The Vienna Circle in Czechoslovakia

Pre-proceedings of the International Conference

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of the International Conference
Pilsen, Czech Republic, February 26–28, 2015

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Edited by
Radek Schuster, Stefanie Dach
and Friedrich Stadler

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To Jiří Fiala,
who is with us
although he cannot.

Research Centre for Theory and History of Science (RCTHS),
University of West Bohemia

Institute Vienna Circle (IVC), University of Vienna

The Vienna Circle in Czechoslovakia

An International Conference

Pilsen, Czech Republic, February 26–28, 2015

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The Vienna Circle in Pilsen

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For convenience and plasticity, we like to identify intellectual currents by way of referring to some geographical node where the members of such a current worked and met, crucial discussions took place and institutions joint to the current had their seat. Thus, we speak of the Copenhagen school of quantum mechanics or Oxford ordinary language philosophy.

Often, this manner of referring is amply justified, and sometimes we actually deal with a self-ascription as is the case with the "Vienna Circle of a scientific world-conception", a group of excellent philosophers and scientists that advocated a purely scientific understanding of the world and saw the task of philosophy to be reduced to epistemology and logical analysis of language. But even in such cases of self-ascription we should not understand these kinds of geographical labels as expressing confinement. Intellectual achievement thrives in an environment of interchange across geographical borders and boundaries of opinion. Therefore, the currents we identify by some outstanding geographical intersection must actually be seen as nets that extend over people, places and times.

This is also true of the Vienna Circle. Indeed, despite the self-identification of the circle with a certain place, it is a good example of the web-like character of intellectual currents. In terms of people, we surely find a "hard core" of indisputable members of the circle (such as Moritz Schlick, Rudolf Carnap and Otto Neurath), but there is a large indefinite stratum of more loosely associated fellow-traveling philosophers and scientists, friendly circles elsewhere, sources of inspiration (in some cases sympathetic ones, in other cases not), not to forget those who later adopted thoughts of the circle members and developed them further. The spatial net constituting the "Viennese scientific world-conception" extended at least over the intellectually fertile Central Europe of the late 19^{th} and early 20^{th} century, and later, of course, included the English-speaking world. Tracing its intricacies helps us to understand the development and repercussions of Viennese Logical Empiricism. This is what motivates our conference.

One part of this net is the area of today's Czech Republic and Slovakia. Examples of connections between the region and the Vienna Circle abound: Several core members of the circle spent at least some part of their professional lives there, and three important events in the development of Logical Empiricism were held at Prague (the 1st Conference on the Epistemology of the Exact Sciences in 1929, the Preliminary Conference of the International Congresses for the Unity of Science and the 8th International Congress of Philosophy in 1934). The lives of Bernard Bolzano and Ernst Mach, both precursors of the Viennese brand of scientific philosophy – one exemplifying the logical and the other the empirical dimension of Logical Empiricism – were bound to the region.

Many of these aspects are mirrored in the contributions presented here. They reflect the phases of life that circle members and their predecessors spent in the Czechoslovak area from a historical and biographical point of view (e.g., the intellectual networks centering around Philipp Frank or leading from Ernst Mach to the Vienna Circle), but also engage with the ideas themselves which circle members at least partly developed during their stays in the region (their reflection of space-time and fluctuations, Carnap's earlier syntactical theories).

From a Slovak and Czech perspective, it is worth investigating the contemporary reactions to Logical Empiricism in the region as well as the marks and traces it has left there. We are glad to present a large number of contributions which paint a complex picture of the reception and influence of the Vienna Circle in the Czech and Slovak region, *inter alia* on the relation (or non-relation) between the Vienna Circle and the Prague Linguistic Circle, on the reception of Logical Empiricism in Czechoslovak positivist as well as phenomenological circles, but also on criticism of Logical Empiricism from a marxist point of view. A contribution on architecture shows that there might also be less obvious links between the Vienna Circle and Czechoslovakia and that these links were multifaceted, including not only science and philosophy in a narrow sense.

However, an intellectual circle is most fundamentally the people which make it up. For this reason, we are especially happy to include memories reflecting personal relationships and connections between Vienna Circle members, their family and the Czechoslovak area. We thank Ladislav Tondl for providing us with his reminiscences and Nina Holton for her lively memories on Hania and Philipp Frank.

Many others helped to make this event possible. We thank all invited and regular speakers and the members of the organizing and program committees, namely Friedrich Stadler, Christoph Limbeck, Tomáš Marvan and Ladislav Kvasz. Further thanks have to be addressed to the two

co-organizing institutions, the Institute Vienna Circle in Vienna and the Research Centre for the Theory and History of Science, as well as to the RCTHS management and support staff, particularly Martina Chalupská, Eliška Babůrková-Květová, Lada Hanzelínová, Nicole Fišerová, Kristýna Vozková a Radim Kočandrle. Our thanks also go to Gerald Holton, who could not attend the conference, but supported it from afar.

We want to express special gratefulness to Jiři Fiala, our former teacher and one of the most enthusiastic communicators of analytical philosophy in the Czech Republic, who passed away in November 2012 and whose revised Czech translation of the Vienna Circle manifesto you can find at the end of these pre-proceedings.

One more word has to be said about why this conference is held in Pilsen, which is, after all, a minor stage of the relations between the Vienna Circle and the Czechoslovak area. In 2015, Pilsen is one of two European Capitals of Culture. This institution symbolizes a European communion not only on the economic or political, but also on the intellectual, artistic and personal level. The current condensed in what we call "the Vienna Circle" similarly exemplifies an open-minded approach to intellectual interchange, its fruitfulness and positive repercussions. We believe that this openness is as indispensable today as it was at the beginning of the 20$^{\text{th}}$ century.

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Vienna – Prague – Vienna:
A Re-evaluation of the Intellectual Networks from Mach to the Vienna Circle

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The intellectual relations and scientific interactions between Prague and Vienna were certainly strong and continuous since the beginning of modern times (let us not forget the court of Rudolf II.), even if also competitive and conflict laden due to political and ethnic reasons.

One could go back to J. A. Comenius, Bernard Bolzano, Robert Zimmermann and the Brentano school, as can be exemplified by the seminal role of T.G. Masaryk after his Vienna years. In music and musicology alone, the Vienna-Prague contacts were of highest relevance as the studies of Kurt Blaukopf have already revealed. (Blaukopf 1995)

A special case of this bilateral exchange is the networking in the sciences and their philosophy, which culminated in the 19th century with Ernst Mach, who played a central role at the Prague University 1867–1895 as a professor for experimental physics and as an intellectual, who fought against every form of nationalism, racism, and anti-Semitism.[1] As rector elected twice, he could not prevent the division of the Charles University into a Czech and German one in 1882. (By the way, since Prague he entertained a long life friendship with the chemist Wolfgang Pauli sen. and his son, the later Nobel laureate in physics, who was instructed privately by Mach in his youth). In this regard he was most influential on his many students, and the friendship with the physicist Anton Lampa and the philosopher Wilhelm Jerusalem (both of them became scholars in Vienna later on) is to be mentioned, in addition. (Also Friedrich Jodl and Alois Höfler, who edited Bolzano's *Wissenschaftslehre* and founded the "Philosophical Society at the University of Vienna", played a major role for the emergence of scientific philosophy after having left their positions in Prague). From these few remarks alone, it appears that the philosophical communication between Prague and Vienna was of significant importance for the specific, so called "Austrian philosophy" as a soil for the origins of Logical Empiricism.

[1] On Mach in Prague: (Blackmore 1972 and 2010), who lists 5 Czech professors out of many former students of Mach; (Haller and Stadler 1988); (Hoffmann 1991).

This intensive scholarly communication was continued in the 20th Century with the appointment of Albert Einstein in 1911 and Philipp Frank at the German University in Prague as his follower, who stayed from 1912 until his emigration in 1938, and played a leading role between the circles in Prague and Vienna – with contacts to the "Prague Circle" of Jewish authors around Max Brod and Hugo Bergmann including Franz Kafka.[2] In parallel, "the author without work", Ernst Polak studied with Moritz Schlick in Vienna, like his favorite student Herbert Feigl, born in Liberec/Reichenberg.[3] And another famous Vienna Circle member was born in Brno: Kurt Gödel, the most influential and important logician of our times, and in addition, the mathematician Richard von Mises, admirer of Mach and Vienna Circle member, who worked at the chair of mechanics of Georg Hamel at the German Technical University in Brno, where he wrote his dissertation and completed his Habilitation thesis (1908).

