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# Sciences, objectivity and realism: between Ludwik Fleck and contemporary debates

ANNA C. ZIELINSKA

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In memory of Marek Klingberg

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It seems that one is required to make a choice when doing philosophy of science: either sciences aim at finding truth, or they construe a more or less complete discourse related to our perception of reality, but fail to offer a firm grasp of what that entails. This trade-off mirrors that of another, between abstract realism and concrete pragmatism. And yet, Ludwik Fleck, the person credited with developing the first systematic reflections on the socio-political implications of scientific discoveries and thus a way to think about science typically associated with constructivism, is not best described as an anti-realist, despite his preference for trivial facts over elegant theories.

In this paper, I explore the philosophical and scientific positions of Ludwik Fleck, author of the first theory of democratic science and, at the end of the day, a scientific realist. This interpretation of his work is somewhat at odds with the more standard approach, wherein Fleck is presented as a pioneer of relativism or of social constructivism in the philosophy of sciences. In the following, I discuss Fleck's philosophical context offer an analysis of a few of his better-known interpretations and offer a final perspective by showing his commitment to the reality of scientific practice, notwithstanding his scepticism towards scientific theories. And while this paper is an attempt to offer an alternative reading of Fleck's positions, it also aims at reaffirming a stance already defended by, among others, Ian Hacking. Scientific realism needs to be understood not *in opposition to* a historical perspective on dynamically developing sciences, but *along with* this perspective.

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## 1 Lviv, a hotspot for metascience

Something extraordinary happened in Poland at the beginning of the 20th century: an unprecedented and surprising moment of philosophical creativity. The country was finally positioned to emerge from nearly a century of inexistence (when it was divided between Russia, Austro-Hungarian Empire and Prussia), and the desire for emancipation was widespread. This also represented a short but golden age for Polish Jews, whose intellectual contribution to various debates in the sciences, humanities, and arts, was unprecedented.

In 1895, almost out of the blue, a 29-year-old philosopher, Kazimierz Twardowski left Vienna, where he received his PhD, and was appointed as a head of the philosophy department at Lvov University. Lvov – now the Ukrainian city of Lviv – hosted this new academic institution, which was given unusual freedom to hire young and promising researchers.

At the time, he felt that classical Polish romantic philosophy with its mysticism was not something he wanted to pursue. Across Europe, philosophers were discovering the power of language, were formulating new conceptions of the foundations of mathematics and were elaborating philosophical logic. Twardowski developed a keen interest in fundamental epistemological, metaphysical and formal questions that philosophers of language were treating in a novel way, and he was able to attract a number of young people ready to work on these subjects.

The most influential members of the first two generations of this newly created “school” (which has subsequently partly migrated to Warsaw, thus the name of “Lvov-Warsaw School” made popular by Jan Woleński (Woleński 1989)) were Jan Lukaszewicz who refined the principles of Aristotelian logic, Tadeusz Kotarbiński – co-founder of the modern philosophy of action, Kazimierz Ajdukiewicz with an original version of conventionalism, and Alfred Tarski, who simply redefined the notion of truth, by introducing the concept of metalanguage in the context of deductive languages.

What united these philosophers was principally their desire to establish tools for conceptualizing reality in the most clear-cut way possible, while bridging epistemological and societal concerns: science is not for elites, and education is a starting point for the society.

## 2 Fleck as an outsider

On the margins of Lvov intellectual life, a Jewish medical doctor Ludwik Fleck (1896-1961) was trying to understand the issues at stake in his own discipline. Ilana Löwy notes that Fleck’s epistemological thought was “influenced by seminal ideas from the Polish School of Philosophy of Medicine” (Löwy 1990, p. 216). He was certainly not a member of the Lvov-Warsaw School, but not a complete stranger either: a few of his papers were published in the journal controlled by the Lvov philosophers. While he understood both their concern with reality, and similar epistemological concerns expressed by members of the

Vienna Circle, Fleck felt that these attitudes, virtuous as they were, lacked something essential: they failed to consider the social dimension of knowledge. His most well-known book, *Genesis and Development of a Scientific Fact* [*Entstehung und Entwicklung einer wissenschaftlichen Tatsache*], published in German in 1935, as we might glean from the title, illustrates his view that scientific facts are not pure entities that we simply state – they have their origins and they are dynamic in their development.

