Ludwik Fleck, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache*

Creating Room for Historical Rationality

Fynn Ole Engler
Jürgen Renn
Matthias Schemmel

Ludwik Fleck, a Polish bacteriologist, physician, and historian of science, published *Entstehung und Entwicklung einer wissenschaftlichen Tatsache* (translated in 1979 as *Genesis and Development of a Scientific Fact*) in 1935.[1] In providing astonishingly timely insights into the collective nature of human and, in particular, scientific knowledge, the book is still as well placed as ever to offer guidance and direction to our ongoing thinking about these issues. This is what makes it worthwhile to invite the reader to undertake a renewed, critical reception of the book.

Ludwik Fleck was born in a Jewish-Polish family on 11 July 1896 in Lemberg/Lwów/Lvív. His father ran a medium-scale painting business. He served in the military during World War I and concluded his medical studies with a nonspecialist medical Ph.D. thesis. With a specific interest in microbiology, he served the typhoid specialist Rudolf Weigl as an assistant. From 1923 onward he worked in a private bacteriological laboratory that he had established himself and also in several hospital departments that specialized in the diagnosis of syphilis, in tuberculosis, and, most of all, in serological problems of a general nature. When World War II broke out Lwów became part of the Soviet Union. Fleck was appointed teacher and departmental director for microbiology at the Ukrainian Medical Institute and director of the Lwów City Institute for Hygiene. In

Fynn Ole Engler is a physicist and philosopher of science at the Center for Logic, Philosophy of Science, and History of Science at the University of Rostock in Germany. His current research focuses on the concepts of rationality and reason in the history of the philosophy of science. Institute of Philosophy, University of Rostock, 18051 Rostock, Germany; olaf.engler@uni-rostock.de.
Jürgen Renn is Managing Director at the Max Planck Institute for the History of Science in Berlin. His research focuses on structural changes in systems of knowledge; the aim is to develop a theoretical understanding of knowledge evolution, taking into account its epistemic, social, and material dimensions. He is Chair of the Humanities Section of the Max Plank Society. Max Planck Institute for the History of Science, Boltzmannstr. 22, 14195 Berlin, Germany; renn@mpiwg-berlin.mpg.de.
Matthias Schemmel is a research scholar at the Max Planck Institute for the History of Science in Berlin. His research focuses on the long-term development of fundamental structures of cognition, such as spatial concepts, and the histories of early modern mechanics, of modern physics and astronomy, and of Chinese science. Max Planck Institute for the History of Science, Boltzmannstr. 22, 14195 Berlin, Germany; schemmel@mpiwg-berlin.mpg.de.
The authorized translation of this contribution has been made by the current Editor of *Isis*, who hopes in this way to make up a little for the first Editor's failure to have Fleck's 1935 book reviewed in the journal.

[1] Ludwik Fleck, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache: Einführung in die Lehre vom Denkstil und Denkkollektiv* (1935; Frankfurt am Main: Suhrkamp, 1980). For the English translation see Fleck, *Genesis and Development of a Scientific Fact*, ed. Thaddeus J. Trenn and Robert K. Merton, trans. Fred Bradley and Trenn (Chicago: Univ. Chicago Press, 1979) (quotations in the text are taken from this edition unless otherwise specified; page numbers will be given in parentheses, with corresponding page numbers in the German edition given in brackets).

Isis, volume 109, number 1. 0021-1753/2018/0109-0006$10.00.

1941, when Hitler's armies conquered Lwów, he was forced to move to the Jewish ghetto, where he developed a typhoid vaccine. In 1943 he was deported to Auschwitz, and a year later he was sent to Buchenwald. After the war he obtained his postdoctoral degree (*Habilitation*) at the Medical University of Lublin, and in 1950 he became a full professor. Between 1952 and 1956 Fleck served as director of the Department of Microbiology and Immunology at the Institute of Mother and Child in Warsaw. During this period he carried out a great deal of medical research. In 1957 he emigrated to Israel, where he passed away on 5 June 1961, in Ness-Ziona.[2]

As might be expected, given his education and his professional activity, Fleck found the starting point for his book above all in medical examples. Thus his first chapter describes "how the modern concept of syphilis originated" and the third discusses "the Wassermann reaction and its discovery"—the Wassermann reaction being a procedure for diagnosing syphilis. In both Chapters 2 and 4 he draws more general epistemological consequences from his examples, and he goes on to widen the subject to include other sciences to which he does not have access as a practicing professional and into whose historical development he has not been digging to the same degree.

