Studia Humana
Volume 1:1 (2012), pp. 83 — 89.

INTERVIEW
PHILOSOPHY OF SCIENCE IN HUNGARY

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Andrew Schumann: Due to some names such as Imre Lakatos, the Hungarian tradition of philosophy of science became well known. Which contributions of Hungarian philosophers to this subject could you notify as the most important?

Péter Szegedi: The first Hungarian who joined to philosophy of science was *Béla Juhos* (Vienna, 1901–Vienna, 1971), a Hungarian who lived mainly in Vienna. He was a truly logical empiricist member of the inner Vienna Circle all the time. He was interested in the epistemological (erkenntnislogische) foundations of sciences, especially physics. Juhos kept the torch of empiricism alive even after World War II, when – together with Viktor Kraft – he was the central figure of the so-called *Third Vienna Circle*. The discussions here exerted an influence on Paul K. Feyerabend and Wolfgang Stegmüller, as well. One of the main topics of the Third Circle was the problem of realism, which was later transferred to the English-speaking world and turned into a very important field of philosophy of science.

While Juhos was not really well known outside Vienna, there were also such Hungarian philosophers who launched new and important schools in philosophy of science. In chronological order the first was *Karl* (in Hungarian: *Károly*) *Mannheim* (Budapest, 1893–London, 1947), the father of sociology of knowledge. He studied philosophy at the universities of Budapest, Freiburg, and Heidelberg. The subject of his PhD thesis (Budapest, 1918) was already the structural analysis of epistemology. In 1919 – escaping from white terror – he moved to Germany. In 1925, he became privatdocent at the University of Heidelberg, and from 1929, he worked as the professor of sociology at the Goethe University in Frankfurt am Main. In 1933, he moved again, this time to England, where he got a job as the professor of sociology at the London School of Economics and Political Science (LSE). The founding of sociology of knowledge fell on the German period, this was the time when he discussed the basic goals and methods of the new discipline, and when he applied it to some of the questions of the intellectual life of societies.

The most important book of this era is the *Ideology and Utopia*. It begins with the sentence: "This book is concerned with the problem how men actually think". Later Mannheim gives the basic methodical principles for this type of investigation. Not mentioning such relevant notions from the book as "totality," "ideology," "utopia," "relativism," "relationalism," etc., I should only emphasize that the author was also able to apply his methods to relatively actual problems, like in the section "The Political and Social Determinants of Knowledge," where he analyzed the opinions of different political movements on the relation of theory and practice. The sociological turn in philosophy of science occurred only in the 70s, but with explicit reference to Mannheim.

Mannheim's life history in some aspects is similar to that of *Michael* (*Mihály*) *Polányi* (Budapest, 1891–Northampton, 1976). Polányi studied medicine in Budapest, thus served as a physician in the army during World War I. His PhD thesis (Budapest, 1917) was written in physical chemistry. When Mannheim moved to Germany, Polányi did the same. Polányi worked as a chemist at Kaiser Wilhelm Institute in Berlin. According to his son, the Nobel-prize winner John C. Polanyi (born in Berlin, educated in Manchester, living in Toronto), his father was an excellent physical chemist in their common research area (reaction kinetics). Michael Polányi had two other Nobel-prize winner disciples, Eugene (Jenő) P. Wigner and Melvin Calvin. In 1933 – parallel with Mannheim – Polányi moved to England and became the professor of physical chemistry at the University of Manchester. In England, they were in correspondence, they collaborated in publishing Polányi's works (Mannheim was general editor at Routledge), and they discussed different problems in the Moot circle. Some of their views on society and economics were in sharp contradiction, but in philosophy of science both of them fought against positivistic approaches.

Perhaps these discussions lead to Polányi's turn to philosophy of science. Therefore, in 1948 University of Manchester created him a chair of social science. The radically non-mainstream ideas – developed during his stay in England – attained full growth for the beginning of 50s and were published mainly in his *Personal Knowledge*. According to Polányi, beyond our explicit, articulate knowledge, we also have a tacit, inarticulate, unformalizable knowledge, based on experience and practice. By the words of Polányi: "we can know more than we can tell". His expressive examples are riding a bike and swimming, where we cannot say, how we manage it, but we do. We can transfer tacit knowledge to other people only by interactions. Connecting perception to the subject, he claimed that explicit knowledge is founded on the tacit one. Tacit knowledge gives a personal context to epistemology. However, the requirement of objectivity and the personal character of knowledge are not in contradiction with each other. On the contrary, science is only able to approach reality because it is personal. Tacit knowledge and personal commitments lead us to discoveries and theories (or in general, to creative acts), too. Tacit knowledge – as Polányi extrapolates from the Zande tribal beliefs to science – seeks for stability with the help of three kinds of mechanisms: circularity (vicious circles of belief systems), epicyclical (self-expanding) theories, and the principle of suppressed nucleation (prevents the germination of any alternative concepts). Kuhn's paradigm has rather similar features, as Kuhn himself admits (Kuhn sometimes attended Polányi's lectures). Polányi's influence had some role in Feyerabend's turn to the practical side of science as well. Sociologists of science used the concept of tacit knowledge in the 70s.

