

Medicine and Thought-Styles: On the 50th Anniversary of the Death of Ludwik Fleck (1896-1961)

Jarosław Sak MD MA PhD¹ and Jakub Pawlikowski MD MA PhD^{1,2}

¹Department of Ethics and Human Philosophy, Medical University of Lublin, Poland

²Institute of Rural Health, Lublin, Poland

KEY WORDS: Ludwig Fleck, thought-collective, philosophy of medicine

IMAJ 2012; 14: 214–218

Last year, 2011, marked the 50th anniversary of the death of Ludwik Fleck, a physician, microbiologist [1] and a passionate philosopher of medicine [Figure 1]. Fleck suffered many of the humiliations that the 20th century inflicted upon the Jews of Eastern Europe [2]. He experienced racial persecution during

Figure 1. Ludwik Fleck in his laboratory in Lublin (about 1949)



World War II and in the years preceding it. He survived that long period of brutal antisemitism, followed by imprisonment in the Lviv Ghetto and Nazi concentration camps [3].

In science, he gained recognition [4] but not the fame that he had every right to expect: this was denied him during his lifetime and after his death. Ludwik Fleck was an exceptionally broad-minded individual and a true scholar. He gained recognition for his achievements in research on the anti-typhoid vaccine and for the discovery of leukergy, the clumping of white blood cells that accompanies some inflammations and infections [5-13]. Fleck's unique theory of thought-styles in the field of philosophy of medicine remained almost completely unnoticed until several years after his death at the end of the 1970s, when it was finally acknowledged by the western scientific community. In the next decade, the concept of thought-styles gained a permanent position in the world of science. Today, it inspires many researchers in the fields of the history of science [14] and the history of medicine [15], as well as people involved in various medical specialties [16,17]. Fleck's concept explains the mechanisms of the evolution of scientific knowledge, especially medical knowledge. He was the last representative of the Polish School of Philosophy of Medicine [18,19]. Looking back over Ludwik Fleck's career as a scientist, a doctor and a philosopher, two questions emerge: Is Fleck's concept of thought-styles useful for contemporary physicians? Does contemporary medicine need Fleck's theory of thought-styles?

THE LIFE AND WORK OF LUDWIK FLECK

Ludwik Fleck was born in 1896 in Lviv, into a family of Polish Jews. Between 1772 and 1918 Lviv was part of Austria and between 1918 and 1945 part of Poland (after World War II, Lviv was annexed to the USSR and from 1991 became part of Ukraine). He graduated from the Polish Lyceum in 1914 (the Poles had autonomy in the Austrian province Galicia) and enrolled at the University of Lviv, where he received his medical degree. In 1920 he became an assistant to the famous typhus specialist Rudolf Weigl [20] in the Department of Biology at the University of Lviv (Weigl was the creator of the world's first effective vaccine for spotted fever, *Typhus exanthematicus*). From 1923 to 1935, Fleck worked first in the Department of Internal

Medicine of the General Hospital in Lviv and then became director of the bacteriology laboratory of the local social insurance institute. His book on theory of thought-styles, entitled *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv*, was published in 1935 [21]. It could well be that the multicultural society of pre-war Lviv (inhabited as it was by Poles, Russians, Ukrainians, Jews, Armenians, Germans, Italians and Tatars) both inspired and facilitated profound thinking about the diversity of thoughts and ideas and how such diversity might arise.

In the years preceding the outbreak of World War II, Fleck experienced antisemitism. This began in 1935 when he was dismissed from his position as director of the social insurance institute's bacteriology laboratory. In 1937, he was deprived of his membership in the Association of Polish Physicians. This followed the introduction of a law by the medical trade unions according to which only Christians could be members. It was during that time that all Jewish physicians were removed from the association (personal file of Ludwik Fleck, 11 October 1945. Document from the archives of the Medical University of Lublin; the authors thank the Rector of the Medical University of Lublin for allowing access to this document).