In *Entstehung und Entwicklung einer wissenschaftlichen Tatsache* Fleck aimed to introduce the doctrine of the "thought style" and the "thought collective." His fundamental starting point is that the historical development of all knowledge is socially conditioned; this manifests itself in concrete reality in the guise of what he calls a thought style. Thus Fleck writes:

> We can therefore define thought style as [the readiness for] directed perception, with corresponding mental and objective assimilation of what has been so perceived. It is characterized by common features in the problems of interest to a thought collective, by the judgment which the thought collective considers evident, and by the methods which it applies as a means of cognition. The thought style may also be accompanied by a technical and literary style characteristic of the given system of knowledge. [P. 99 (p. 130)]

For Fleck, then, the genesis and development of scientific knowledge was not a matter of a "symbolic epistemological subject" but, rather, was linked up with communities and social mechanisms like education and tradition.[3]

Key to his endeavor was to draw scientific rationality into the multiple sociocultural contexts of the long-term historical development of knowledge and, in so doing, to use a comparison between distinct thought styles for questioning their claim to universal validity. In this respect Fleck writes: "Rational epistemology . . . necessarily leads to the investigation of thought style as its proper object" (p. 87 [p. 115]).

This is the background against which, in his historical-comparative study, Fleck occupied himself with the origins and the long-term development of medical knowledge, which he elucidated by means of one specific example. Guided by the relationship between the concept of syphilis, the sources for which could be traced back to the end of the fifteenth century, and the Wassermann reaction, which in 1904 provided the first workable proof of syphilitic blood thanks to the cooperative labor of a thought collective, Fleck was able to show how one of the best-validated medical facts of his time depended on a range of factors that were at the same time social, psychological, and historical.

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[2] See Katarzyna Leszczyńska, "Ludwik Fleck: A Forgotten Philosopher," in *Penser avec Fleck: Investigating a Life Studying Life Sciences*, ed. Johannes Fehr, Nathalie Jas, and Ilana Löwy (Zurich: Collegium Helveticum, 2009), pp. 23–36.

[3] Ludwik Fleck, "Das Problem einer Theorie des Erkennens" (1936), in *Erfahrung und Tatsache: Gesammelte Aufsätze*, ed. Lothar Schäfer and Thomas Schnelle (Frankfurt am Main: Suhrkamp, 1983), pp. 84–127, on p. 84.

Take "primeval ideas" about syphilis like "carnal scourge [*Lustseuche*]," which used to be widely shared across social strata to no less a degree than a similar conception of "foul blood in syphilitics" (pp. 6, 11 [pp. 3–6, 17–22]).[4] Such ideas and conceptions had marked the understanding of syphilis over the centuries, inscribing themselves into the very depths of collective memory. They could thus play a role in the formation and constitution of the scientific fact in question just as important as that of the socially mediated experiences with the materials under investigation—experiences the investigator could attain only after many years of labor in the bacteriological laboratory as a member of a collective committed to tradition. In Fleck's view, the cooperative nature of human knowledge came to the fore in particular in the socially mediated transfer and transformation of theoretical and practical resources of knowledge over many generations of investigators.

This view was chiefly the outcome of observations and reflections that Fleck could make from the 1920s onward as a physician and a lab boss in the medical enterprises of his hometown, Lwów. Thus he wrote:

> Experience gained over several years of working in the venereal disease section of a large city hospital convinced me that it would never occur even to a modern research worker, equipped with a complete intellectual and material armory, to isolate all these multifarious aspects and sequelae of the disease from the totality of the cases he deals with or to segregate them from complications and lump them together. Only through organized cooperative research, supported by popular knowledge and continuing over several generations, might a unified picture emerge, for the development of the disease phenomena requires decades. [P. 22 (p. 33)]

By means of the concepts of thought style and thought collective, Fleck had defined his central conceptions for a theoretical account of scientific knowledge on a historical-socio-epistemological basis. The manner in which he approached the history of knowledge had taken shape in particular in a confrontation with the thought of the Vienna Circle, formed around the philosopher Moritz Schlick. In September 1933 Fleck sent Schlick an extensive manuscript entitled "Die Analyse einer wissenschaftlichen Tatsache: Versuch einer vergleichenden Erkenntnistheorie" ["The Analysis of a Scientific Fact: An Essay in Comparative Epistemology"], with a request that Schlick offer his opinion and, if it suited him, submit the essay as a candidate for a prize in this domain offered by the Viennese Sociological Society. Apparently Fleck, who had no other connection with German science outside of his own specialty, hoped by means of this letter to enlist the help of the head of the Vienna Circle in getting his manuscript published. Fleck clearly regarded Schlick as a particularly open-minded figure among German philosophers, though surely an essay on "comparative epistemology" based on materials from the history of medicine and biology was bound to strike him as rather strange.

