structure of the universe centered in the idea that "there are no stars," that the stars are actually optical replicas of the sun, for the reason that light rays, in his opinion, cannot be exactly rectilinear. Not being rectilinear, they must, when returning to the earth, produce images of the sun on a diminished scale — i.e., the stars. The "sizes" of the stars, according to this theory, correspond to the cycles of the revolution of a curvilinear light ray issuing from the sun. The most ancient cycles form agglomerations of stars such as the Milky Way, which actually is nothing but the sun itself. From the very first this hypothesis seemed to me devoid of solid foundation, yet it was novel and interesting, and in a scientific sense no less,

[428] Pavel Florensky, *Mnimosti v geometrii* (Moscow: Lazur', 1991), 47–51. Moreover, Florensky even specified its borders: "the demarcation equator, the division of Heaven and Earth, is not particularly distant from us, and the earthly world is indeed cozy. [...] [I]ts boundary is between the orbits of Uranus and Neptune. This result is striking because it confirms the Ptolemy-Dantean view of the world [...] and the boundary of the world falls precisely where it has been recognized since antiquity. The boundary of the world was beyond Uranus, — about which there was already vague information" (Ibid., 49–50). It is not clear from which source he might have taken this idea, as modern historians of astronomy seem to agree that Uranus was not known in antiquity, cf. Noel M. Swerdlow, "A Curiosity: Did Ptolemy See Uranus?" in *Instruments — Observations — Theories: Studies in the History of Astronomy in Honor of James Evans*, eds. Alexander Jones and Christiàn Carman (New York: New York University Faculty Digital Archive, 2020), 143–146.

[429] Most recent example is Natalino Valentini, *Il Dante di Florenskij: Tra poesia e scienza* (Torino: Lindau, 2021). For detailed commentary, see Michael Hagemeister's introduction in Pavel Florenskij, *Mnimosti v geometrii* (München: Verlag Otto Sagner, 1985), 1–60.

[430] Sergey Glagolev, *Religiya i nauka v ikh vzaimootnoshenii k nastupayushchemu XX stoletiyu* (Sergiev Posad: Tipografiya Svyato-Troitskoy Sergievoy lavry, 1900), 30. For more on this subject, see Ilona Svetlikova et al., "Kosmologiya i Vozrozhdenie na rubezhe XX veka: 'Miry' Aleksandra Bloka," *Logos* 31, no. 5 (2021): 141–164.

> and perhaps more, revolutionary than the Copernican system once was with regard to the Ptolemaic cosmogony. It was marked by a paradoxical freshness of thought and a thrilling audacity.[431]

Where could this paradoxical idea that "there are no stars" come from? Given Florensky's familiarity with ancient and (perhaps to a lesser extent) medieval sources, one may suppose that it stemmed from the tradition in which the sun was thought to be the unique source of celestial light.[432] Appearing in a condensed form in Plato's *Timaeus* (39B), it is found in Pliny (*Nat. hist.* 2.12–13) and in a variety of medieval sources afterward, being supplemented with an image of the created universe provided by the Book of Genesis (1.14–15), where "the firmament is seen only by virtue of the luminaries, or the Sun and Moon."[433] The demise of this tradition logically coincided with the spread of modern cosmology in the sixteenth and seventeenth centuries: the enormous distance of the sphere of fixed stars from the sun in the Copernican system made one doubt that it could be their only source of light, while empirical observations made with the telescope confirmed this doubt, prompting Galileo to liken the fixed stars to "so many suns."[434] This comparison was famously developed in the cosmology of Giordano Bruno, who declared the existence of an infinite number of suns revolving in infinite space.[435]

Florensky clearly drew on the premodern tradition, but this alone does not explain the peculiarity of his cosmos, since no one went so far as to deny not only self-luminosity but the very existence of the stars. Here it may be noted that his acquaintances and contemporaries shared some similar opinions regarding the stars as something horrible, off-putting, or insignificant.[436] A remark made by Hegel in a conversation with his student Heinrich Heine seems to have enjoyed a particularly wide circulation: "pointing to the stars, [Heine] spoke of the infinity of worlds. 'What nonsense,' Hegel exclaimed, 'the stars are only a brilliant rash on the face of the sky!'."[437] This retort likely inspired a line from a 1910 poem by the Russian futurist David Burliuk, Florensky's classmate at the First Tiflis Classical Gymnasium, entitled "The Dead Sky" ("The sky is a corpse! Nothing more! [...] Stars are worms — a (festering living) rash!"), which clearly represented a response to the cosmological views developed during the nineteenth century, in which astronomy