This idea, stated in such a simplified way, provokes obvious reactions: a social dimension of science? Would this imply that science is merely a convention, a discourse with no outward connection to reality, but only expresses specific opinions? Does this mean that all discourses are equally valid, regardless if they are fictional or so called “scientific”?

The tension that emerges from this (erroneous) way of reading Fleck not only teaches us something about a particular debate in Polish philosophy but recalls a discussion that is as old as philosophy itself, between those who believe that some ideas do somehow “touch” the world, and others who claim that science is not about truth but about efficiency and elegance, and that the scientific discourse is not epistemologically superior when it tries to say something about the world.

In the following section, I present the criticism that Fleck received from one of the prominent members of the Lvov-Warsaw school, Izydora Dąmbska, which offers important historical context to this particular debate, which I follow by presenting Fleck’s own views in more detail (beyond the caricature) and try to understand philosophical problems he viewed were important. Finally, I will try to show that Fleck’s work is less a form of “relativism” as some, like Bruno Latour, would like to believe is the case, but rather a new kind of lucid realism.

### 3 Izydora Dąmbska’s criticism

One of the representatives of the third generation of the Lvov-Warsaw School, Izydora Dąmbska, expressed a position that corresponded to the spirit of several members of the school<sup>1</sup>: she thought that there was something uncanny in Fleck’s denial of the absoluteness of truth:

I think that the position of Dr Fleck is wrong, when he notes that all depends on the “style of thought” [*Denkstil*]: whether one is an empiricist or a mystic, and that none of those styles can be presented by epistemology as one which is more apt than others to lead to truth rather than to incomprehensible mumbling. (Dąmbska 1937, p. 293)

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1. It’s worth noting that not all members shared this view, for example Kazimierz Ajdukiewicz who defended an original kind of conventionalism, in the spirit of Poincaré, whereas some other philosophers (Lesniewski and Kotarbiński) pursued long discussions questioning whether truth is eternal or community dependent. For a more detailed presentation of the context of this debate, cf. (Woleński 1997), (Szlachcic 2006).

Dąbbska held that the empiricist way of thinking proved its superiority in the fact that it is sharable (both a scientist and a mystic use it in a similar way and understand each other), and practically necessary for the survival of the community. The intersubjectivity of science is guaranteed by the capacity of “normal people” [*ludzie normalni*] to admit the truthfulness of the same sentences in more or less the same conditions (Szlachcic 2006).

For Fleck this was unclear: neither the notion of “normal person” was convincing nor indeed the notion people systematically agree in their perceptions of the same events. Indeed, in the context of laboratory work, people tend to use the same intellectual tools, they train themselves to pay attention to the same phenomena and report them according to established standards. But this is precisely what Fleck describes with his concept of “style of thought”: the notion that science offers the most rigorous world description.

Was Fleck a sceptic? A sceptic, traditionally, claims that nothing can really be known, and would not pretend to be able to draw conclusions about objectivity *per se*.

Pyrrho, the first Greek sceptic philosopher who lived just after Aristotle, claimed that neither our sense perceptions nor our theories are able to provide us with any truth. We should therefore remain “without views” (adoxastous). Sextus Empiricus, another sceptic, would say that “the qualities of bodies which strike our senses are only mere appearances” (Bayle 1826, p. 3, 3:56), thus we should suspend our judgment. This is a very powerful stance, inspiring to many, Gassendi and Descartes among others.

Other philosophers with sceptical tendencies (while not classical Sceptics) – the pre-Socratic Gorgias among others – claimed that even if some things could be known to oneself, this knowledge is never sharable. Yet, is there really a reason to believe that? Do we need to have exactly the same sense impressions – do those sense impressions have to be intersubjective – or be based on intersubjective knowledge? Dąbbska’s response to this question was negative: indeed, our sense impressions do not need to be the same, but the knowledge formation process, series of established research procedures, constructive criticisms, create what is known, and this has value by virtue of both the way it offers the most accurate possible description of reality, and in the way it was elaborated.