At the same time, however, Fleck wanted to engage Schlick in conversation. He raised questions about the long-term processes of transformation of knowledge, about the connection between traditional knowledge stocks and the individual act of knowing, and about the dependence of the cultural evolution of knowledge on the social structures of concrete thought collectives—questions quite foreign to the epistemological concerns of his time. Fleck did not even hesitate to give clear expression to his skepticism regarding traditional, classic epistemology, with its exclusive concentration on the relationship between subject and object—precisely the kind of epistemology represented by the Vienna Circle and by Schlick in particular: "I have never been able,"

[4] More broadly, see Fleck, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache* (cit. n. 1), Ch. 1.

Fleck wrote to Schlick, "to resist the impression that, rather than investigating knowledge such as it presents itself in reality, epistemologists most often investigate an imagined ideal picture that lacks the real properties thereof." In an equally critical vein, he continued:

> Already the very selection of material almost exclusively from physics, astronomy, or chemistry seems to me to lead one astray, since the genesis of our elementary physical knowledge goes back so far that we can investigate it only with great difficulty, whereas the more recent insights are to so great an extent "enclosed in a system" [*systembefangen*], as it were, and imprinted in all of us by ramming them down our throats at school and by means of the scientific tradition, that I must regard them as equally unfit to serve as our principal research material. The statement that all knowledge stems from our sense impressions leads us astray—indeed, the largest part of the knowledge of all human beings stems simply from textbooks. . . . There are, finally, in the historical development of knowledge, too, some remarkable general phenomena, such as for instance the special, stylistically very close coherence of any system of knowledge—phenomena that require an epistemological investigation.
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> These are the considerations that gave me occasion to treat a scientific fact from my own discipline in the epistemological way, thus giving rise to the manuscript that I mentioned to you.[5]

In 1934 Schlick passed the manuscript on to the Springer publishing house, with which he had a close relationship. In his response to Fleck he had suggested as a possible referee the sociologist and economist Franz Oppenheimer, who had practiced in Berlin as a physician, was well acquainted with Albert Einstein, and was at the time working in Palestine as a guest professor. It is not known, however, whether either he or any other referee had been called in for advice when Springer decided not to publish the book. It appeared instead in 1935 with the Basel publishing house of Benno Schwabe and Company, and for the time being its influence was minimal.[6]

Not until the 1960s was Fleck's work rediscovered. From the late 1970s onward it has received ever-increasing attention among sociologists, historians, and philosophers of science. Right from the start, Fleck's conception was discussed in connection with positions taken by T. S. Kuhn, who, in spite of his limited understanding of Fleck's ideas, undoubtedly made a decisive contribution to their revival.[7]

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[5] Ludwik Fleck to Moritz Schlick, 5 Sept. 1933, Ludwik Fleck Archive, ETH Zurich (translated by H. F. Cohen).

[6] See Erich Otto Graf and Karl Mutter, "Zur Rezeption des Werkes von Ludwik Fleck," *Zeitschrift für Philosophische Forschung*, 2000, 54:274–288; and Ludwik Fleck, *Denkstile und Tatsachen: Gesammelte Schriften und Zeugnisse* (Berlin: Suhrkamp, 2011), pp. 606–618.