[431] Leonid Sabaneeff, "Pavel Florensky — Priest, Scientist, Mystic," Russian Review 20, no. 4 (1961): 317.
[432] On this tradition, see Edward Grant, *Planets, Stars, and Orbs: The Medieval Cosmos, 1200–1687* (Cambridge: Cambridge University Press, 1994), 392–400. Cf.: "We see light and only light, the singular light of the singular sun." (Pavel Florensky, *Sochineniya, Vol. 4*, eds. igumen Andronik (Trubachev), P. V. Florensky, and M. S. Trubacheva (Moscow: Mysl', 1996), 414).
[433] Grant, *Planets, Stars, and Orbs*, 416.
[434] Ibid., 416–418.
[435] Alexandre Koyré, *From the Closed World to the Infinite Universe* (Baltimore: The Johns Hopkins Press, 1957), 41ff.
[436] See Varvara Kukushkina, Ilona Svetlikova, and Pavel Yushin, "Nauchnye konteksty 'zvezdnogo uzhasa': Kommentariy k Andreyu Belomu," *Die Welt der Slaven. Internationale Halbjahresschrift für Slavistik* 65, no. 2 (2020): 73–88.
[437] Aleksandr Blok, *Polnoe sobranie sochineniy i pisem*, Vol. 8 (Moscow: Nauka, 2010), 81. For the original version, see Robert C. Solomon, *From Hegel to Existentialism* (Oxford: Oxford University Press, 1987), 58.

and biology were brought together through the nebular hypothesis and hence implied the notion of the "living sky."[438] Among its most prominent popularizers was Ernst Haeckel, whose philosophical monism explicitly drew on the philosophy of Giordano Bruno that promoted "the idea of the *homogeneity of all parts of the universe*."[439] According to Haeckel, mankind was no more than an insignificant component of cosmic evolution, at the basis of which lied the so-called protoplasm, the elementary form of life: "as our mother-earth is a mere speck in the sunbeam in the illimitable universe, so man himself is but a tiny grain of protoplasm in the perishable framework of organic nature."[440] A close friend of Florensky, the poet Andrei Bely, wrote in 1905 that "the stars emit [...] the nasty slime — protoplasm," with which the entire evolutionary "horror of being" began.[441]

Florensky's writings do not exhibit any such aversion towards the stars, but he of course also rejected the modern scientific "view of the sky as a collection of hot pans or globes" (i.e., the multiplicity of suns) and of life as "protoplasm — slime."[442] Interestingly, however, his conception of the formation of the Milky Way passed on by Sabaneeff bears an unmistakable (albeit of course superficial) resemblance to the process described by the nebular hypothesis, the difference being that the rotating clouds of gas, from which stars were formed, have been replaced by "the revolution of a curvilinear light ray issuing from the sun." This may be explained by the fact that Florensky's very first publication, written during his final year at the Gymnasium, was devoted to the problem of how best to illustrate the formation of nebulae (fig. 3). Apparently, after he developed "an acute hatred of evolutionism, of the infinite extension of astronomical spaces and geological times," he abandoned the nebular hypothesis that had occupied him before and attempted to replace it with his own hypothesis of star formation, "marked by a paradoxical freshness of thought and a thrilling audacity."

438 Stephen G. Brush, "The Nebular Hypothesis and the Evolutionary Worldview," *History of Science* 25, no. 3 (1987): 245–278. The connection between Burliuk's verse and Hegel's remark was noticed by my colleagues, Ilona Svetlikova and Varvara Kukushkina.
439 Wilhelm Windelband, *History of Philosophy*, (New York: The Macmillan Company, 1905), 402 (emphasis in original).
440 Ernst Haeckel, *The Riddle of the Universe at the Close of the Nineteenth Century*, trans. Joseph McCabe (New York and London: Harper and Brothers, 1905), 14.
441 Andrei Bely, "Sfinks," *Vesy,* no. 9–10 (1905): 33. For more details, see Kukushkina et al., "Nauchnye konteksty 'zvezdnogo uzhasa'," 74–78.
442 Pavel Florensky, *Sochineniya, Vol. 3(2)*, eds. igumen Andronik (Trubachev), P. V. Florensky, and M. S. Trubacheva (Moscow: Mysl', 2000), 363, 396.