Here, we need to understand Dąbbska’s primary concern. Kazimierz Twardowski, the founder of the Lvov-Warsaw School, posited that truth needs to be absolute. In light of obvious difficulties with this position, he then tried to specify what a “truth proposition” might mean. Certainly, the proposition: “Anna Zielinska is in Tel Aviv”, although rather appealing, is true only occasionally. A few days per year, at most. How might one even consider this an absolute truth? The solution is quite simple: the proposition must be carefully specified to have a definite meaning: “On May 25, 2017, A.Z. was in Tel Aviv”, is a proposition which is quite modest, does not say that much

about the world, certainly, but it is hard to see why we would not consider this to be absolutely true<sup>2</sup>.

The fact that Fleck indeed made no particular effort to try to definitely state this absolute truth made his views difficult to accept in the eyes of the major Lvov philosophers, but at the same time extremely attractive to others.

#### 4 Fleck's double-edged success – between Thomas Kuhn and Bruno Latour

Thomas Kuhn read Fleck when he began considering leaving the field of physics and became interested in “scientific revolutions”. Science, he thought, was not cumulative, could not be reduced to simply compiling different bits of knowledge, but was instead a relatively isolated discourse, which essentially replaced one dysfunctional reasoning with another. From the “normal science” phase, a paradigmatic one, he spoke about increasing dissatisfactions, or “cracks” in the system, which are followed by a scientific revolution, and imposing a new paradigm. This is a “paradigm shift”. Moving from one paradigm to another makes discussion impossible, if not futile: everything changes.

This position is one of the strongest stances favoring a form of relativism: nothing can be known as it is since all knowledge is essentially dependent of the paradigm in which it was formulated. Kuhn's main target was, as such, scientific realism: the idea that sciences aims to describe reality. That there are truths about the world which are independent from any observation, an ideal world in the style of Frege or Popper, or, if we go further, of Plato.

It is thus not surprising to see that Kuhn took an interest in Fleck's idea that a thought collective would have trouble communicating. He wrote, in foreword to the English translation of Fleck's *Genesis and Development of a Scientific Fact*:

[...] given my own special concerns, I am particularly excited by Fleck's remarks (chap. 4, sec. 3) on the difficulties of transmitting ideas between two “thought collectives,” above all by the closing paragraph on the possibilities and limitations of participation in several “thought communities.” (“Very different thought styles are used for one and the same problem more often than are very closely related ones”).

Yet it seems that for Fleck, the things at stake were a bit different. And Kuhn's admiration might be misled, for he seems to reduce, in the *Structure of scientific revolutions*, the study of sciences to the *sociology* of the sciences. Yet while Fleck has undoubtedly added a social dimension to the study of sciences,

2. The first version of this paper was presented at the Nuit de Philosophie in Tel Aviv, on May 25, 2017. The author is grateful to the Polish Cultural Institute in Tel Aviv and to Raphael Zagury-Orly for the invitation.

he certainly did not reduce *all* its dimension to sociology, contrary to Kuhn's suggestion:

I have encountered Ludwik Fleck's almost unknown monograph, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache* (Basel, 1935), an essay that anticipates many of my own ideas. [...] Fleck's work made me realize that those ideas might require to be set in the sociology of the scientific community. (Kuhn 1962, p. vi–vii)

However, it is certainly Kuhn who made Fleck quite well known in the second half of the twentieth century, also by contributing to the publication of the English translation of Fleck's 1935 book.