All these flourishing interactions were reinforced by the appointment of Rudolf Carnap at the German University in 1931–1936, who contributed immensely to the trilateral development of Logical Empiricism as a joint enterprise in Prague, Vienna, and Berlin (around Hans Reichenbach, see Stadler 2001/2015; Haller and Stadler 1988). Moreover, this development became manifest in Prague with the first public appearance of the Vienna Circle on the occasion of the 1st Conference on the Epistemology of the Exact Sciences in 1929, where the famous manifesto *The Vienna Circle. The Scientific Conception of the World* was presented for the first time and provoked the scientific community of the co-organized 5th meeting of "German Physicists and Mathematicians".[4] Five years later, the "Preliminary Conference of the International Congresses for the Unity of Science", held in Prague 1934 in connection with the 8th International Congress of Philosophy was the starting point of the internationalization of Logical Empiricism, and at the same time the beginning of its dissolution and disintegration in the home countries of this intellectual and philosophical movement for political, scholarly and racist reasons. (As a side-effect, the visits of American philosophers in Prague from William James, Charles Morris to W. V. O. Quine also in-

[2] A nice historical and intellectual biography in context: (Frank 1953).

[3] The relations between philosophy and literature are investigated by David Luft, who claims a genuine intellectual area of Bohemia, Moravia, Vienna, and southern parts of Germany to be a specific intellectual sphere.

[4] *Wissenschaftliche Weltauffassung. Der Wiener Kreis.* Ed. by the Verein Ernst Mach (1929). Reprinted and edited in 4 translations into English, French, Italian, and Spanish by (Stadler and Uebel 2012).

dicate the importance of this axis for the emergence of pragmatism and analytic philosophy of science, in parallel).

With the increasing influence of German nationalism and National Socialism in Prague after 1933, the proponents of Logical Empiricism shared the same fate: persecution and forced migration, inter alia Rudolf Carnap, Philipp Frank, but also the famous Hans Kelsen, who was dismissed in Cologne in 1933 and moved back to his roots in Prague 1936–1938 until his fourth emigration to the US, with an active participation in the Unity of Science movement. In Czechoslovakia the impact of his pure theory of law ("legal positivism") is obvious up to the present despite all political breaks (e.g., the Brno school of law around F. Weyr, see Jabloner and Stadler 2001).

In retrospective, National Socialism and Communism after WW II destroyed this fascinating cosmos of an Austro-Czech community from Hot War to Cold War, but the memories, traces, and impacts are still there, hopefully being revived and continued by new generations of science and "scientific humanism" (Carnap).

In 1991, on the occasion of its founding, the Institute Vienna Circle organized its first international conference entitled the "Rise of Scientific Philosophy", celebrating the centenaries of Rudolf Carnap, Hans Reichenbach, and Edgar Zilsel.[5] (By the way, each of them, together with Otto Neurath, were occasionally striving for a position at the German University in Prague.)

This year, in 2015, the first representative exhibition on the Vienna Circle will take place at the University of Vienna.[6] In 2016, the centenary of Mach will be celebrated in both countries of his life and work with conferences and publications.[7]

With reference to these two events and related publications, my paper will critically re-evaluate the results of these activities and deal with the most recent research on this topic with a focus on the Vienna-Prague interactions (besides the Berlin group and the Warsaw school) – from today's scholarly point of view aiming at a more precise and complete reconstruction of this unique international and interdisciplinary "republic of scholars" in Central Europe. Concluding, the current scholarly rela-

[5] Cf. (Haller and Stadler 1993); (Stadler 1993). Mach edition: http://xenomoi.de/philosophie/mach-ernst/216/ernst-mach-studienausgabe.

[6] The Vienna Circle. Exact Thinking in Demented Times. Exhibition in the Main Building of the University: http://www.univie.ac.at/AusstellungWienerKreis.

[7] Ernst Mach Zentenarium/Ernst Mach Centenary Conference, University of Vienna and Austrian Academy of Science, organized by the Institute Vienna Circle, June 16–18, 2016: www.univie.ac.at/ivc.

tions between Vienna and Prague and Czechoslovakia will be addressed, with a tentative preview for a future perspective.[8]

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[8] On the occasion of the 650$^{\text{th}}$ anniversary of the University of Vienna: http://www.univie.ac.at/650/.

Extended Abstracts – Invited Talks

Philipp Frank's Networking in Prague with Philosophers, Physicists and Biologists

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Philipp Frank is known to the wider public as a founding member of the "Vienna Circle", who met regularly with Hans Hahn and Otto Neurath in the Coffeehouses before he left Vienna to succeed Einstein for the chair in theoretical physics in Prague in 1912. To scholars of the history and philosophy of Logical Empiricism he is known for his tempered position in terms of Ernst Mach's legacy for the development of modern physics and for closely collaborating with the physicist-philosopher Moritz Schlick, with Rudolf Carnap and other members of the Vienna Circle to bring about the philosophy of the new physics. He is also known for participating in the scholarly atmosphere of the debates among physicists and philosophers in his new home in Boston, where he happened to strand with his wife Hania when Hitler's occupation of Prague and the outbreak of the war hindered them to travel home after a lecture trip through England and America. Knowing this much of his life, his work and his character, it is felt even stronger that there is not much knowledge about his real life in Prague, where he lived and worked for 25 years. In this talk I will provide some details about the development of his academic career at the German Charles University in Prague. I will show which circumstances in his beginnings in Prague forced him to work out Mach's contribution and Mach's shortcomings for a consistent formulation of the Relativity Theory in Physics and with whom of his colleagues at the university he could form bonds in order to canalize Mach's legacy in a direction which would be open and friendly to the kind of philosophy of science, which the Vienna Circle was about to establish as a new field and intellectual framework. In order to give an accurate picture I will talk about the unfolding of his interests in view of his university lectures and seminars. I will speak about his style in managing the institute for theoretical physics in cooperation with Reinhold Fürth and Rausch von Traubenberg and how they managed to keep up with the rapid development in theoretical physics for the training of physicists during Frank's time in Prague. With regards to his manifold activities in Prague and with respect to his engagement concerning the flourishing of the philosophy of Logical Empiricism his outreach to biologists in his academic environment in Prague is of special interest here. I will discuss the intellectual features and the political habitus of some of Frank's colleagues in Prague he felt close and he associated with on sev-

eral occasions in order to provide a full picture of Frank's life in Prague from 1912–1939.

Prague and the Emigration of German Scientists After 1933

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The talk will consider the city of Prague as a destination for exiles from Nazi Germany. After recalling the fates of emigres such as the astronomer Erwin Finlay-Freundlich, the philosopher Walter Dubislav or the physics student Martin Strauß, I will reflect on the fact that Prague had not only become a key destination for German literati, artists and exiled politicians, but also for German scientists, in particular logical empiricists and members of the so called Berlin Circle. Prague had served as a first safe haven for a number of German intellectuals and Kulturträger after the Nazis came to power in 1933 and a transit place for their journeys to other countries, especially the U.S.A., until the German occupation in March 1939 had put an end to it.

Carnap's Inferentialism

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During his Vienna Circle years (which he spent mostly in Prague), Carnap developed a theory of language according to which the only thing a logician or a philosopher can get hold of is (logical) syntax. Later he famously changed his mind: under the influence of Tarski he realized that there is a way of getting a logical grip directly on semantics (truth & denotation) and he concluded that the logician and the philosopher must embrace an extended theory of language encompassing not only logical syntax, but also formal semantics. This is sometimes portrayed as a breach of his early obtuseness.

In this contribution I would like to point out that his early views, presented especially in his *Logische Syntax der Sprache*, are surprisingly close to the ideas laying the foundations of the approach to language that has recently come to be called *inferentialism*. This, in my eyes,

compromises the view that his later "semantic awakening" can be seen straightforwardly as getting rid of an obtuseness. I think from the contemporary perspective there is much more to his earlier views than it would seem from the fact that he himself, as well as many of his commentators, saw them as overcome by his later conception.

In fact, though in the *Logische Syntax der Sprache* he explicitly says that there is no way to deal directly with semantics ("interpretation" as he calls it), the book does contain a distinction tantamount to that between syntax and semantics: namely that between inference and entailment. This is very important; and it is instructive to see how Carnap draws the dividing line between the two: he does so in such a way that while inference is a matter of chaining inferential rules in the strict sense, entailment emerges when we consider, in addition, also inferential rules in some more relaxed sense of the word, such as the omega rule.

This indicates that Carnaps theory of logical syntax did in a sense offer an unabridged theory of language – at least for non-empirical, especially mathematical languages. It does address also the semantic aspect of language – though it addresses it exclusively in terms of inferential rules. In this sense it can be seen as very much ahead of its time, namely a premature overture to contemporary inferentialism.