From 1935, Fleck worked in the private bacteriology laboratory that he had founded earlier. Following the outbreak of World War II in 1939, Lviv was occupied by the Soviet Union and later, after June 1941, was under Nazi occupation. Fleck survived the pogrom on 30 June 1941 perpetrated by Wehrmacht soldiers and Ukrainian nationalists by hiding. During this pogrom approximately 4000 Jews were brutally murdered [22]. In 1941, Fleck managed the bacteriology laboratory at the Jewish Hospital in the ghetto established by the Germans in Lviv (Ghetto Lemberg) that year. In February 1943 he was arrested and transported to Auschwitz and then moved to the Nazi camp at Buchenwald. In July 1945, after the liberation of Buchenwald by American troops, Fleck returned to Poland. He was appointed head of the Department of Medical Microbiology at the Faculty of Medicine of the newly established Maria Curie-Skłodowska University in Lublin. One of his most important achievements while there was creation of the anti-diphtheria vaccine.

In 1949 *JAMA* published his article on leukergy [8] – a phenomenon that occurs in inflammations resulting from the tendency of leukocytes to agglutinate in cytologically homogeneous groups (lymphocytes and monocytes). His identification of this phenomenon proved to be an essential step in explaining the nature of immunological and rheological disorders [11].

After leaving Lublin, in 1952, he headed the Department of Microbiology at the Institute of Mother and Child in Warsaw for five years. In 1957, he left for Israel where he took up the post as director of the Department of Experimental Pathology at the Institute of Biological Research in Ness-Ziona. Soon afterwards, he became a professor in the Department of

Microbiology at the Hebrew University of Jerusalem. He died of a heart attack on 5 June 1961 at the age of 64.

THOUGHT-STYLES AND THOUGHT-COLLECTIVES

Although Fleck's medical achievements were impressive, his philosophical understanding of how scientific knowledge is created has had a greater influence on the world of science [23]. During his lifetime, his theory of thought-styles did not receive much recognition. However, just before the outbreak of World War II, it became the subject of heated debate between Fleck and Tadeusz Bilikiewicz, a Polish physician [24,25]. This dispute concerned the origins of the relationship between science and culture. Unfortunately, it gained publicity only in Poland, following publication of an article on the topic in a popular Polish journal *Przegląd Współczesny* on the eve of World War II. Sadly, the discussion generated in Poland as a result of the article did not lead to dissemination of the concept of thought-styles during Fleck's lifetime. It was only after his death that western scientists rediscovered the theory of thought-styles [26,27]. It all happened thanks to the curiosity of an American philosopher and science historian, Thomas Samuel Kuhn [28]. In 1979, Fleck's book was translated into English and published in America under the title *Genesis and Development of a Scientific Fact* [29].

In the book, Fleck tried to answer the following questions: What is a scientific (medical) fact, and in what way is the scientific discovery made? His concept of thought-styles was

based on examples from the history of venereal diseases. Fleck defines the thought-style as “the readiness

for directed perception, with corresponding mental and objective assimilation of what has been so perceived” [29]. In other words, every observer has been shaped by a particular culture and represents a thought-style of a specific scientific group. The community that carries the thought-style is a thought-collective. It is a community of scientists, people of a certain profession (for example, medical doctors) or people who share the same ideas and communicate freely with each other. The thought-collective, as defined by Fleck, is “a community of persons mutually exchanging ideas or maintaining intellectual interaction” [29]. Every scientist is a member of the thought-collective. It should be emphasized that it is possible to be a member of several thought-collectives simultaneously: for example, one could belong to a scientific, a religious, and a political thought-collective. Even *within* the professional or the scientific life, one could simultaneously be a member of several collectives. A physician is usually a member of the local medical thought-collective, which comprises his colleagues, with whom he performs his professional medical duties and with whom he exchanges ideas on diagnoses and therapy. At the same time, he also belongs to the global medical thought-collective, which

Every physician is a member of the medical thought-collective

consists of physicians in the same specialty as him, with whom he may communicate and exchange experiences via the medical literature and correspondence and by attending national and foreign conferences. In contemporary medicine there are numerous global thought-collectives: cardiologists, nephrologists, pulmonologists, surgeons, etc. There are as many global thought-collectives as there are medical specialties.