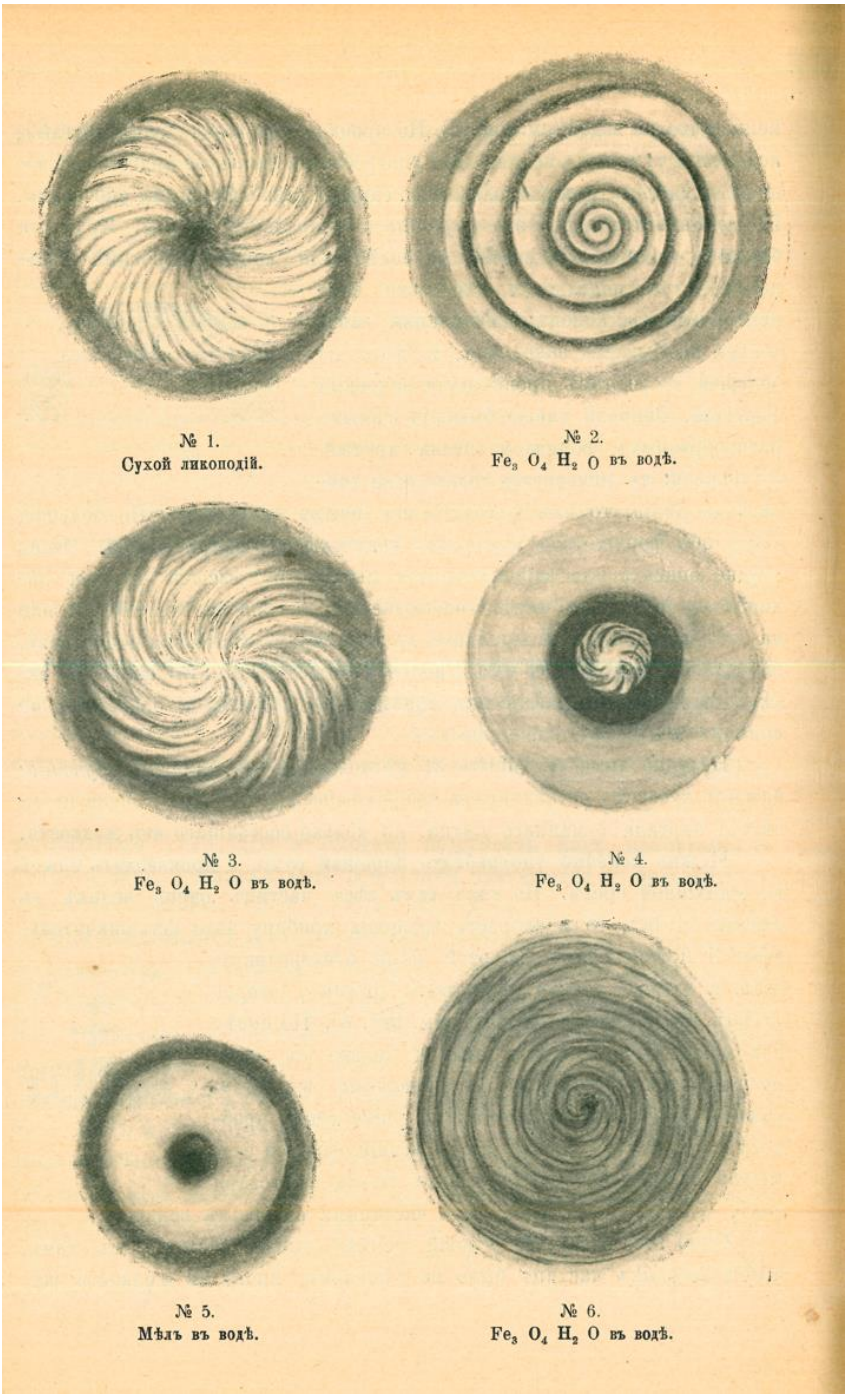

Fig. 3. Pavel Florensky, Various ways to depict the formation of nebulae. From: Idem, "Opyt vosproizvedeniya tumannyh piaten," *Izvestiya russkogo astronomicheskogo obshchestva* 8, no. 4–6 (1900): 106. "Looking at this simple example of artificial nebulae, we are involuntarily drawn back to the time when the flap that formed the solar system began to separate from the immense chaotic cluster of primary matter. Before our mental eyes, we see pictures of the successive development of our system. Little by little, the torn-off piece gets a circular motion. At first slow, it accelerates; some particles fall along spiral orbits, more or less gentle, to the center of gravitation, and others form separate pieces as the central part of the ring thickens. The masses become more and more dense and incandescent. The rings break off, producing planets. Thus our Earth is formed. At first, it glows, then gradually its light fades, and finally it is covered with crust. Geological processes begin. In the meantime, millions of years go by; gradually the number of species of flora and fauna increases; by natural selection they all improve; finally man appears..."[443]

[443] Ibid., 107.

As for the claim that the stars are "optical replicas of the sun," essentially optical illusions, it may have rested on another popular fin-de-siècle idea, being a product of an interpretation of the fact that stellar light must travel considerable temporal distances to reach the Earth.[444] While it has become quite commonplace for us, at the time it was still perceived as something novel and continued to capture the public imagination. This is best exemplified by the fate of Felix Eberty's pamphlet *The Stars and World History* (*Die Gestirne und die Weltgeschichte*, 1846–1847), which had a powerful influence on the intellectual life of the period: from Einstein's theory of relativity to Walter Benjamin's theory of history.[445] One implication of this fact was that, as the philosopher Ludwig Klages put it, the fixed stars "shine in absence" — all we perceive are their "light-images" (*Lichtbilder*), while the stars themselves could be long gone.[446] For a person like Florensky, the simple psychological fact that in our immediate perception the stars are nothing more than their optical images could serve as a solid ground to be certain that modern astronomical views rested on illusion: in fact, there were no stars at all. A recently published drawing that illustrated his 1909 lecture on "the identity of heaven and sea in the mythological worldview" seems to represent the way he himself envisioned the cosmos (fig. 4).