How Philosophers in the Czech Lands Broke Ground for the Vienna Circle (Bolzano, Mach, Masaryk)

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While the scientific revolution culminated in the western countries during the 17^{th} and 18^{th} centuries (I do not forget Kepler's decisive contribution realized in Prague), the Czech Lands lived in a cultural and scientific backwater. In philosophy, a combination of Leibnizianism and Neo-scolasticism was dominating. The first sign of the revival of science was the foundation of a "Private society" in Prague in the years 1773–1774 by Ignaz Born, which later became the Royal Society and eventually the Academy of Science. In 1780–1785 Jan Tesánek published Newton's *Principia mathematica philosophiae naturalis* with a commentary. – The most important figure in the first half of the 19^{th} century was Bernard Bolzano (1781–1848), philosopher, mathematician and theologian. In mathematics, together with Gauss, Cauchy and Abel, he put the analysis on firm foundations. His *Paradoxes of the Infinite* (1851) prepared Cantor's and Dedekind's set theory. His monumental *Theory*

of Science (1837) is an inquiry into the structure of science whose core is formal logic, which anticipates the semantics of the 20th century. Contrary to Bolzano's logical apriorism, Ernst Mach (1838–1916), developed science on strictly empiricist foundations and his *Mechanic in its historical development* (1883) prepared the path towards Einstein's theory of relativity. Einstein himself developed the general theory of relativity in Prague in 1911–1912. – Many of Brentano's disciples worked in Prague, among them the philosopher, sociologist and politician Thomas Garrigue Masaryk (1850–1937), who renovated the Czech philosophy of history and offered a new vision of the modern world in his struggle for democracy. His *Concrete Logic* (1885 in Czech), a study of the classification of sciences, is conceived in the spirit of Auguste Comte, but against Comte it makes room for psychology as the source of evidence and certainty. The most personal passages reflect the discussions with his younger compatriot Edmund Husserl.

The thinkers in the Czech Lands developed all the ingredients of the doctrines of the Vienna Circle: Bolzano's logic combined with Mach's empiricism, Mach's opposition to metaphysics, philosophy of language of Masaryk and of the Prague Brentanians, attention paid to Marxism and to the social question by Masaryk. Einstein's theories became a paradigm of scientific theory for the Vienna Circle. The Viennese Otto Neurath always stressed the importance of scholastic roots of Bolzano's logic which preserved Austria from the Kantian parenthesis and from the excesses of the German idealism.

Fluctuations and Their Philosophy

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The Vienna Circle went public at the 1929 Prague joint congress of the German Physical Society and the German Mathematical Society. As president of the congress, Philipp Frank arranged a surprisingly philosophical opening session, featuring talks by himself, Richard von Mises and Arnold Sommerfeld on the philosophical implications of modern physics. Even though Frank and von Mises, on the one side, and Sommerfeld, on the other, substantially disagreed as regards traditional philosophical questions, among them dualism and teleology, they all sought to defend modern physics against the criticism that it violated our basic intuitions about causality and the deterministic character of natural

laws. Instead they emphasized the mathematical character of the basic regularities expressed as differential equations or by probability distributions. Frank and von Mises departed from Sommerfeld and most German physicists in their consistent empiricism, which had permitted them – long before the advent of quantum mechanics – to embrace statistical laws as genuine laws dealing with collective phenomena. As I have argued elsewhere, this thinking had emerged in the thought collective around the Viennese physicist Franz Serafin Exner in the first decade of the 20^{th} century. Yet Vienna Indeterminism, as I call this tradition, was not merely a philosophical thesis. It was embedded in the combination of specific research programs, among them Brownian motion and radioactivity research, in which fluctuations appeared as a quantity in its own right. Both the work of Marian von Smoluchowski on Brownian motion and of Egon von Schweidler on radioactive fluctuations emerged in this context.

The present paper investigates to what extent the Physical Institute at the German University at Prague effectively pursued a similar line of research during the 1920s, at a time when Exner's Circle had ceased to exist in its original form. I focus on the three professors in the Institute of Physics. Frank's work on causality provided a more refined justification of statistical laws than Exner's empiricist indeterminism, not least because he could base his analysis on von Mises' mathematical formulation of the relative frequency interpretation. Reinhold Fürth published a critical edition of Einstein's and von Smoluchowski's works on Brownian motion and, in 1920, advocated to consider fluctuations as an interdisciplinary phenomenon ranging from biology and chemistry to foundational physics. Finally, Heinrich Rausch von Traubenberg was working in radioactivity research at a time when the field had developed far from the original table-top experiments of the turn of the century.

Contributions – Regular Talks

Husserl in Prague: Phenomenological Criticisms of Carnap & Co.

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In 1935, the founder of phenomenology Edmund Husserl comes to Prague, invited by the local philosophical circle (*Cercle philosophique de Prague pour les recherches sur l'entendement humain*). The circle was run by two of Husserl's distinguished pupils, Ludwig Landgrebe and Jan Patočka, who was the most notable personality of the young generation of Czech philosophers. Husserl gave several lectures here; at both Prague universities he talked with great success about "The Crisis of European Science and Psychology". The reworked text of the lectures then became the opening part of Husserl's last major work, the *Crisis* (1954). During his visit in Prague, he gave also other, more informal speeches, among other occasions for the Prague Linguistic Circle, on the invitation by Roman Jakobson and by the linguist and aesthetician Jan Mukařovský (who was also a member of the abovementioned philosophical Circle). It is not without interest that few years earlier, a lecture for the Prague Linguistic Circle was given also by Rudolf Carnap, during his professorship in Prague. His talk, unlike Husserl's, met no great interest.

It is interesting in this context that Husserl's criticisms of the modern scientism pervading, in his eyes, the then philosophy might have been directed towards the members of Vienna Circle. The core of Husserl's Prague lectures, as captured in *Crisis*, goes quite against the direction followed by logical empiricism. Husserl argues that the modern science lost its capacity to say anything about the world within which we really live (*Lebenswelt*), which is the reason why people, in search for a meaningful, "deeper" statement about the world, recur to irrationality and superstitions ("the rationality of the idle reason"). Modern science lacks the phenomenological focus. Instead of respecting the primitive character of the everyday experience (dealing with meaningful "things"), it discovers, as the true nature of things and processes in the world, their geometrical and mathematized characteristics (extension in three-dimensional space, laws of physics, etc.).

In Husserlian vein, Jan Patočka publishes in the following year his book *The Natural World as a Philosophical Problem* (1992), where he

identifies modern science as the source of estrangement lurking within our very notion of the world. The world we live in is, originally, a horizon of *sense* (of meaningful things we understand) within which we orient ourselves as *free* and creative beings, capable of reflecting the world as a whole. On the other hand, science suggests that the *real* world has a different character: it is the object of our cognition (scientific knowledge), which is not the same as being the object of our perception and everyday experience. For the true nature of the world – the laws governing it – is not directly perceived; it is hidden and only science can uncover it. Also, the nature of the world is deterministic; the laws of nature leave no open space for human actions as actions performed by free, creative beings. As a result, we live in two different worlds simultaneously that are incompatible (as explanatory images) and compete for primacy.

Much of Husserl's and Patočka's criticisms can be applied to the reductionist tendencies of logical positivism. Husserl was aware of the activities of the Vienna Circle and was critical of the positivistic approach, but he does not address them directly. The same is true for Patočka (who, however, knew also Wittgenstein's *Tractatus* and was perhaps its first critical reader in Czechoslovakia). Nevertheless, the scientism of the Vienna Circle is a part of the broader tradition of Modernity, with its naturalistic emphasis on primary vs. secondary layers of our experience ("qualities"), quantitative and empirical methods in epistemology, etc. So Carnap's (1932) proposal of the language of protocol sentences as an ideal tool for true cognition would be a natural target for phenomenological criticisms. As the units captured by protocol sentences, Carnap identifies atomic perceptions (sense data) that are essentially describable by a system of coordinates. Only such sentences can truly be "verified", that is to say, confirmed by means of empirical science (repeated observation open to control, measurements etc.). Certainly, the categories in which we usually reflect our world and our experience of it and in which we express this experience do not meet Carnap's criteria. "I wasn't born under a lucky star" is an example of self- and world-reflection which is understandable for most competent speakers. From Carnap's point of view, in order for this utterance to be deemed a meaningful statement about the world, it would have to be analyzed into its primitive building blocks – protocol sentences capturing coordinated sense-data – subject to scientific confirmation. An attempt at such an analysis would probably fail, which would be a proof that this is no statement about the world whatsoever. But if it didn't fail – and that is even more important –, then what this analysis would provide, would be, in Carnap's eyes, the "true", primary meaning of the sentence, which was only disguised and distorted by the form "I wasn't born under a lucky star". This result is

hardly acceptable, not only for the phenomenologists, but also for most of post-positivistic analytical philosophers.