Ludwik Fleck emphasized that in order to "see," that is to say, to grasp an idea, one must first have knowledge; in other words, it is important to learn to "see" by absorbing certain patterns, certain ways, of interpreting reality [30]. For example, the shared ideas of the thought-collective of scientists influence the content of scientific observations and the creation of scientific facts. Ludwik Fleck maintained that we see through "the eyes of the collective": metaphorically speaking, that we see through the "glasses" that are put on the scientist by the thought-collective in which he participates. A scientific fact is a collection of chaotic stimuli arranged as dictated by a collective scheme (arranged as dictated by the "glasses" of the thought collective).

THOUGHT-STYLES IN CONTEMPORARY MEDICAL PRACTICE

Ludwik Fleck's theory is essential for a better understanding of the mechanisms involved in the recognition and treatment of diseases in contemporary medicine. The medical knowledge acquired by modern physicians is passed on through the various thought-collectives (both local and global). In order to notice a given disease entity in the "tangle" of various data obtained from physical examination and other additional observations, a physician must have undergone medical training. This training begins at medical school and continues during various postgraduate courses. As an example, microbiologists (such as Fleck) are able to perceive certain biological objects on a microscopic image. A layperson, such as a representative of a thought-collective of engineers or lawyers, is not capable of making such an observation. A layperson sees something completely different from what a microbiologist sees (they usually have different associations). They do not possess the necessary visual pattern or background against which to see the object. They would have to learn that pattern, in order to understand, to make sense of, the image. The same thing applies to interpreting images obtained as part of the diagnostic process and identifying symptoms of disease. A physician notices and interprets them almost automatically – e.g., the features of acute pancreatitis, acute coronary syndrome, kidney failure – that a layperson could not spot. The effect of the existence of various thought-styles within medicine (thought-styles vary across the globe) is that patients are referred to specialists in particular fields. For example, a surgeon treating a patient with a specific illness that requires surgery usually does not feel competent to

make a decision about non-operative treatment. That is why he turns to a physician of a given specialty for help.

Very often in medicine, making a diagnosis can be extremely difficult. The diagnosis may remain uncertain for days or even weeks (despite multiple specialist consultations). These uncertainties in the diagnosis may result from the fact that the collective thought-style to which the physician belongs did not pass on an appropriate thought "pattern." Because of the failure to pass on such a thought pattern, it proves impossible to interpret the disease in the same way. Such an outcome may also result from an insufficient flow of information within the thought-collective (both local and global). Or it could arise because of the lack of an appropriate pattern being known within the thought-collective – in other words, it arises as a result of the lack of proper "glasses" for interpreting the observed data. This is why access to the "collective's knowledge" is essential for a practicing physician who is unable to find in the "tangle of information" the characteristics of the diseases confronting him or her. Such access includes being able to set up case conferences within the confines of the local medical thought-collective and being able to search for specialist literature. Today the internet plays an important role in this context. In cases where a diagnostic pattern cannot be found, a new way of looking at things arises in the mind of the physician, which can lead him to make a scientific discovery. For example, he might discover a new disease or

We see through "the eyes of the thought-collective"

a new subtype of a disease. It is important to stress that while making this discovery the physician will be using the knowledge he has gained from being a part of a given thought-collective (local and global).

On the other hand the theory of thought-styles also explains the resistance of the medical community to new diagnostic and therapeutic methods [31]. The attachment of members of a given thought-collective to certain behavioral patterns and opinions means that their beliefs have a closed and inert character, not conducive to innovative diagnostic and therapeutic propositions [32]. Sometimes this means that several years pass before new treatment methods are accepted by the medical community. Fleck's theory also explains why it is often very difficult for scientific discoveries to flow between various fields of study and between various medical specialties.