Undoubtedly, the most widely recognized Hungarian philosopher of science is *Imre Lakatos* (Debrecen, 1922–London, 1974). He began to study mathematics, physics, and philosophy at the University of Debrecen, where his youngest professor was *Árpád Szabó*, who later became a famous historian of mathematics. After the liberation of Debrecen (and later Budapest) by the Red Army, Lakatos went into politics, and participated in the organization of the already legal Hungarian Communist Party. He worked in the cultural, scientific, and educational area of the administration, helped to lay the foundations of the new system (and destroy the old one). Meanwhile, he did not loose his interest in sciences and philosophy, he took part in *Georg* (*György*) *Lukács*' seminar in Budapest. In 1947, he defended his doctoral dissertation in Debrecen with the title *On the Sociology of Concept Formation in Natural Sciences*. In 1949 – because of obscure reasons – he fell into disgrace: one after the other, he lost his scholarship, his job in the Ministry of Education, his flat, his party membership, and finally, he was transferred to the labor camp of Recsk (gulag in North-Hungary) for more than three years.

After his release, he began to work on mathematical problems. He also translated a few books on mathematics to Hungarian, e.g. *György Pólya*'s book on heuristical methods. Recognizing his talent, Alfréd Rényi, founding director of the Institute of Applied Mathematics of the Hungarian Academy of Sciences (HAS) employed him, first as a librarian, then as a researcher. This was the time, when Lakatos – also reading philosophical literature – was acquainted with Popper's

philosophy of science. After the 1956 revolution, his situation was hopeless from several points of view, so he left Hungary and rather quickly got a Rockefeller fellowship in philosophy at the University of Cambridge. The title of his PhD thesis was *Essays in the Logic of Mathematical Discovery*, and the content bore marks of Pólya's and Popper's thinking. *Proofs and Refutations* was developed from this paper. In 1960, Lakatos went to Popper's department at LSE. He became a radical anti-Marxist and Popperian. After a while, he broke with Popper's philosophy of science and formed his own one, the so-called "methodology of scientific programmes." Because of his early death, his "big book(s)" have not been written, but we have some long papers from which it is possible to reconstruct his views. Based on these reconstructions, some colleagues consider Lakatos the most talented philosopher of science in the 20th century.
The roots of Lakatos's own philosophy of science can be found partly in Pólya's heuristics, but he was also influenced – straining through the Lukácsian filter – by the Hegelian and Marxist ideas, and the communist political practice in Hungary. The motivation was perhaps to take back – at least in some measure, after all the hard core is a variation of the paradigm – the Kuhnian turn with its (apparently) irrational and non-explicable revolution, which interrupts the development. In favor of this, he introduced the competing research programs as historical series of theories, linked by a common hard core and heuristics. This core is irrefutable as the result of the functioning of the negative part of heuristics. The scientific research program has positive heuristics, too, which give ideas for the further developing of theories. For the development of the research program, it is necessary to eliminate the old theories via "minor crucial experiments", while "major crucial experiments" decide between two competing research programs. According to Lakatos, these latter kinds of experiments are seen – only with hindsight, occasionally several decades later – to have been crucial, actually they do not exist in falsificationist sense.
Lakatos used the criteria of progressivity and degenerativity for solving the problem of elimination of research programs. Of course, the evaluation of a program can change with time, and Lakatos wanted to evaluate the programs only in the long run. Lakatos also applies progression as a metacriterion for rationality and for the models of philosophy of science itself (of course, based on this criterion, his methodology gives a wider rational reconstruction for history of science than the rival models made by Popper, Polányi, Kuhn, Feyerabend, or Toulmin). The importance of Lakatos's work for the philosophy of science community is demonstrated by the fact that the most prestigious prize of the profession bears his name (Lakatos Award).