It is ironic that Carnap shares certain points with Husserl here. Both were *foundationalists*, each in his own right (Moran 2000); though the foundations of the world-structure weren't represented by sense-data for Husserl, but by, so to speak, various aspects of the "things themselves". The sense (the fully meaningful experience) of the world consists of these various aspects gradually synthesized and contextualized to further horizons of sense. As Mayer (1991) suggests, the proximity of both thinkers can be explained by Husserl's strong influence on young Carnap, resulting in the latter's emphasis on "methodological solipsism" or the need to retain a formal subject to whom the flow of sense-data appears (Carnap 1928). Foundationalism manifests itself even in the problematic solutions to the issue of intersubjectivity which remains, for both thinkers, something that has to be constituted from simpler, more basic elements of experience *via* conjecturing the inner (for this analogy see Rosado Haddock 2008).

However, unlike Carnap, Husserl did not think that the flow of sense-data could be the principal, primary sense-bearer, but suggested that even its sense had to be further constituted out of the stream of experience (sense-data belonging to the theses we utter about the world outside). Although the procedure of synthesizing can be followed backwards through an analysis, the synthesis is the very origination of sense according to Husserl. The phenomenological elements of experience, expurgated of all their horizons, tell us very little of their sense; but the final sense, embedded into the constitutive horizons, is the only true sense, not a secondary or composed or derived one. The bodily nature of the world-knowledge is one of these horizons.

A certain option of reconciling Husserl with Carnap is offered by the early and the "middle" Wittgenstein's (1964) conceptions of logical atomism and verification. In reality, Wittgenstein is associated only loosely with the Vienna Circle and almost not at all (except for biographical anecdotes) with Czechoslovakia. But his position can illuminate the nature of the early Carnap vs. late Husserl opposition and suggest some reconciliation options. The early Wittgenstein's (1922) atomism avoids – cautiously, or cowardly – any specification of what an atomic fact or an elementary proposition looks like. But since he does not postulate the construction of an ideal language, we can follow the word "logical" in the "logical atomism" and say that the elements of true cognition/experience of the world are represented by the simplest *meaningful* propositions of the natural, everyday language, understood as speaking about the world and subject to a decision as to their truth/falsity. The "simplicity" refers

here to the impossibility to identify propositions that would be understood as both meaningful in their own right and comprising the analyzed proposition. Verification is then not a scientific confirmation, but any meaningful, intersubjectively understandable procedure allowing us to tell whether a proposition is true or not, revealing thereby what it means.

Thereby Wittgenstein retains both 1) Carnap's intuition that for telling whether a proposition is true and what it means, non-trivial analyses, revealing quite unexpected constituents of it, sometimes have to be performed, and 2) Husserl's distrust of the need to search for anything more foundational *behind* the everyday (language, experience), using the tools of science.

The atomistic, reductionist approach of logical positivism was later rejected in favor of various holistic frameworks of semantics; yet Carnap is not wrong in assuming implicitly that we can hardly learn and get any notion of the whole of language any other way than through learning to work with individual propositions. Therefore, holism is not necessarily "truer" than atomism; our apprehension of the meaning of our language and of our world takes shape of the hermeneutical circle: the parts and the whole emerge simultaneously and are conditions for one other. This epistemological aspect, identified by Heidegger (1977), plays nevertheless only a small role in Husserl's and Patočka's criticisms of positivism.

To conclude: Husserl's Prague lectures and Patočka's first book present indirect, but very pertinent objections to the logical empiricism and positivism of the members of the Vienna Circle. Much of this critique is justified as it reveals Carnap's or the early Wittgenstein's idle and self-indulgent working with highly artificial concepts of "world", "language", or "elementary". However, Husserl overlooked the potential residing within the pioneering analytical philosophy that had yet to come with a thorough investigation of the true working of language and of its part in the constitution of the human world. A comparable elaboration of this importance of language remained rather neglected by most phenomenologists of Husserl's generation.

The late Husserl stops by briefly admitting language to be an important bond of human intersubjectivity (humanity as a whole). In the same time, young Patočka devotes a chapter of his first book to "A sketch for a philosophy of speech", reacting critically to the positivistic philosophies of language (including the early Wittgenstein). Patočka shows language as an important tool constituting the human world here; as a medium through which human creativity is realized and through which human work re-creates the world freely. Language makes theory possible and opens a space for social norms. At the same time, he takes into account

a broad range of empirical studies concerning language acquisition and uses this material to show that thinking cannot be simply separated from language.

Analytical and continental traditions got closer to one another in their views on language only after the Second World War. In both traditions, these richer conceptions of language can be traced back to the initial criticisms of the early analytical positivism.

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The Wiener Kreis and the Cercle linguistique de Prague: (k)eine Wahlverwandtschaft?

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The Wiener Kreis (WK) and the *Cercle linguistique de Prague* (CLP) are two phenomena often mentioned together when talking about new scientific paradigms which emerged in the new Europe born from the Great War 1914–1918. There are obvious reasons for doing so: they were contemporaneous, they both reached a world-wide resonance, and they have both remained quite nice examples of a vigorous and non-sentimental Mitteleuropa. Moreover, there are even symbolic coincidences: in autumn 1929 two manifestos, one signed by the WK, one signed by the CLP, appeared in Prague on the occasion of two international meetings held there independently; in 1934 two prominent scholars, the "Viennese" (WK) Rudolf Carnap, then professor in Prague, and the "Praguian" (CLP) Karl Bühler, then professor in Vienna, published the *Logische Syntax der Sprache* and the *Sprachtheorie*, respectively. Yet after a first glance it turns out that there is hardly any common ground for comparison: the WK shows no interest at all in what the CLP is doing, whilst the CLP invites, in 1935, politely Rudolf Carnap, and separately Oskar Kraus to refer on Carnap, concluding that the Carnapian way is not only unsuitable for, but utterly impracticable in linguistics; only secondarily, Bühler's and Carnap's students debated in Vienna on the nature of psychology, which incidentally may have concerned language, without reaching any consensus. What can we do further under those circumstances? Well, we can put such an empirical-but-still-impressionistic historical view on a more solid historical basis, which should certainly conform both to the WK and the CLP programs, when distinguishing the WK and the CLP (i) as text corpora, (ii) as institutional fora, (iii) as instances of intellectual currents.

Ad primum. The historian's work consists in interpreting texts, and the results thus achieved depend on the corpus of texts taken into consideration. It is crucial to be explicitly clear which texts we are speaking

about when speaking about the CLP and the WK. Intellectual currents, such as functional structuralism or logical empiricism, are first of all large sets of scholarly works. A very important kind of text set is the FOCUS (French: *foyer*, Czech: *ohnisko*), a sum of texts which have been produced within and by an intellectual milieu. Not all texts belonging to one and the same focus are supposed to use the same notional apparatus: such a claim would be characteristic rather of a SCHOOL, which is a much smaller set of scholarly texts (there may be, and usually are, several schools in one focus). Texts belonging to one and the same focus are supposed to be aware of one another, to react to one another, to share certain general goals with one another. In this sense, the CLP as well as the WK, while often called the Prague and the Vienna Schools, respectively, are foci (*foyers*), not schools. Taking advantage of his *Atlas du structuralisme européen*, the submitting author will present an explicitly gathered and closely structured corpus of texts representing the Prague focus of functional structuralism. However, when gathering, in a similar way, a Vienna focus of logical empiricism, we encounter some difficulties: we have the German manifesto *Wissenschaftliche Weltauffassung. Der Wiener Kreis* (1929) as the only collective text, we have Otto Neurath's French survey *Le développement du Cercle de Vienne et l'avenir de l'empirisme logique* (1935) as contemporary self-confirmation, and Rudolf Carnap's English-written *Intellectual Autobiography* (1963) as a retroactive construction, we have the Leipzig journal *Erkenntnis* (1930–1938, im Auftrag der Gesellschaft für empirische Philosophie Berlin und des Vereins Ernst Mach in Wien); beyond that, we have nothing but personal bibliographies of members and fellow-travelers of the WK.