The theory of thought-styles applies to many fields of modern medicine. It can be applied to the problematic area of medical diagnosis, particularly regarding the clinical-scientific and sociocultural conditions surrounding the diagnosis [33]. It applies not only to internal specialties, where physicians frequently deal with chronic and psychosomatic diseases and where cultural conditions may play an essential role in making a diagnosis, but also to fields such as medical genetics. The theory of thought-styles shows not only that fitting patients into prefixed diagnostic categories can be a mistake but also that the diagnostic process itself is marked

by moments of uncertainty, ambiguity, and by deferring to the opinions of others in the thought-collective. The theory also explains how the patterns of physical features can be identified as genetic or not. The existence of ambiguity and deference to the opinions of others in this context demonstrates the urgent need for better science, which in turn will lead to better clinical judgment and thus to better genetic science in the future [16].

The latest application of Fleck's thought-styles has been in the analysis of contemporary knowledge on transplantation provided by Gil P. Pena [17]. In an article on this topic Pena shows that Fleck's theory has led to a better understanding of the evolution of medical knowledge over the last few decades. The theory of thought-styles points to an ongoing evolution in the transplantation thought-style, on the basis of which the Banff classification system for pathology of the renal allograft has evolved.

THOUGHT-STYLES IN THE CONTEMPORARY HISTORY OF MEDICINE

According to Fleck the process of gaining knowledge, including the making of a scientific discovery, should not be regarded as simply the work of an individual, even if he or she is an outstanding scholar. The social and cultural contexts of the work of those who make scientific discoveries have to be taken into account when explaining the genesis of a scientific fact. According to Fleck, scientific discoveries are an outcome of the activity of a specific thought-collective. The thought-collective steers the researcher towards seeing certain phenomena, including those he or she previously omitted. Frequently, the merit of making a scientific discovery is ascribed to one particular scientist. However, it is essential to be aware that all scientists owe a large part of their knowledge to others – their teachers as well as their predecessors, including those living in far-off countries and who lived several centuries ago. A scientific discovery happens as a result of the collective creative thinking of many scientists. As Fleck states, “it is as if one would like to faithfully write down a natural flow of a heated discussion. Everybody talks simultaneously, chaotically but from this chaotic discussion a common idea arises” [29].

In order to understand the meaning of a given historical fact it is essential to explore the reality of the thought-style on which it is based. It is also important to know in what cultural context the process of the creation of a given fact took place and through which “glasses” physicians from previous epochs learned human biology. The thought-style theory is of great importance for contemporary research in the field of history of medicine. It allows for a better understanding of the mechanisms of the creation and evolution of medical knowledge. It

also makes it possible to examine the specific ways of thinking of physicians even from very distant epochs [34].

Most recently, successful trials of the application of the thought-styles theory were conducted to examine the historical development of the theories of infection [35,36], molecular genetics [37], and knowledge of the circulatory system [38]. Fleck's conception of the thought-collective was addressed in a 1998 book by the American physician Robert Alan Aronowitz [15]. Analyzing the genesis of some diseases (Lyme disease, ulcerative colitis, chronic fatigue syndrome and coronary heart disease), Aronowitz defines the extent to which social factors influence the naming of new diseases. He emphasizes that interactions between social and psychological factors (attitudes, social relations, ideas) and biological insights influence the creation of the scientific and social image of a disease [15].

CONCLUSION

Fleck's conception of thought-styles has finally achieved its proper place in the modern scientific consciousness. It is widely appreciated that this conception enables us to understand the diversity of thinking with regard to different historical periods as well as different social and cultural spheres existing simultaneously. Understanding and accepting the diversity of structural

styles of thinking within which scientists think and work, and accepting the diversity of different social, ethnic and religious groups, are essential for

creating such an attitude of tolerance, which (as the history of the 20th century demonstrated) is indispensable if humanity is to survive.