Among those who both made Fleck's philosophy genuinely fashionable at the beginning of the 21st century was the French thinker, sociologist, and anthropologist Bruno Latour. Latour is well known for his controversial stances on truth and facts:

So-called "facts" they argued, are not discovered or revealed by science, but rather are "constructed", "constituted", or "fabricated" when scientific statements come to be accepted, or are no longer contested. [...] Discourse being a social phenomenon, what they were saying, in effect, is that facts were to be eliminated in favor of social phenomena. (Whether social facts should also be eliminated is a question they didn't address very clearly.) (Goldman & Blanchard 2015)

There is no object beyond discourse ... the organization of discourse is the object. (Latour & Woolgar 1979)

Latour notes in another context that the links between knowledge and truth are accidental, and not very fruitful – he uses here terminology inspired by Fleck, but quite probably his ideas are very far from Fleck's:

Knowledge is an operation that produces objectivity for practice of a collective inquiry about the world. Truth is a different matter. It is not necessarily associated with knowledge. Knowledge is about objectivity, it's one kind of truth. But there are others: about politics, about diplomacy, law, religion or art. In all that cases there is a difference between true and false. I don't think that we have any advantage to associate knowledge and truth. (Bruno Latour, *The Relativist*, talk at the University of Bergen, 2013)

In France, these ideas have since been associated also with Fleck – Latour helped, like Kuhn a few decades earlier, to translate Fleck's book, this time to French (Fleck 2005). And yet, the similarity of their positions is lesser than it is commonly thought. Their ideas imply not only different ontological stances, but also opposed conceptions of the role of science in society.

## 5 Fleck as a theoretician of medicine

Certainly, Fleck was not a straightforward realist. He was an experimenting scientist himself and did not view scientific discourse as a neutral given. He certainly wanted to be rid of the Cartesian portrayal of a thinker who establishes knowledge independent of any element from his surrounding:

Three systems of factors come into being, that contribute to every process of cognition [*Erkennen*], are interrelated and interacting: the burden of Tradition, the weight of Education, and the effect of the Sequence of the acts of cognition.

These are social factors, and any new epistemology must, therefore, be brought into a social and cultural-historical context. [...]

At no time do we resemble a blank page, nor are we in a state of a *tabula rasa* as is the screen before a film is projected on it. Cognition has no discernible beginning, certainly not at the moment of birth or even in the womb, because the capacities for feeling, and feeling as such, originate in a parallel and synchronous way through interaction. (Fleck 1986)

In his *Genesis and Development of a Scientific Fact*, Fleck wanted to establish a definition for medical fact – an unusual object in times when medicine did not attract a lot of attention from philosophers. His work was focused on the study of syphilis, considered not only as a scientific and medical entity, but also as an artifact of general folklore, with mythical and religious elements that nourished it over time. But does this mean that he thought that the result of scientific inquiry could be compared to folklore or religion? Far from it.

Fleck felt that adding the historical dimension and showing hesitations of researchers might lead to a dismissive attitude towards scientific discoveries and clearly noted that this is not at all the obvious consequence of his approach:

The views outlined here should not be construed as skepticism. We are certainly capable of knowing a great deal. If we cannot know “everything”, according to the traditional position, it is simply because we cannot do much with the term “everything”, for every new finding raises at least one new problem: namely an investigation of what has just been found. The number of problems to be solved thus becomes infinite and the term “everything” meaningless.

An “ultimate” or set of fundamental first principles from which such findings could be logically constructed is just as non-existent as this “everything.” Knowledge, after all, does not repose upon some substratum. Only through continual movement and interaction can that drive be maintained which yields ideas and truths. (Fleck 1979, p. 51)



Already in his early writings, “Fleck argued in favor of a holistic approach to pathological phenomena”, which “cannot be understood from a simple, reductionist point of view”. He noted in particular that infectious diseases did not stem from a single etiological cause (pathogenic microorganisms), but resulted from “multifactorial and multidimensional interactions between the microorganism and its host” (Löwy 1990, p. 216).

In his paper on the “crisis of reality”, Fleck noted that the reality sought by the philosopher was an illusion – this nevertheless did not mean that there was no reality whatsoever serving as a starting point for scientific investigations.