Ad secundum. Vilém Mathesius and Moritz Schlick, founders and spiritual fathers of the CLP and of the WK respectively, were contemporaries (both born in 1882), of the same academic and social status (both professors at a metropolitan university), renowned as open-minded personalities and excellent organizers. Yet their respective circles as institutions were quite different. The CLP was unofficially constituted in October 1926 as a private circle outside the (Czech Prague) university and officially registered in December 1930 as a private learned society. Its relations to the Czech Prague university were rather strained, although it cooperated quite well with members of the then German Prague university, as well as with members of various research institutions and scientific associations. The CLP got represented in the Comité international permanent de linguistes (1931), took initiative in founding specialized international bodies for research coordination (Association internationale pour les études phonologiques, 1931; Committee for functional-structural research in Slavic languages, 1929), served as example for creating new

circles (Lingvistkredsen i Křbenhavn 1931, Cercle belge de linguistique 1936, Nederlandsche kring voor linguistiek 1940, Linguistic Circle of New York 1943, Circolo Linguistico Fiorentino 1945, Cercle linguistique de Bratislava 1945), published its works in series (e.g. *Travaux du Cercle linguistique de Prague*, since 1929) as well as "hors série", launched a quarterly of its own (*Slovo a slovesnost*, since 1935), besides the four already existing philological periodicals in Czech, and made preparations for an international structuralist review (*Acta linguistica*, since 1939), which due to the Nazi occupation remained eventually in the hands of their Danish colleagues only. Under such circumstances it is easy to decide which texts – to which degree, perhaps – are to be gathered into the corpus called the Prague focus of functional structuralism. Nothing like that on the side of the Wiener Kreis, which was an extension of Moritz Schlick's university seminary and which ceased to work immediately after Schlick was murdered. Any institutional history of the WK must therefore start with clarifying whether there was a proto-WK inside the Philosophische Gesellschaft an der Universität zu Wien, what was the difference, if any, between the WK and the Verein Ernst Mach, how the cooperation of the WK with the Gesellschaft für empirische Philosophie in Berlin actually worked. And one must remain cautious so as not to confuse the history of the CLP or the WK as institutions with personal projections made in the later lives of some of their exponents, might they be as authoritative as the Americanized Roman Jakobson or Rudolf Carnap.

Ad tertium. The CLP as an institutional forum which has produced a significant amount of scholarly texts constitutes a historical current of European structuralism. Unlike other structuralist centers (Geneva, Paris, Copenhagen), Prague was not a Saussurean scene, relying on its own linguistic as well as philosophical roots. Nonetheless, the Praguians soon found a common language with the then very isolated Genevans (common theses presented in 1928 in The Hague), and they subsequently developed a particular approach to the bifacial linguistic sign, which they applied to the study of a whole utterance (Vilém Mathesius) or even of a whole poetic work (Jan Mukařovský). Philosophical topics were not remote from the CLP interests, which can easily be proven by the texts of its members as well as by the program of its meetings. Moreover, a *Cercle philosophique de Prague pour les recherches sur l'entendement humain* was founded in 1934 along the lines of the CLP, having a French title and bringing together both German (prevailing) and Czech members, who all cooperated with the CLP. The CLP linguistic revolution was a constructive one. The question of a specific Czechoslovak linguistics never arose: it was always the case of world science and world philosophy fos-

tered under the particular Czechoslovak conditions; whereas in the WK we find repeated reflections on a specific Austrian philosophy, different from the German one. The radical WK program of purifying the language of the sciences is obviously something quite different from a functional-structural sign approach to the human language as a historical-cultural institution. However, cooperation between groups is only possible if there are cooperating individuals. A positive example may be found in the second-world-war Slovakia where the Vienna-formed philosopher Igor Hrušovský, then working on his Theory of science (1941), closely cooperated with the Prague-formed philologist Mikuláš Bakoš.

Minimum Dwellings: Otto Neurath and Karel Teige on Architecture

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While Prague was a venue of an important meeting of logical empiricists in 1929 and, subsequently, a home of Rudolf Carnap for several years during the 1930s, it is a well-known fact that the Vienna Circle had virtually no impact on the Czech philosophers at the time. The Czech scene was dominated by the old-style 19$^{\text{th}}$-century positivism and various idealist philosophies, with some relatively isolated figures pursuing transcendental phenomenology. Hence, when it comes to the issue of an influence of logical empiricism on the work of Czech-speaking philosophers, historians have usually concentrated on its echoes in the work of some Marxist revisionists during the 1960s.

However, I shall demonstrate that there was a certain intellectual correspondence between the Czech-speaking culture and the Viennese logical empiricism during the interwar period after all. It can be found in a peculiar overlap between the views of a Czech art critic and theorist, Karel Teige, and those of a leading figure of the Vienna Circle, Otto Neurath. Both of these authors achieved, though no doubt independently of each other, a strikingly similar understanding of modern architecture as a scientific activity to be integrated into the scientific conception of the world.

Karel Teige was a key figure of the Czech artistic avant-garde of the interwar period. Although neither a scientist nor philosopher, Teige developed a radical theory of architecture as a science within the framework of Marxism understood as a scientific, materialistic sociology (cf. Neurath 1931/1973). During the 1920s and '30s, Teige was one of the most systematic early theorists of modern architecture, highly respected by the likes of Le Corbusier and Siegfried Giedion. However, I think Teige's theory of architecture was more thorough-going in its materialism and scientism. Although Teige's view that architecture is not a fine art, but science, seems reminiscent of Adolf Loos, Teige did not stop at condemning the traditional *Beaux-arts* notion of architecture as merely a bad stylistic choice. Rather, he construed aesthetics in architecture as an ideological sham, in the Marxist sense. According to Teige, the character

of modern building should be determined strictly in terms of materialistic criteria, such as hygiene and efficiency, supplied by the materialistic sociology, i.e. Marxism.

Otto Neurath developed a similar view of architecture as a strictly scientific activity, particularly in his book *Personal Life and Class Struggle* (1928/1973). As a matter of fact, a similarity between Teige and Neurath was already noted by the German historian Simone Hain (see Hain 1993). However, she did not go beyond some general observations. More importantly, she left unclear the precise nature of the Teige-Neurath relationship: Was Teige directly influenced by the Viennese positivists? Or was it just a matter of overlap? Subsequently, Hain's claims were readily dismissed as speculative by a Czech architecture historian, Rostislav Svacha, because he did not find any allusion to the Vienna Circle doctrines in Teige's writings (see Svacha 1996).

In my view, it must be granted that there was no direct influence of Neurath on Teige. However, the two moved in some of the same circles and shared the same intellectual atmosphere. E.g., Teige taught at the Bauhaus (see Teige 1930), at an invitation of the director Hannes Meyer, who also welcomed the Viennese positivists (see Galison 1990). The one architect whose work Neurath closely followed was Josef Frank, a brother of the philosopher Philipp Frank, and co-signatory of the 1929 Vienna Circle Manifesto. Teige also studied J. Frank's work and critiqued it in his book, *The Minimum Dwelling* (1932/2002). Further, the textual evidence, completely overlooked by both Hain and Svacha, reveals the following points: Firstly, like Teige, Neurath saw the architect as a key social mover, whose task was not only to build, but also to help establish the foundations of the future socialist society already within the present capitalist order. Similarly to Teige, Neurath did not clearly distinguish between the ethical imperative and the economic necessitation when he said that the architect "must seek to anticipate the future," even though the main tenor of his discussion appears to have been economically deterministic. Secondly, Neurath voiced sentiments similar to Teige's criticism of modern architecture degenerating into a mere style lacking any relevance for the transformation of society (Vossoughian 2008). Teige expressed this criticism most sharply in his condemnation of the modernist villas for the rich (Teige 1932/2002). Neurath's talk of the "utilitarian buildings" put up "in the most economical way" is also reminiscent of Teige's technological, anti-aesthetic attitude.

However, there are also some points of disagreement: (1) Teige actually recognized, in a way that seems absent from Neurath's discussion, that a strictly utilitarian design may not be the most economical one. For Teige, the neglect of psychological and social aspects of living is likely to

have a high cost in terms of the human well-being. (2) It appears that Neurath did not condemn ornament as much for its cognitive role-as part of the ruling-class ideology-as for its economic wastefulness. Hence, Neurath seems to have missed an opportunity to oppose ornamentation on a more consistently Marxist basis. (3) Neurath appears to have been more positively inclined towards the state capitalist funding of the communal housing projects and other essentially socialist structures, which contrasts with Teige's explicit Marxist condemnation of such efforts as so many vain attempts to postpone the total collapse of capitalism. Finally, (4), Teige and Neurath differed in some aspects of their particular design ideas for the socialist building. Like Teige, Neurath envisioned communal upbringing of children, communal cultural and educational facilities, and the eventual complete elimination of private kitchen. For a period of transition to full-blown communal living, he proposed kitchenettes. But as for the architectural form of his communal housing, he favored simple terraced houses with connecting gardens and a communal house in the middle. This is pretty much one of the forms designed by Josef Frank. And this design is among many critiqued by Teige as too compromised by accepting the realities of the capitalist system, but valued by him over some others nevertheless.