The concept of thought-styles may help contemporary physicians to shape and develop their critical thinking. It may prompt them to reflect on misunderstandings that occur in everyday medical practice both among physicians of different specialties and in the physician-patient relationship. By describing and analyzing one's own sociopsychological conditions, it is possible to identify the limitations resulting from conventional thinking. The acknowledgment of the existence of such patterns is undoubtedly a large achievement of contemporary medicine. Therefore, a very important trait of medical thought should be the ability to strike a balance between ‘the compulsion’ of collective thinking and the possibility of going beyond the set patterns of thinking [39]. Awareness of the sociocultural conditions may help scientists and physicians to maintain a proper distance from current knowledge. This distance will allow the development of an open attitude towards assimilating new discoveries and ways of thinking in medicine.

Acknowledgments

The authors thank Andrzej Wróbel PhD, chief of the History of Medical Sciences Department of Medical University of Lublin, for making available a photo of Ludwik Fleck.

Corresponding author:**Dr. J. Pawlikowski**

Dept. of Ethics and Human Philosophy, ul. Szkolna 18, 20-124 Lublin, Poland

Phone: (48-81) 710-1936**email:** pawlikowskij@gmail.com**References**

1. Weisz GM, Grzybowski A. Medical discoveries in the ghettos: the anti-typhus battle. *IMAJ Isr Med Assoc J* 2011; 13: 261-5.
2. Strous RD. Antisemitism and the history of medicine: the challenge then and now [Editorial]. *IMAJ Isr Med Assoc J* 2010; 12: 229-30.
3. Hedfors E. Medical ethics in the wake of the Holocaust: departing from a postwar paper by Ludwik Fleck. *Stud Hist Philos Biol Biomed Sci* 2007; 38: 642-55.
4. Research in Poland during the Occupation [Editorial]. *Lancet* 1947; 250: 765-6.
5. Fleck L. Specific antigenic substances in the urine of typhus patients. *Tex Rep Biol Med* 1947; 9: 697-708.
6. Weisz GM. Dr. Fleck fighting fleck typhus. *Soc Stud Sci* 2010; 40: 145-53.
7. Weisz G, Grzybowski A. Rapid urinary antigen diagnosis of infectious diseases: the legacy of Dr Ludwik Fleck. *Wurzbg Medizinhist Mitt* 2010; 29: 314-24.
8. Fleck L. Hyperheparinemia, white emboli and leukergy. *JAMA* 1949; 139: 542.
9. Fleck L. Leukergy and its use in medicine and research. *Harefuah (J Palestine Jewish Med Assoc)* 1950; 38: 35-6 (Hebrew).
10. Fleck L. Recent investigations on leukergy. *Tex Rep Biol Med* 1956; 14: 424-31.
11. Grzybowski A. From Ludwik Fleck's leukergy to the present-day rheology of leukocytes in heart and vascular diseases [Review]. *Kardiol Pol* 2007; 65: 822-6.
12. Grzybowski A. Ludwik Fleck's studies in microbiology. *Wurzbg Medizinhist Mitt* 2007; 26: 110-19.
13. Weisz G, Grzybowski A. Rapid urinary antigen diagnosis of infectious diseases: the legacy of Dr Ludwik Fleck. *Wurzbg Medizinhist Mitt* 2010; 29: 314-24.
14. Rheinberger H-J, Ludwik Fleck, Edmund Husserl. On the Historicity of Scientific Knowledge. An Epistemology of the Concrete. Twentieth-Century Histories of Life. Durham: Duke University Press, 2010.
15. Aronowitz RA. Making Sense of Illness: Science, Society, and Disease. Cambridge, UK: University Press, 1998.
16. Latimer J, Featherstone K, Atkinson P, Clarke A, Pilz DT, Shaw A. Rebirthing the clinic: the interaction of clinical judgment and genetic technology in the production of medical science. *Sci Tech Hum Values* 2006; 31: 764-6.