A.Sch.: Which Hungarian schools of philosophy of science are still heavyweight? What are their results?

P.Sz.: *Márta Fehér*, who became more or less the master of the whole recent generation working on these problems, founded the first group on philosophy of science in Hungary. She exerted the upmost influence on Hungarian philosophy of science. She began her researches in history of science (especially on the 17th century), but always with erudition in philosophy of science. She translated Newton's *The System of the World* and the Bentley-letters. Turning to philosophy of science, she has never truly committed to any school. Some Popperian influence can be detected on the first Hungarian philosophy of science textbook written by Fehér and *László Hársing* in 1976. Then her favorite is Kuhn, she wrote for example the afterword to the Hungarian edition of *The Structure of Scientific Revolutions,* and published a book on incommensurability (in Hungarian). The analytic approach was never alien to her, but she likes the sociological approaches (especially the "strong program"), as well. In the last decade, she has also supported the hermeneutic approach. Besides research, she has always given lectures and not only in the regular way. In the 80s, she organized a philosophy of science circle – with *Imre Hronszky* and *Tibor Szécsényi* – for the interested colleagues, and she was a leading figure in the one-week courses of the Center of Continuing Education for Philosophy Teachers. The young Hungarian philosophers were

acquainted with theories of scientific development, i.e. with Feyerabend, Lakatos, Laudan, Toulmin, etc. through her lectures and papers. Márta Fehér also contributed to the propagation of philosophical culture by her translations of Neurath, Schlick, Carnap, Peirce, and Berkeley.
As Fehér worked at the Department of Philosophy (now Department of Philosophy and History of Science) of Budapest University of Technology (now Budapest University of Technology and Economics), one of the philosophy of science centers was formed there. Fehér's co-worker in this area was Hronszky, who had come from the Department of Philosophy (now Department of History and Philosophy of Science) at the Faculty of Natural Sciences of Loránd Eötvös University of Science (ELTE). He was interested in philosophy, sociology, and history of science and technology. Later on, he also took up innovation research and management, and founded the Department of Innovation Studies and History of Technology at his university. Some of Fehér's engineer students converted to philosophy of science, e.g. *Tihamér Margitay*, who is the head of the department recently. In 1998, they successfully started a PhD school in history and philosophy of science, the only one existing in Hungary. The school is a well-functioning one; it has 5 – 10 new students every year, so young blood is guaranteed, there are talented young people at the department, as *Benedek Láng*, *János Tanács*, and *Gábor Zemplén*.
Another center formed from the above-mentioned HPS department at the Faculty of Natural Sciences of ELTE. From the middle of the 70s, the average Marxist philosophy department was gradually filled in with young people coming from natural sciences, mainly from physics. Of course, the latter small group was interested in philosophy of physics at first, but later on, one or other also reached general problems in philosophy of science, history of physics, sociology, and hermeneutics of science, etc. *Miklós Rédei* (at LSE since 2007) and I began with researches in quantum mechanics, Rédei rather from a logical and mathematical, while me from a philosophical and historical point of view, but we had common areas of interests, too. Rédei specialized in the problem of non-existence of hidden parameters in quantum mechanics first, then in Reichenbach's common cause theory. On the latter subject, he worked together with *László E. Szabó* (who had a job at the department at the end of the 70s, but later on, he took a job at the Theoretical Physics Research Group of HAS, and recently, he is a professor at the Department of Logic at the Faculty of Humanities of ELTE), and with Rédei's student, *Gábor Hofer-Szabó*. In the last decade, Rédei was engaged – among others – with the heritage of John von Neumann.
László Ropolyi was concerned with the philosophical problems of thermodynamics first, but his range of interest has broadened, and now he deals, among others, with the problems of computers and Internet, and with the philosophical, sociological and hermeneutical approaches to science. After the regime change, the department was transformed – in a long process – into the Department of History and Philosophy of Science, and *György Kampis* was invited to lead it. He came from biology and broke into philosophy of science with his book on self-modifying systems, which had a part on epistemology. Since, he has been interested in complexity, the mind-body question, different aspects of the evolution theory (he newly translated Darwin's *The Origin of Species* into Hungarian), new approaches of classical problems like causality, and modeling biological systems. *Gábor Kutrovátz* is the youngest member of the group; he began his studies with the philosophical and historical aspects of the "heat death" concept, then he dealt with Lakatos and Árpád Szabó in the context of the modern history of philosophy of science and mathematics, and recently he wrote on the epistemology of Science War and conflicts between sciences and "pseudosciences."