[444] While not recognizing the astronomical dimensions of the universe (on which this phenomenon is predicated), Florensky was of course well aware of it: "A communication with the Sun, i.e. getting an answer to a request sent there, would take more than a quarter of an hour, but a similar response from the nearest star — let us pretend that we believe the astronomers — would be received in seven years" (Pavel Florensky*, Istoriya i filosofiya iskusstva*, ed. igumen Andronik (Trubachev) (Moscow: Mysl', 2000), 196).

[445] Karl Clausberg, "A Microscope for Time: What Benjamin and Klages, Einstein and the Movies Owe to Distant Stars," in *Given World and Time: Temporalities in Context*, ed. Tyrus Miller (Budapest and New York: CEU Press, 2008), 297–358.

[446] Ibid., 337ff.

Fig. 4. Pavel Florensky, *The Scheme of the World Structure*. Circa 1909. Paper, watercolor, pencil, ink. From Yuliya Makoveychuk, "Svyashchennik Pavel Florenskiy — russkiy Leonardo," *Pravmir*, December 7, 2012, https://www.pravmir.ru/svyashhennik-pavel-florenskij-russkij-leonardo. "I invite you to go out with me on a summer day to a meadow or a clearing in the woods. Have you ever wondered what the sky is? If not, let's think about it together. Let's lie down on our backs, gaze into the azure spaces above us, and try to forget ourselves a little — give ourselves up to contemplation. Soon our heads start to spin slightly. It seems to us that the blue vault of translucent glass is not above us, but that we are hugged to the edge of the abyss, that we are hanging over the blue space. What would you call it? What does it look like? — Yes, of course, one word solves the case. It is a blue ocean stretched out with a curved spherical surface under our eyes. It is an everlasting azure laughing sea, surrounded by the green horizon line, the green shores. The white drifting boats, the clouds, are slowly sailing on the sea of heaven. Like a golden tub, the sun dignifies the sea. Another tub, the moon, is also sailing. [...] This immediate perception is vividly reflected in the cosmogonic and cosmographic representations of peoples that are most diverse and most distant from one another."[447]

[447] Florensky, *Iz istorii antichnoy filosofii*, 292; cf. Spitzer, "Milieu and Ambiance," 188–191. See Chapter 2 on the method of "pure experience" and Chapter 3 on the Aryan ocean.