17. Pena GP. The epistemology of Ludwik Fleck and the thought community of Banff: reflections on the classification of the renal allograft pathology. *Am J Transplant* 2011; 11: 907-10.
18. Löwy I. The Polish School of Philosophy of Medicine. From Tytus Chalubinski (1820-1889) to Ludwik Fleck (1896-1961). Dordrecht/Boston/London: Kluwer Academic Publishers, 1990.
19. Löwy I. Fleck. Anatomical drawings and early modern history. *Med Secoli* 2008; 20: 745-66.
20. Weigl R. Immunization against typhus fever in Poland during World War II. Texas Reports on Biology and Medicine. Special section, L. Anigstein, ed., A Symposium of Polish Medical Contributions in World War II. 1947; 5: 177-9.
21. Fleck L. Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv. Basel: Benno Schwabe und Co, 1935.
22. Friedman P. The destruction of the Jews of Lwów 1941-1944. In: Marrus MR, ed. The Nazi Holocaust. The "Final Solution" Outside Germany. Westport: Meckler, 1989: 659-736.
23. Löwy I. Ludwik Fleck's epistemology of medicine and biomedical sciences. *Stud History Philos Biol Biomed Sci* 2004; 32C: 437-45.
24. Symotuk S. Two sociologies of knowledge: L. Fleck-T. Bilikiewicz. Controversy in looking again at Ludwik Fleck. *Kwart Hist Nauki Tech* 1983; 28: 569-82.
25. Löwy I. Historiography of biomedicine: "bio," "medicine," and in between. *Isis* 2011; 102: 116-22.
26. Löwy I. Quantification in science and cognition circa 1937. A newly discovered text of Ludwik Fleck. *Sci Context* 1988; 2: 345-55.
27. Hedfors E. The reading of scientific texts: questions on interpretation and evaluation, with special reference to the scientific writings of Ludwik Fleck. *Stud Hist Philos Biol Biomed Sci* 2007; 38: 136-58.
28. Kuhn TS. Foreword. In: Fleck L. Genesis and Development of a Scientific Fact. Chicago: University of Chicago Press, 1979: i-xi.
29. Fleck L. Genesis and Development of a Scientific Fact. Second edition was edited by Trenn TJ, Merton RK. Chicago: University of Chicago Press, 1979: 99.
30. Fleck L. To look, to see, to know. In: Cohen RS, Schnelle T, eds. Cognition and Fact - Materials on Ludwik Fleck. Dordrecht: Reidel, 1986: 129-52.
31. Heldenberg E, Bass A. Acute ischemic stroke: adopting a new vision [Editorial]. *IMAJ Isr Med Assoc J* 2010; 12: 762-3.
32. Cohen Ej, Leker RR, Kahana S, Lossos A, Itshayek E. Novel use of stenting for temporary endovascular bypass and thrombectomy in major ischemic stroke. *IMAJ Isr Med Assoc J* 2010; 12: 764-6.
33. Seising R. From vagueness in medical thought to the foundations of fuzzy reasoning in medical diagnosis. *Artif Intell Med* 2006; 38: 237-56.
34. Toulmin S. Fleck and the historical interpretation of science. In: Cohen RS, Schnelle T, eds. Cognition and Fact - Materials on Ludwik Fleck. Dordrecht: Reidel, 1986: 267-85.
35. Mendelsohn JA. Like all that lives: biology, medicine and bacteria in the age of Pasteur and Koch. *Hist Philos Life Sci* 2002; 24: 3-36.
36. Brorson S. The seeds and the worms: Ludwik Fleck and the early history of germ theories. *Perspect Biol Med* 2006; 49: 64-76.
37. Gaudillière JP. Exoteric knowledge and esoteric knowledge. Ludwik Fleck, pedigrees and the visualization of pathological heredity. *Med Secoli* 2008; 20: 767-89.
38. de Camargo KR Jr. The epistemological aspects in the historical works of Don Bates. *Can Bull Med Hist* 2009; 26: 107-28.
39. Jenicek M, Croskerry P, Hitchcock DL. Evidence and its uses in health care and research: the role of critical thinking. *Med Sci Monit* 2011; 17: RA12-7.