Besides the two universities, the third center for philosophy of science is the Institute of Philosophy of HAS. Earlier, there was a largish group for epistemology, but it has been ceased and now only a few members of the institute constitute a group for philosophy of science. *Vera Békés*, coming from linguistics, expanded the Kuhnian theory of scientific development, called the "missing paradigm" model. According to Békés, there are not two, but three paradigms, in the process of scientific revolution, one of them, as an "island", or "inclusion" coming from the earlier stage of development. In her opinion, this model is able to keep the incommensurability thesis and

discontinuity, but can solve their paradoxes and fits more to the real history of science than the original Kuhnian theory. Her example for the "missing paradigm" is the Humboldtian program for science at the University of Göttingen (Georg-August-Universität) from the end of the 18th century until the first decades of the 19th century. Unfortunately, Békés' book was published only in Hungarian, and her short English paper appeared only in the periodical of the Institute of Philosophy of HAS, hence the international community of philosophers has not recognized it. *János Laki*, among others, has been also dealing with Kuhn, and published a book on his researches (in Hungarian). In 2010, during the – politically motivated – debates in the Institute he was fired out based on faked reasons, recently he became a member of Forrai's department, which will the last, I will mention. Another member of the group, *András Benedek* was interested in the philosophical and historical problems of mathematics. *László Székely* works on the philosophical-epistemological background of relativity theory and modern cosmology, the hermeneutic approach of sciences, and the relationship between science and religion (anthropic principle and intelligent design). The Institute was recently merged to a huge Research Institute of Humanities, further dismissals are expected, so the little group is in danger.
Gábor Forrai at the Department of Philosophy at University of Miskolc founded a relatively newly formed philosophy of science group. Forrai received his PhD degree at University of Notre Dame, Indiana, where he studied scientific realism. First, he worked at the Institute of Philosophy of HAS, later he went to University of Miskolc to teach, and now he is the director of the Institute of Philosophy there. He applies the analytic tradition in a wide sense and he is mainly interested in realism, Locke, and the theory of mind. He has translated many papers into Hungarian including Lakatos' most important essays. In his Institute, work two other philosophers of science, *Gergely Ambrus* and *Tamás Demeter*, both mainly engaged in philosophy of mind, as well. Demeter graduated already at Miskolc, and so did *László Nemes*, who is now working at the Institute for Behavioral Sciences, University of Debrecen in the fields of philosophy of biology, philosophy of ethology, evolutionary psychology, and bioethics.

A.Sch.: The Maecenas George Soros is the best known Hungarian the world over. How can you estimate his role in the transition from communism to capitalism in post-Socialist countries and in the development of Hungarian contemporary science and education?

P.Sz.: *George* (*György*) *Soros* came (back) to Hungary in 1984. One of its first actions was raining free copy machines on Hungarian libraries and universities. In a country, where to all copy machines belonged a responsible person, whose name was given down to the Ministry of Internal Affairs. This was a very smart tactics for loosen up the system.
The aim of his educational programs was also – at least partly – to build an open society. For instance, several hundreds of English teachers could take part in 5 weeks courses in the USA. They strengthened their English, learned new teaching methods and were acquainted with a country, which was earlier impossible for most of them. Coming back, they started to spread their experiences.
The Soros Foundation played a very important role in the development of Hungarian science, partly with the support of libraries, and especially through improvement of the international connections. It provided some scholarships for young Hungarians – for instance, the present prime minister of Hungary could spend a few months in Oxford – and offered numerous grants for scientific tourism, too, mainly for participating on conferences.
Concerning philosophy of science, Soros founded "The Popper Project" affiliated with the Central European University, founded also by Soros in Budapest (later on the Project moved to Vienna). The aim of the Project was not only the Popper research, but also to publish Popper's manuscripts (see e.g. "The Myth of the Framework", "Knowledge and the Body-Mind Problem"), and to translate his books into many languages. The Project organized dozens of workshops and summer

schools for translators (among them many philosophers) of East Europe and FSU. The Soros Foundation, the Central European University, and Soros' Open Society Foundation assumed – at least partly – the financial support for these translations.

A.Sch.: Why are so huge and expansive projects like Large Hadron Collider implemented? Can we expect that this collider will give us absolutely new data causing a scientific revolution? What do you think if the God particle, Higgs boson, will be detected some day or other in fact?