The striving for to know, to gain knowledge [*Erkennen*] of the absolute is based upon a strange misunderstanding. [...] It is impossible to deduce an absolute reality from the laws of natural science, whose contents cannot be derived from the mere philosophically trained intelligence of the contemporary European. [...] Of what ought the absolute reality to be independent? If one wished it to be independent of man, one ought to consider that in this event it would also be of no use to man. If one wished it to be independent of the individual, one should construe it as socially conditioned, and therefore dependent on the collaboration and communication of many individuals, as many as possible. One should construct it democratically, taking into account that it would then become much less dependent on time, because the collective develops much more slowly, but also more consistently. This is the way of the natural sciences. (Fleck 1986, p. 55–56)

Natural sciences are thus not anti-realist. Nor are they anti-rational. And the proper follow up of Fleck’s ideas is not to be found in Kuhn’s reflections, but instead appears in the writings of Ian Hacking.

Ian Hacking suggested that one might be tempted to see Fleck as having a “‘constructionist’ attitude to scientific facts, although blessedly he did not use the construction metaphor” (Hacking 1999, p. 60). Scientific facts (but likely not “fact” *per se*) existed for Fleck – and this is one reason his work appealed to Hacking – only as long as they were part of styles of thinking. Fleck himself gently mocked former sociologists of science for clinging to an exaggerated respect for scientific facts. This view made him a potential ally for anti-scientific positions within the science wars in the 1990s, opposing postmodernist and realist thinkers. Such an interpretation of Fleck is, however, anachronistic, and does not take into account the background against which he was positioning himself, which was a metaphysical picture of the world structured into scientific facts. This latter picture cannot be seen as a scientific hypothesis, Hacking notes, but as a metaphysical view. Fleck avoids as much as possible including any metaphysics in his work and offers a series of descriptions of human and historical processes that accompany the emergence of scientific findings. And Hacking believes that while Fleck’s work might have a constructivist flavor in

the eyes of a contemporary reader, this approach does nevertheless risks being better understood as *nominalism*.

Hacking's philosophical position, "realism of entities", as opposed to the "realism of theories", is itself close to Fleck's own stances. He blames philosophers for having been too interested in elegant theories, and not enough in the daily practice of scientists:

Philosophers long made a mummy of science. When they finally unwrapped the cadaver and saw the remnants of an historical process of becoming and discovering, they created for themselves a crisis of rationality. That happened around 1960. (Hacking 1983, p. 1)

But once in laboratory, this mummified conception of science does not hold up. The possibility of experimentation itself confronts us with irrefutable truth. If an experiment is conducted on some entities (say, positrons or electrons), and they have a predicted causal effect, they are genuine. "So far as I'm concerned, if you can spray them then they are real", says Hacking.

He adds that "[r]ealism about theories says they aim at the truth, and sometimes get close to it. Realism about entities says that the objects mentioned in theories should really exist". The two are conceptually independent: the realism of theories should be understood as more fragile and revisable than that of entities. This interplay between different degrees of epistemological robustness (between laboratory experimentation and theoretical developments) is to be found already in Fleck's writings, where reality and objectivity could be considered in terms which do not imply a human-independent absoluteness.

## 6 The taming of objectivity

What is objectivity? The insistent quest for objectivity has been placed by Lorraine Daston and Peter Galison in the middle of the nineteenth century – it has apparently been a recently added requirement for science:

Objectivity has not always defined science. Nor is objectivity the same as truth or certainty, and it is younger than both. Objectivity preserves the artifact or variation that would have been erased in the name of truth; it scruples to filter out the noise that undermines certainty. To be objective is to aspire to knowledge that bears no trace of the knower — knowledge unmarked by prejudice or skill, fantasy or judgment, wishing or striving. Objectivity is blind sight, seeing without inference, interpretation, or intelligence. (Daston & Galison 2007, p. 17)

Ian Hacking notes that in English – but not in German – "objective/subjective were neutral, and not evaluative, terms, until around 1850" (Hacking 2015, 22). Daston and Galison show that this notion of objectivity aimed at erasure of an

individual subjectivity of the creator from the workings of science. It became important to suppress the “wilful intervention of the artist-author, and to put in its stead a set of procedures that would, as it were, move nature to the page through a strict protocol, if not automatically”. (Daston & Galison 2007, p. 121)

This understanding of the concept of objectivity does not lend any specific positive content, but rather acknowledges the quest to avoid “various types of vice”, according to Hacking (Hacking 2015, p. 22). And as such, these vices are particularly salient in the context of life sciences involving the repetition of experiments. The fact that Fleck started his epistemological work in the medical sciences is not only accidentally linked to his own profession. He indeed knew that it is with life sciences that offer a better understanding of the porosity and complexity of the scientific mindset.