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Hrušovský on Social Sciences

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Igor Hrušovský, a distinguished Slovak philosopher and a founding figure of the Slovak academic philosophy in the interwar Czechoslovakia, was in close contact with the Vienna Circle (VC) for many years. He was one of the main characters behind the creation of its Slovak sister organization – The Council for Scientific Synthesis – that met regularly in Bratislava between 1937 and 1940. His relations to the members of the VC have been well documented and sufficiently described elsewhere (Bakoš et al 2009, Viceník 2002). Our interest is more narrowly focused and diffuses certain preconceived conceptions of Hrušovský as a positivist who opportunistically turned to Marxism when the political situation changed. We also attempt to reject the claim, approved repeatedly in the literature, that Hrušovský "unintentionally worked with ideas that belong to various stages of neo-positivist philosophy" (Zigo 1998, 502). Instead of a confusion on the side of Hrušovský, we believe that a certain distance he keeps from the orthodoxy of the VC (if, indeed, there is any such thing), is mostly due to differing research interests. While it is unquestionably true that in his formative years, Hrušovský follows the (neo-)positivism of Viennese provenance rather closely (as witnessed masterfully in his 1941), his keen interest in methods and principles of biology and the social sciences opens him an avenue into other philosophies as well. Our comments will mostly concern his understanding of the social sciences, mentioning biology only in passing. The first thing to know is that Hrušovský repeatedly emphasizes the exemplary achievements of the natural sciences of the time, yet his judgments of explanations in social science are never even remotely as harsh as those of some prominent members of the VC. Being aware that directives of VC methodology will come of little help to explicate the intricacies of the social sciences (and, for that matter, of biology as well) he turns his attention to Marxism. His key term in this effort is that of *development*. In biology, that leads him to a questionable acceptance of the entelechy of Hans Driesch. In two major works (Hrušovský 1935, 1942), he offers a unique blend of positivism and non-dogmatic Marxism to explicate the progress and success of the social sciences. The reason behind his acceptance of these

theories is, however, not a dogmatism of any kind. Instead, he insists that the complexity of the issues under investigation and the *dynamics* of changes within the very subject matter call for a less static approach than positivism can offer. In his perspective, psychology plays a very prominent role, as it is, alongside logic, a major building block of the scientific philosophy.

In the paper, we will offer some general insights into Hrušovský's appropriation of Marxist dialectical strategies in developing his views on methods of the social sciences, mentioning also his anti-metaphysical stance which was less vigorous than most of the VC members advocated. We will be especially interested in the intermingling of his Marxist inspirations with those of the VC and the resulting synthesis, as demonstrated on various domains of the social sciences with a special emphasis on psychology. We also elucidate his relation to Neurath, whose philosophy bears the closest resemblance to Hrušovský's autonomous project. Apart from the philosophical goal of scrutinizing the tenability of Hrušovský's position, our aim is also a partial apology of his political standings after the Second World War, which we claim is not a result of his momentous opportunism, but a gradual and systematic embrace of the Marxist tradition.

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Why Czech Positivism Did Not Become Logical

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Although logical positivism was geographically connected to the Czech territory in the period of its birth and early development, it did not leave a noticeable mark on Czech philosophy. This may seem peculiar since positivism was conceived as a Czech national philosophy (see Fajfr 1928, 51, Popelová 1942, 5, etc). One would thus expect that the later versions of positivism would become easily and firmly established within Czech philosophy.

This, however, did not happen, which meant the philosophy of the Vienna Circle was not assimilated into Czech positivism. For an explanation, we must look back to the main features of Czech positivism and of its evolution.

The development of Czech positivism is usually divided into three periods (Cetl 1981). The first period is the period of reception and took place between the 1870s and 1890s, when Czech Herbartians, mainly Josef Durdík, tried to establish a "scientific philosophy". This was a reaction to Hegelianism; Comte, Mill and Spencer are frequently mentioned within this movement. Durdík was convinced that the growing quantity and specialization of knowledge needed unification and order, a task which philosophy was determined to carry out. Grounded in the results of science, philosophy was to build up a firm and unified conception of the world and of life (*Weltanschauung*) (Durdík 1876, 8).

This first period is often described as a purely preparatory stage. I do not wholly agree since some of the main elements and, indeed, part of the agenda of Czech philosophy, not only positivism, had already been established. Philosophy was called on to provide a unified conception of the world. Not only did it contain a method of knowing the world through a synthesis of knowledge, it also integrated ethics in the form of a set of norms and values which did not result from metaphysical and subjective speculations, but from science.

Now, even before we come to the second and third periods of Czech positivism, we might posit that the main features of Czech positivism are as follows: The purpose of philosophy is to provide a unified and

firm conception of the world and of life, both in theory and in practice; ethics is seen as an inextricable part of positivism (Czech positivists were well aware that scientific psychology was an essential part of this mix); the most eminent proponents of Czech positivist philosophy are also psychologists (Krejčí), sociologists (Král) and educationalists (Drtina, Čáda), all of whom are students of Masaryk.

Masaryk's philosophical expectations were similar to those of Durdík. According to Masaryk, the aim of philosophy is to provide a unified and firm conception of the world and of life. He expected that philosophy could help to overcome religious, moral and social crises and remove spiritual anarchy which lay at the root of social disorder. Although this idea is Comtean in nature, Masaryk was nevertheless an opponent of his brand of positivism (see Masaryk 2001, 225, Masaryk 1925, 125, etc.).

The second period of Czech positivism (1900s–1920s) is sometimes called "the period of František Krejčí", who became one of the most influential philosophers. His positivism was much closer to that of Spencer than to that of Comte, although it did not necessarily conform to their political ideas. Finally, the third period refers to the period of the decline of positivism and of attempts to renew it in order to compete with the rise of new idealism and new trends such as phenomenology. One of the most important authors of this period was Josef Tvrdý, whose philosophy is sometimes called, "positivism revived" (Šerackỳ 1932, 92).

It is occasionally asserted that Czech positivism lagged not one but two steps behind its European variant, or arrived two generations delayed. European positivism evolved in three stages: the first consists of the old 19th century positivism (Comte, Spencer, Mill); the second concerns the philosophy of Ernst Mach; the third relates to logical positivism.

By simple comparison of these two developmental branches, one can easily show, using the second as a norm, that at the time when European positivism was nearly in its third stage, Czech positivism was still frozen in its first incarnation (Cetl, 1981, 75).

But this comparison is not only simple; it is also simplified, if not oversimplified. It suffers from the evolutionist perspective, as if the history of philosophy can be explained as a string of beads where the one strung later is always the more reliable. I am not inclined to see Czech positivism as a delayed version of its European cousin, nor do I lean towards the view of the history of philosophy as a race, simply because these two branches of positivism, Czech and European, do not occupy the same track. In fact, the main features of Czech positivism make it more than a national version of classical positivism, i.e., a new and quite autonomous philosophical position (Popelová 1958, 301).

Let us take the most important Czech positivist, František Krejčí, as an example. Of course he was well acquainted with Mach's and Avenarius's thinking, since he assumed empiriocriticism to be the most important philosophical position of all. This shows that it is not true that he did not keep pace with the development of positivism abroad. But it does not help to answer the questions posed by Czech philosophers. It was *only* a noetical training ground for positive philosophy, which had not yet reached its fullest form (Krejčí 1930, 77).

It is logical to ask: Why did, in its third period, Czech positivists not absorb the new impulses emanating from the Vienna Circle? In my opinion, the answer lies in the fact that the most influential exponents of Czech positivism were not natural scientists and that they expected that philosophy would and should provide a conception of the world, including its moral certainty. Moreover, Czech positivists were not so hostile to metaphysics.

Metaphysical spheres had always existed within positivism (as described by Fischer 1929, 41). Czech positivists were well aware of this and admitted so explicitly. Krejčí, the most positivist positivist, admitted that there was "an unknowable transcendence" (Krejčí 1930, 61) or "an unknowable necessity" which determines everything (Krejčí 1922, 69). Drtina assumed metaphysics to be at the core of philosophy (Drtina 1929, 51). Tvrdý did not even think to ask if metaphysics was possible or acceptable; in fact, he directly asked which kind of metaphysics was plausible. According to him, it was impossible to eliminate metaphysics and that is why it was better to prefer scientific over theological metaphysics, since metaphysics was not possible without science (Tvrdý 1932, 76).

Logical empiricism simply could not find fertile ground as Czech positivists had no use for it. In addition, they still harbored some sort of "idealistic nostalgia" (Popelová 1946, 8). Czech philosophers only reported on logical positivism, but they neither followed nor developed it, in contrast to Polish philosophy, for example. Philosophers who occupied themselves with logic or the philosophy of science assumed the philosophy of the Vienna Circle to be an extreme position. Materna spoke about the "Scylla of neo-positivistic nominalism", calling Husserlian phenomenology "the Charybdis" (Materna 1936, 85). Tardy, who reviewed Carnap's books shortly after they had been published, called physicalism, "the most extreme stage of neo-positivism" (Tardy 1934, 167). Tvrdý assumed logical positivism to be a new version of medieval nominalism (Tvrdý 1947, 71). According to Dratvová, the notion of structure used by Carnap was a metaphysical notion, and she argued that science and metaphysics were inseparable (Dratvová 1946, 299).