P.Sz.: Why physicists should like to build larger and larger equipments? – This is not a question. The more interesting question is: Why do politicians give so huge amounts of money for these projects? I know two possible answers from the 70's. The first came from some counter-movements of science. Those left-wing sociologists told that the politicians wanted to withdraw the best minds from the society. "Let the children play!" They do not make revolution meanwhile. The second follows from an idea by Fred Hoyle, the astrophysicist and science fiction writer. In an article he wrote, that the complexity of particle accelerators had reached the complexity of society. Who are experts in operating an accelerator? Of course the particle physicists. Therefore, we have to give the power or the administration to the particle physicists. If Hoyle's argumentation was valid, than the LHC is nothing other than a training school for managers of the world, and it is worth the price. I think a third answer is nearer the truth. The keyword is the nationalism, even in its internationalist form. In the middle of 80's I have seen a documentary, titled "The Geneva Event". The subject was the constructing the forerunner of LHC, the proton-antiproton collider at CERN. This equipment gave the possibility to Carlo Rubbia to find the W and Z bosons and to win the Nobel Prize. The film was like a victorious production report from a newsreel of any socialist countries (only much longer). The film and the project itself was a kind of promoting the European Communities (including the European Economic Community and the European Atomic Energy Community) which was after the first and second and before the third enlargement. The common scientific enterprise symbolized the economic, political, and cultural unity and superiority of the participating nations (this is the international nationalism). Therefore, the goals of the project were almost the same, as in the case of the Apollo Program, for instance. The particle physics is not so impressive than the space programs, but proportionally cheaper, too. Nevertheless, it is undeniable that some politicians recognized that the support of basic research could strengthen development of industry; that the big projects with obscure objects, like Higgs-bosons, may have useful side shoots (Rubbia's new concept on the safe nuclear power reactor, using a particle accelerator-driven system; medical diagnostic and therapy techniques); that the international cooperation improves the climate for the foreign policy; etc.
Now one can say this moment the results of the LHC experiments. Its effect on physics depends on the mass of the discovered particle(s) – Higgs-boson(s), other particles, or nothing new. Probably it will simply confirm the standard model of particle physics. Even if it will be the case, the certainty can encourage physicists to elaborate the further details of the model. In other cases, they have to modify the theory. However, in my opinion one experiment (maybe only with a few events, like in the Rubbia-story) will not cause a scientific revolution. Speaking with Lakatos (see the first question), the negative heuristics will defend the core of the standard model (remember the quark confinement idea, which was at that time a typical *ad hoc* hypothesis in philosophers view), and we shall be able to evaluate the status of this experiment only later.

A.Sch.: Physics is usually considered as the most exact science. It is maintained that it is built up on mathematics and hence it does not depend on common sense and other unscientific knowledge. Is physical knowledge so pure? How does physics depend on social competencies and social behaviors as a whole?

P.Sz.: It is a difficult and debated problem, but I think the sociology of science (or the sociology of scientific knowledge) have some convincing – and some not so convincing – demonstration of the embedding of physics to the structure of society. First, the scientific knowledge does not come from ivory tower. For instance, the Marxist Boris Hessen already in 1931 tried to describe the social and economic roots of Newton's *Principia*, and in my opinion, Robert Merton partly justified it. Paul Forman's attempt at attributing the acausality of quantum mechanics to the hostile intellectual environment of the Weimar Republic was clearly not so successful. Nevertheless, the intellectual environment plays a role in the accepting the different scientific theories, as well. I think Gideon Freudenthal's analysis on the acceptance of Newtonian ideas and the rejection of Leibniz is a good example for the influence of society to the theory choice – of course through the scientists, as the agents of the society. The Strong Program in sociology of science, the Empirical Program of Relativism, and the social constructivist approaches proved that micro sociological tools could examine the science, as well. Their case studies showed that the new empirical data could be interpreted in different ways; that behind the different interpretations there are different personal histories, different local traditions. In the end, the debates will be closed, but the course of a debate may be determined by the previous agreements of representatives of the special discipline; by the authority structure of science; by individual and group interests. Further fact, which casts a doubt on pure rationality of physics, is the presence of tacit knowledge (see the Polányi part of the first question).

However, these results do not query, that the physics is the most exact science, build with the help of highly developed equipments and of mathematics, because all the other sciences (astronomy, chemistry, life sciences) are influenced by extra scientific factors (economy, politics, religion, philosophy, etc.), too. Unfortunately, the mentioned sociological case studies did not get together to a general theory of science, so the debate will go on.