This multifaceted conception of objectivity, present in Fleck’s original work from 1935 and in Hacking’s criticism of armchair philosophy of sciences in the early 1980s, does not amount to undermining realism, but reinvents the thinking surrounding both realism, and the fragile yet genuine reality of knowledge. Trust in science – essential – needs to be carefully and historically constructed (Olesko 2020).

And at the end of the day, an appeal to objectivity might be construed as sterile, particularly when it involves political, social or strategic decision-making in, e.g., the medical sciences. “When public virtues compete—evidence-based versus clinical medicine, for example—we need to think harder, not more objectively” (Hacking 2015, p. 26). The defence of the specificity of science as a privileged path towards truth cannot count on solely quoting abstract ideas but should rather engage in a detailed study of a forever incomplete set of “bits and pieces” scientific information. Here, we could just as well be following Ludwik Fleck, whose constructivist reading fundamentally rests on a mistake.

## Bibliography

- Bayle, P. (1826). *An Historical and Critical Dictionary*, vol. 3. London: Hunt & Clark.
- Dąmbska, I. (1937). Czy intersubiektywne podobieństwo wrażeń zmysłowych jest niezbędnym założeniem nauk przyrodniczych. *Przegląd Filozoficzny*, 40(3), 288–294.
- Daston, L. & Galison, P. (2007). *Objectivity*. New York: Zone Books.
- Fleck, L. (1979). *Genesis and Development of a Scientific Fact*. Chicago; London: University of Chicago Press.
- Fleck, L. (1986). On the Crisis of “Reality” [1929]. In *Cognition and Fact: Materials on Ludwik Fleck, Boston Studies in the Philosophy of Science*,

vol. 87, Dordrecht: Springer Netherlands, 47–57, doi:10.1007/978-94-009-4498-5\_3.

Fleck, L. (2005). *Genèse et développement d'un fait scientifique*. Paris: Les Belles Lettres. Trad. fr. par N. Jas.

Goldman, A. & Blanchard, T. (2015). Social Epistemology. In E. N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*, Metaphysics Research Lab, Stanford University, Summer 2015 edn.

Hacking, I. (1983). *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*. Cambridge; New York: Cambridge University Press.

Hacking, I. (1999). *The Social Construction of What?* Cambridge (Mass.): Harvard University Press.

Hacking, I. (2015). Let's not talk about objectivity. In F. Padovani, A. Richardson, & J. Y. Tsou (eds.) *Objectivity in Science: New Perspectives from Science and Technology Studies*, Cham: Springer International Publishing, 19–33, doi:10.1007/978-3-319-14349-1\_2.

Kuhn, T. S. (1962). *The Structure of Scientific Revolutions*. International Encyclopedia of Unified Science, Chicago: University of Chicago Press, 2nd edn. 1970.

Latour, B. & Woolgar, S. (1979). *Laboratory Life: The Construction of Scientific Facts*. Princeton: Princeton University Press.

Löwy, I. (ed.) (1990). *The Polish School of Philosophy of Medicine. From Tytus Chalubinski (1820-1889) to Ludwik Fleck (1896-1961)*. Philosophy and Medicine, Dordrecht: Kluwer.

Olesko, K. M. (2020). Ludwik Fleck, Alfred Schutz, and trust in science: The public responsibility of science education in challenging times. *HoST – Journal of History of Science and Technology*, 14(2), 50–72, doi:doi:10.2478/host-2020-0014.

Szlachcic, K. (2006). Konwencje, style myślenia i relatywizm Kilka uwag o sporze I. Dąbka – L. Fleck. *Studia Philosophica Wratislaviensia*, 1(1), 27–45.

Woleński, J. (1989). *Logic and Philosophy in the Lvov-Warsaw School*. Dordrecht: Kluwer.

Woleński, J. (1997). *Szkola lwowsko-warszawska w polemikach*. Warszawa: Scholar.

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