[7] See, among others, Wilhelm Baldamus, "The Role of Discoveries in Social Science," University of Birmingham, Discussion Paper No. 2, July 1966, rpt. in *The Rules of the Game: Cross-disciplinary Essays on Models in Scholarly Thought*, ed. Teodor Shanin (London: Tavistock, 1972), pp. 276–302; Baldamus, "Ludwik Fleck and the Development of the Sociology of Science," in *Human Figurations: Essays for/Festschrift für Norbert Elias*, ed. Peter R. Gleichmann, Johan Goudsblom, and Herman Korte (Amsterdam: Amsterdams Sociologisch Tijdschrift, 1977), pp. 135–156; Robert K. Merton, "The Sociology of Science: An Episodic Memoir," in *The Sociology of Science in Europe*, ed. Merton and Jerry Gaston (Carbondale: Southern Illinois Univ. Press, 1977), pp. 3–141; Lothar Schäfer, "Theorien-Dynamische Nachlieferungen: Anmerkungen zu Kuhn-Sneed-Stegmüller," *Z. Phil. Forsch.*, 1977, 31:19–42; Dieter Wittich, "Eine aufschlußreiche Quelle für das Verständnis der gesellschaftlichen Rolle des Denkens von Thomas S. Kuhn," *Deutsche Zeitschrift für Philosophie*, 1978, 26:105–113; Jonathan Harwood, "Ludwik Fleck and the Sociology of Knowledge," *Social Studies of Science*, 1986, 16:173–187; Babette E. Babich, "From Fleck's *Denkstil* to Kuhn's Paradigm: Conceptual Schemes and Incommensurability," *International Studies in the Philosophy of Science*, 2003, 17:75–92; Peter Stachel, "Was ist eine Tatsache? Ludwik Flecks Beitrag zur Wissenschaftssoziologie," in *Jahrbuch des Simon-Dubnow-Instituts* (Göttingen: Vandenhoeck & Ruprecht, 2004), pp. 357–362; and Daniela Bailer-Jones and Cord Friebe, *Thomas Kuhn* (Paderborn: Mentis, 2009), pp. 18–21.

Even so, this revival has been linked up to the present day with a shift in its reference frame, owing to which Fleck is made to appear as a representative of an irrationalist conception of science. The point is rather this. Fleck used for his point of orientation a concept of rationality of the sort expressed in an analytical theory of science that at the time was just being brought into being. That is why he felt compelled to characterize as irrational structures of experience that lead one beyond that particular concept of rationality. He says, for instance: "The necessity of being experienced [*Erfahrenheit*] introduces into knowledge an irrational element, which cannot be logically justified. Introduction to a field of knowledge is a kind of initiation that is performed by others. It opens the door. But it is individual experience, which can only be acquired personally, that yields the capacity for active and independent cognition" (pp. 95–96 [pp. 125–126]). If, in contrast, one does not confine one's concept of rationality to elements that can be legitimated by logic, then such aspects of the historical development of systems of knowledge can surely be represented as fully rational and as adequate to the empirically given. Fleck offers important hints that address the challenge of formulating such a concept of historically developing rationality.

For Fleck, a fact is definitely not just a purely social or cognitive product; rather, it arises "at first [as] a signal of resistance in the chaotic initial thinking, then a definite thought constraint, and finally a form to be directly perceived" (p. 95 [p. 124]). To bring about a scientific thought style means, in Fleck's view, to adapt it to resistance from the outside and to maximize what he calls "passive connections [*Kopplungen*]." The objective of modern science, he asserts, is to attain "a maximum of information [*Kenntnisse*], the greatest possible number of mutual relations between individual elements," so as to approximate in this manner "the ideal of objective truth" (pp. 95, 144 [p. 189]). The "being experienced [*Erfahrenheit*]" required to master a scientific domain is, therefore, not at all irrational—unless one understands rationality quite narrowly in the sense of being capable of formal-logical legitimation.

In 1960, shortly before he passed away, Fleck summed up his thoughts on the social, historical, and epistemic structures of scientific knowledge one final time in a manuscript that remained unpublished for more than twenty years. He found his insight into the social nature of science and its development confirmed by the developments of his time. "In the present day," he wrote, "in the era of team cooperation, of articles published by several coauthors, of so many journals, reviews, conferences, symposia, committees, governing bodies, societies and congresses, the communal nature of scientific knowledge becomes evident."[8]

In view of the role of international large-scale cooperation at scientific experimental and measuring facilities, and of the significance of new information technologies for scientific communication and cooperation, Fleck's analysis of the collective nature of the production of scientific knowledge is today more timely than ever.

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[8] Ludwik Fleck, "Krise in der Wissenschaft: Zu einer freien und menschlicheren Naturwissenschaft" (1960), in *Erfahrung und Tatsache*, ed. Schäfer and Schnelle (cit. n. 3), pp. 175–181, on p. 176.

No Escape from Fleck

Felix E. Rietmann

My first encounter with Ludwik Fleck's *Genesis and Development of a Scientific Fact* was an experience of painful catharsis (*κάθαρσις*: "purging," "cleansing," "clarification"). I had