Although logical positivism, or at least its basic features, was known among Czech philosophers, they assumed it to be one of the modern trends in philosophy, incapable of satisfying their expectations. Instead of welcoming the philosophy of the Vienna Circle to Czech positivism, they shunned it.

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The Vienna Circle and Space-Time

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Einstein's theory of relativity has been a challenge to physicists and mathematicians, but also to epistemologists. Albert Einstein's obituary for Ernst Mach is often quoted: *How does it happen that a properly endowed natural scientist comes to concern himself with epistemology? Is there no more valuable work in his specialty? I hear many of my colleagues saying, and I sense it from many more, that they feel this way. I cannot share this sentiment.* (Einstein 1916, 101). Einstein's insight told him that the theory of relativity changes the physical picture of the world so deeply that epistemological considerations about space and time are as important as the mathematics involved.

The Vienna Circle was a good team for this task. All its members were well educated in mathematics and Moritz Schlick and Philipp Frank were active theoretical physicists. The technical paper by Frank and Rothe (1910) was of some importance in the development of special relativity – the term *Galilean transformation* was coined there. Similarly, their spiritual cousins from Berlin, especially Hans Reichenbach, were well educated in mathematics and physics.

Moritz Schlick's *Raum und Zeit in der gegenwärtigen Physik*, which appeared in 1917, was important for the philosophy of the new concept of space-time. Schlick discussed the manuscripts of the first and second edition with Einstein, who appreciated the book. There is a very valuable discussion about Poincaré's conventionalism in the context of the Riemannian geometry of the general theory of relativity. However, let us quote the text which expresses the relation of the Vienna Circle to philosophy as to the unifying element of different sciences well: *... der Physiker braucht sich um die Untersuchungen des Psychologen über die Raumanschauung nicht im geringsten zu kümmern. Sobald es sich aber um die letzte erkenntnistheoretische Klärung der Naturwissenschaft handelt, wird es nötig, sich von dem Verhältnis beider volle Rechenschaft zu geben. Das ist Sache der philosophischen Besinnung, denn der Philosophie fällt anerkanntermaßen die Aufgabe zu, die letzten Voraussetzungen der Einzelwissenschaften bloßzulegen und untereinander in Einklang zu*

bringen. The modest attitude of the Vienna Circle to the function of philosophy has been really appreciated by specialized scientists.

I will return to some works by the logical positivists later but now I want to show how deep the epistemological changes caused by the special and general theory of relativity were. Let us start with the peculiar story of ether.

1. The grin without a cat

During its more than 2000 years old history, ether played different parts. If we skip its function as an antidote to the *horror vacui*, it served as the realization of Newton's *Sensorium Dei* – it was supposed that ether in absolute space was at rest. Ether was also supposed to be the transmitter of light waves – according to James Clerk Maxwell a carrier of electromagnetic waves. But even Maxwell considered a mechanical model for electromagnetism – the electromagnetic field represented something like a tension in ether (the term *Maxwell stress tensor* is the relic of this interpretation). In a wonderful book of Alfred Jarry, *Exploits and Opinions of Dr. Faustroll, Pataphysician* (Jarry 1980), we find the "telepathic letter to lord Kelvin" where we read: *Luminiferous ether together with all material particles, ... system of rigid links joined together, and having rapidly rotating flywheels pivoted on some of the links. Thus it fulfils exactly the mathematical ideal worked out by Navier, Poisson, and Cauchy. Furthermore it constitutes an elastic solid capable of determining the magnetic rotation of the plane of polarization of light discovered by Faraday. At my posthumous leisure I shall arrange it to have zero moment of momentum as a whole and to reduce it to the state of a mere spring balance.*

It looks like hogwash, but it is a more or less exact description of Kelvin's mechanical model of ether from the end of the 19$^{\text{th}}$ century. Physicists simply believed in the existence of ether and the electromagnetic field was interpreted as a state of ether. However, the theory of special relativity did exclude the existence of mechanical ether.

In *Alice in Wonderland* by Lewis Carrol, Alice met the grinning *Cheshire Cat*, which finally disappeared and just its grin remained. *"'Well! I've often seen a cat without a grin,' thought Alice; 'but a grin without a cat! It's the most curious thing I ever saw in my life!'"*

Similarly, "the most curious thing" happened with the electromagnetic field, which was supposed to be a sort of "grin" in the mechanical ether. The ether disappeared, but the electromagnetic "grin" *remained*.

I think that the parallel which I made can serve as a nice illustration of Philipp Frank's assertion in *Das Ende der mechanistischen Physik* (Frank 1935): *"The era of mechanistic physics was reaching its end and the era of logico-empiricist physics was beginning."* (This book was translated into Czech by Professor František Záviška, one of Frank's closest friends in Prague.) What is a field in physics? According to "Wiki" "a field is a physical quantity that has a value for each point in space and time". It is used in this sense in physics and Frank would probably agree with this definition. Of course, Marxists used to say that "the field is a form of the existence of matter" but such an assertion contains no verifiable information and evokes the image that the field is a sort of soup filling the space.

2. The cause wherefore the leagues are so short in France

In *Pantagruel* by François Rabelais (1991), it is explained why French miles are so short. A king sent one hundred boys and one hundred girls from Paris and told them to put a milestone wherever they stopped to make love. At first they stopped very often but later the boys were tired and the stops were less frequent and it makes the leagues in Brittany, Delanes, Germany, and other more remote countries so long.

This is obviously a wrong method of measurement but what is a correct way of measurement? What is a "true" length, what are the "ideal" standards which behave according to the rules of the theory of relativity? What is factual and what is conventional in the propositions about the geometry of the world and what assertions about the geometry of the world have no real meaning? Take a simple example. In many textbooks the principle of the constant speed of light is formulated as follows: *The speed of light in free space has the same value* c *in all inertial frames of reference.* But in order to determine the velocity of light, we need synchronized clocks and the recipe for synchronization is to use the light signal. Obviously the principle must be formulated with much greater care.

Similar problems are discussed in Schlick's *Raum und Zeit* and especially in Hans Reichenbach's *Philosophie der Raum-Zeit-Lehre* (Reichenbach 1928). In this wonderful book which followed *Axiomatik der relativistischen Raum-Zeit-Lehre* (Reichenbach 1924), Reichenbach developed concepts like differential and universal forces, equivalent descriptions etc., which I consider very useful to understand the general theory

of relativity. I think that Schlick's and Reichenbach's books influenced – at least vicariously – the further development of the theory of relativity.

3. Beauty is truth, truth beauty (John Keats)

Finally I would like to appreciate the logical positivists from another point of view. I read Reichenbach's *The Rise of Scientific philosophy* as a student in 1960. It took me just a few days – it was not only interesting to read, it was also funny. Later I read Frank, Bertrand Russell and other people from "the school of philosophy of logical analysis" as Russel called it and I was hardly ever disappointed.

At the same time I was pushed into reading *Materialism and Empirio-criticism* and other classics of dialectic materialism. I never managed to finish those books – they were too boring.

Therefore I also prefer logical positivism according to the Keats criterion.

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Arnošt Kolman's Critique of Mathematical Fetishism

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In this paper, we would like to look at Kolman's arguments against logical atomism which revolve around the notion of the fetishization of mathematics.

Kolman derives his notion of fetishism from Marx's conception of commodity fetishism, or from capital fetishism as expounded in Marx's *Capital*. What Kolman is aiming for is not the nature of the relations between individuals, their praxis in commodity production. But here he is aiming at the fact that, besides its real existence, a thing (system, structure, logical construction) acquires another formal existence. It is this doubling of its existence and the becoming of an independent driving force that develops independently of, but at the same time determines the character of the field of its activity. Fetishes belong to human existence. No nations, no individual can do without them. They appear in public life as a part of ideologies in a new form, as a bearable guise of real and unwanted truth. They should not have any place in science.

According to Marx, commodity fetishism occurs if the value of a commodity (i.e. its exchange form) appears to have no connection with the use value of the commodity (i.e. its natural form). The commodity-form which is detached from the physical nature of the commodity has a phantasmagoric appearance. Fetishism means this fantastic detachment of the physical characteristics of real things or phenomena from these things (KV, 280). The distinctive feature of a mathematical fetishism is that the detached characteristics are *quantitative* properties. Kolman speaks mostly of mathematical fetishism, less often of logical fetishism. We will return to this distinction in the contexts of Kolman's critique of mathematics to logic and logic to mathematics. It is noteworthy that quantitative properties do not necessarily need to be illusory or erroneous. The formal or abstract concepts which we use to express these properties only acquire a standalone existence. In the second step (on a higher level) of this development, mathematical or logical categories are proclaimed to be the only true reality. Mathematical principles are

proclaimed to be the principles of all being (KV, 251). Mathematical concepts and principles, therefore, can undergo change independently of the things from which they have been abstracted. There is no reluctance to the formation of new, more and more complex mathematical structures which then allegedly disclose the deepest metaphysical truths about all being.