As we saw in previous chapters, Florensky assumed a position of extreme primitivism, believing that ancient and primitive notions, as the fruits of immediate perception and universal (though characteristically Aryan) mythical thinking, not yet corrupted by (Semitic) scientific rationality with its abstract theories, are ipso facto true and therefore should comprise the future Christian worldview. This was the subject of his last course of lectures at the Moscow Theological Academy: "Two paths in the worldview. A natural, universal worldview, culminating in Christianity, and an artificial, 'scientific,' anti-Christian worldview."[448] The stability of his views is evidenced by his 1925 lecture on the theory of art that contained the following digression:

> Astronomers and physicists can dismiss the beauty and materiality of the firmament as much as they wish; but for the direct perception of life it exists and remains essential: it is by no means nothing. The dimensions of the firmament are not the extent of the crystal planetary spheres, much less the spheres of the fixed stars, as they were schematized in ancient astronomy. On the contrary, the boundaries of this visual space are very close to us, although they are further than the tops of trees and tall buildings. This is exactly how we see the sky, and if we speak of it otherwise, it is based on abstract conclusions rather than on directly observable ones. The ancient understanding of the world is based on a direct view of the world and therefore speaks of the world as a cozy nest, correlated in its size with human activity. It is impossible to imagine the world otherwise: in the opposite case, an abstract extrapolation of experience begins, [...] [which] is unproven and unmotivated, in fact, in assuming it, the main feature of experience — its concreteness and therefore its individuality — is forgotten [...].[449]

While it is hard to imagine that any of the professional scholars mentioned at the beginning would subscribe to such radical empiricist claims, their writings — "tinged with melancholy and nostalgia" for a more "cozy" (*gemütlich*) premodern worldview — suggest that they would probably evoke a certain sympathy in them.

Two Bankruptcies of Science

I decided to end with this rather bizarre example in order to emphasize one of the main conclusions of this thesis. It lies in the suggestion that a more comprehensive understanding of the fin-de-siècle "bankruptcy of science" seems to have been hampered by a relatively insufficient study of the legacy of the empiricist tradition, which in the second half of the nineteenth century led to the development of a new descriptivist epistemology and thereby to a sense of scientific crisis. As Jessica Riskin showed in her book *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (2002), despite its professed neutrality and straightforwardness modern

[448] Oleg Ermishin, "Lektsii svyashchennika Pavla Florenskogo po istorii antichnoy filosofii," in Pavel Florensky, *Iz istorii antichnoy filosofii*, ed. igumen Andronik (Trubachev) (Moscow: Akademicheskiy proekt, 2015), 517.
[449] Florensky*, Istoriya i filosofiya iskusstva*, 286–287.

scientific empiricism "hides a baroque past": "By naming sensory experience as the only genuine source of knowledge, sensationism engendered a suspicious attitude toward abstract theory, which operated at a remove from immediate physical sensation."[450] Hence, under the influence of empiricist philosophy, such seemingly unrelated issues like manners, monsters, and sex turned out to be unexpectedly important ingredients of the early modern history of science. But this influence apparently was not limited to the eighteenth century — it continued into the ensuing one, and one of its main vehicles was the tradition of associationist psychology, which provided a virtually alternative-free epistemological lens for addressing the workings of the human mind and all matters related to it, effectively becoming "the foundation of every metascientific discourse."[451] Far from being limited to the history of German philosophy, as it is usually understood, psychologism constituted "a historical force that determined exceptionally much in the intellectual life of the nineteenth and early twentieth centuries," as Ilona Svetlikova has put it in her pioneering book on Russian Formalism.[452] Though I did not set myself such a task when I began to explore Pavel Florensky's views on science, the preceding chapters have been largely devoted to proving this assertion. Judging by Florensky's example, it was precisely psychologism and radical empiricism, accompanied by a characteristic distrust of abstract theory, that was one of the most prominent intellectual elements behind the fin-de-siècle crisis of scientific rationality and the discussions of the bankruptcy of science, leading in turn to such unexpected consequences as the denial of Copernican cosmology and the belief that there are no stars.

As a matter of fact, though he was addressing a somewhat different set of problems that are beyond the scope of my present work, the philosopher Edmund Husserl came to a similar conclusion in his lectures under the telling title "The Crisis of European Sciences and Psychology" (*Die Krisis der europäischen Wissenschaften und die Psychologie*), delivered in Prague in 1935: "European sciences are in crisis, the cause of which is psychology, or rather, its absence. Psychologism could become a solid foundation for the development of the human sciences if its adherents were to draw on a genuinely scientific psychology, not one that comes from Locke and is scientific only in appearance."[453] As is well known, Husserl and his *Logical Investigations* (*Logische Untersuchungen*, 1900–

[450] Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago: The University of Chicago Press, 2002), 10.
[451] Fernando Vidal, "Psychology and Classifications of the Sciences," *Republics of Letters: A Journal for the Study of Knowledge, Politics, and the Arts* 3, no. 3 (2014): 15.
[452] Ilona Svetlikova, *Istoki russkogo formalizma: Traditsiya psikhologizma i formal'naya shkola* (Moskva: Novoe Literaturnoe Obozrenie, 2005), 19.
[453] Ilona Svetlikova, *Istoki russkogo formalizma,* 34. These lectures were published posthumously as *The Crisis of European Sciences and Transcendental Phenomenology* (*Die Krisis der europäischen Wissenschaft und die transzendentale Phänomenologie*, 1954). As Daston remarked, "Husserl's views on Galileo and the modern mentality were widely diffused through his student Koyré's publications long before Husserl's own lectures saw the light of print" (Daston, "The History of Science," 151, note 3). It is quite possible that Koyré inherited his nostalgia for the pre-Copernican cosmology from Husserl,

1901) made a major contribution to the wave of philosophical criticism that toppled psychologism from its throne at the beginning of the twentieth century.[454] But since the sacred place is never empty, it was soon overtaken by an equally imperious sociologism, which made it possible to explain human cognition (and therefore science, too) as a wholly social phenomenon — a view that is perhaps best exemplified by Ludwik Fleck's classic study, also published in 1935: "those who consider social dependence a necessary evil and an unfortunate human inadequacy which ought to be overcome fail to realize that without social conditioning no cognition is even possible. Indeed, the very word 'cognition' acquires meaning only in connection with a thought collective."[455] Over the course of the twentieth century, having once again acquired familiar traits of universal epistemological omnipotence, science found itself "under fire" for a variety of reasons.[456] But it seems that sociologism was a key ingredient in the new "rebellion against science" — or another bankruptcy, if you will — that was actively debated at the end of the twentieth century and received the moniker of "science wars."[457] When one reads Bruno Latour's manifesto *We Have Never Been Modern* (*Nous n'avons jamais été modernes*, 1991), which has been viewed as a relativist affront to scientific rationality,[458] in the context of the fin-de-siècle polemic against modernity exemplified by Pavel Florensky's writings, one cannot help but notice that it recasts some older psychologistic arguments in a new sociologistic key. A comprehensive history of these two bankruptcies, however, is yet to be written.

too, see Juha Himanka, "Husserl's Argumentation for the Pre-Copernican View of the Earth," *The Review of Metaphysics* 58, no. 3 (2005): 621–644.

[454] Svetlikova, *Istoki russkogo formalizma*, 33–35; Martin Kusch, *Psychologism: A Case Study in the Sociology of Philosophical Knowledge* (London and New York: Routledge, 1995).

[455] Ludwik Fleck, *Genesis and Development of Scientific Fact* [1935], trans. Fred Bradley and Thaddeus J. Trenn (Chicago and London: The University of Chicago Press, 1979), 43. For insightful observations on sociologism, see Viktor Vakhshtayn, "Konets sotsiologizma: perspektivy sotsiologii nauki," *Polit.ru*, August 7, 2009, https://polit.ru/news/2009/08/07/vv.

[456] For the American part of this story, see Andrew Jewett, *Science under Fire: Challenges to Scientific Authority in Modern America* (Cambridge: Harvard University Press, 2020).

[457] Gerald Holton, *Einstein, History, and Other Passions: The Rebellion Against Science at the End of the Twentieth Century* (Cambridge: Harvard University Press, 1990), 3–39. Notably, the major point of debate concerned the issue of relativism, cf. Bruno Latour, "The Science Wars: A Dialogue," *Common Knowledge* 8, no. 1 (2002): 71–79.

[458] Margaret C. Jacob, "Reflections on Bruno Latour's Version of the Seventeenth Century," in *A House Built on Sand: Exposing Postmodernist Myths About Science*, ed. Noretta Koertge (New York and Oxford: Oxford University Press, 1998), 240–254.

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