Mathematical fetishism is, according to Kolman, something typical of our way of thinking which "has an inert inclination towards turning this relative side of knowledge into an absolute one." (KV, 19) However, the social conditions that lead to fetishism are more important here.

In his main work, *The Critical Exposition of the Symbolic Method of Modern Logic* (1948), Kolman knuckles down to a sharp critique of the tenets of analytic philosophy of that time, i.e. logical empiricism and neo-positivism. The core of this critique is already present in his critique of Pythagoreanism: "They are ancient, long time refuted thoughts that go back to Platonism, Pythagoreanism." (KV, 7) Kolman finds the main features of modern positivism to be: (1) neutral monism (reality is neither material, nor ideal), (2) the task of philosophy is the description of phenomena, not their explanation, (3) diminishing or refuting the significance of philosophy (KV, 276). If the task of philosophy is only describing positive facts or showing that anything that goes beyond them is nonsensical, "then it is natural that the method of the most universal science – mathematics – becomes the universal method of knowledge" (KV, 277). According to Kolman, fetishization of mathematics follows then from a limited role of philosophy. If philosophy were deprived of every critical and explanatory task, then only the logical analysis of language would remain. The principles of such an analysis must (logically, not temporally) precede every statement itself. Logical laws must be a priori. The independence of the logical laws of facts means that they can be applied to *all facts*, i.e. to the whole world which is the totality of facts (Wittgenstein, TLP 1.1). Logical laws are thus the principles of all being.

Kolman, being a mathematician in the first place, speaks mainly about mathematical fetishism and less often about logical fetishism (KV, 212 & 219). He also criticizes the attempts to reduce mathematics to logic (logicism) and vice versa. According to Kolman, mathematics and logic have different tasks. Logic "studies arbitrary forms independently of their content" (KV, 18). The task of logic is a clarification of the (logical) structure of sciences, including mathematics (KV, 220), while mathematics studies only quantitative forms and relations. In order to clarify the logical structure of science, simple logical systems are enough. These systems can be modeled mathematically (classical logic can be

taken as Boolean algebra). Mathematics is, on the one hand, a part of logic (because it studies quantitative forms only), on the other hand, its combinational possibilities far exceed the possibilities of classical logic.

Kolman ascribes this attempt to reduce mathematics to logic to Frege and Russell (KV, 199 & 203) and the opposite attempt to reduce logic to mathematics to the Vienna Circle (KV, 205), but also to Russell and Wittgenstein (KV, 253–4). Kolman is inaccurate here and his arguments are abridged. In the end, it is not decisive whether the most fundamental abstraction is mathematical or logical. As we have seen above, from one perspective, mathematics is a part of logic; from another perspective it is the other way around. It is nevertheless a formal abstraction and Kolman criticizes an arbitrary detachment of logic and mathematics from the content and their fetishization. Ultimately: "Formal logic as well as mathematics ... divides what is actually connected, and connects what in fact is divided." (KV, 230)

Do Russell, Wittgenstein and the members of the Vienna Circle commit fetishization of mathematics or logic?

Bertrand Russell was a leading proponent of neutral monism in the 20th century. After years of sympathizing with this doctrine, he fully subscribed to it in his book *The Analysis of Mind*: "both mind and matter are composed of a neutral-stuff which, in isolation, is neither mental nor material." (1921, 25) In Russell, we also find Kolman's second and third characteristic of logical positivism. The task of philosophy is the logical analysis of positive facts, not their explanation: "The business of philosophy ... is essentially that of logical analysis, followed by logical synthesis" (Russell 2010, 147); or: "The most important part ... consists in criticizing and clarifying notions" (Russell 2010, 147). The significance of philosophy is reduced to anticipating the yet unknown. The difference between philosophy and science is only in that philosophy is concerned with what we do not know, while science with what we already know (Russell 2010, 124). In this scientific image, Russell did not hesitate to accept that there are general principles that cannot be derived from experience.

In Wittgenstein's *Tractatus* there are plenty of assertions that meet Kolman's characteristics. Wittgenstein clearly meets the second and third characteristic of logical positivism: (2) Philosophy is the logical analysis of (scientific) language (TLP, 6.53) and (3) very little is achieved by solving (all) philosophical problems (TLP, Preface). For the first characteristic – neutral monism – there is no unambiguous confirmation to be found in the *Tractatus*. Objects make up the substance of the world. But Wittgenstein leaves open whether these objects are dependent on the thinking subject. Kolman (without any backing argument) inclines

to the so-called epistemological interpretation, which is close to Russell and was later revived by Hintikka: Objects are sensory perceptions, i.e. sensory data (KV, 204). Apart from this interpretation, there are both realistic and idealistic interpretations of objects. Wittgenstein was reluctant to decide on the character of the basic building blocks of the world. Therefore, we can also – albeit indirectly – attribute neutral monism to him. The absolutization and fetishization of logic should therefore result from these three characteristics. And indeed, such claims are to be found in the *Tractatus*. Logical tautologies describe the basic structure of the world. Wittgenstein speaks directly about the scaffolding of the world "Gerüst der Welt" (TLP, 6.124).

Rudolf Carnap in his book *The Logical Structure of the World* (*Der Logische Aufbau der Welt*) explicitly endorses Mach's neutral monism. The basic building blocks of his Aufbau are called "elementary experiences," which Carnap later called "basic elements" and likened to Mach's elements, i.e. concrete sensory data. Carnap's conception of philosophy draws on many ideas from Wittgenstein's *Tractatus*. Philosophy is the logical analysis of language. For Carnap, the principles of logical analysis are expressible in terms of logical syntax. (For Wittgenstein, these principles are ultimately unnecessary, since they are shown in a logical notation of an ideal scientific language.) A language for the describing of logical syntax is a meta-language which refers to the object language. The basic principles of a meta-language must be based on another meta-meta-language, or there must be obvious logical axioms. Like Russell, Carnap is forced to accept that there are general principles that cannot be derived from experience. This is approaching Hilbert's meta-mathematics. It also may explain why Kolman attributes to Carnap an attempt "to create a universal mathematical philosophical theory of all being" (KV, 254).

We can therefore conclude that Kolman's understanding of logical atomism is correct, even considering some inaccuracies and false attributions.

The above mentioned philosophers do something that has always been one of the main tasks of metaphysics: They are all looking for the essential features of reality by abstracting from accidental features. Why should Kolman, and hence Marxism, be bothered about this?

Lenin's work *Materialism and Empiricism-Criticism* is a fundamental attack on Mach's neutral monism from a Marxist standpoint. Lenin shows that although Mach and his successors were trying to be neutral as regards the decision between materialism and idealism, nevertheless they lapsed into Berkeleyan subjective idealism in yet another guise. Kolman applied Lenin's arguments to Russell's neutral monism. This idealism

has socio-political origins: "the socio-political sense of this fetishization of mathematics and of entire neopositivism ... is that this 'reality' that is neither material nor spiritual, allows the opportunity to take our ideas for being just as the 'real' essence as things and phenomena of the material world are, and thus ultimately justify 'real' politics ... based on the misleading views on the possibility and necessity of reconciliation with this nasty order of parasitism, violence and lies." (KV, 277) Mathematical fetishism arises from the mycelium of neutral monism, whose socio-political sense is that it allows for maintaining the status quo of social relations and conditions.

Kolman's second main argument is that logical and mathematical fetishes are epistemologically deprived of any historical and dynamic dimension. Formal logic examines only the isolated and unchangeable forms of things, "but they are not sufficient for an adequately truly scientific understanding of the world" (KV, 211). Logic and mathematics are historical sciences and their truths are historically contingent. Mathematical and logical fetishism overlooks this conditionality. The basic foundation of all epistemology is not logic or mathematics, but praxis. If we did not admit the criterion of praxis as the sufficient criterion of knowledge, then we would not recognize the materiality of the world (Kolman 1947, 167). Or, in Lenin's words: "The standpoint of life, of practice, should be first and fundamental in the theory of knowledge." (Lenin 1972, 142)

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Tensions and Paradoxes: The Relation Between the Prague Linguistic Circle and the Vienna Circle

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It is curious to note that so far there has not appeared any detailed treatment of the relation between the Prague Linguistic Circle [PLC] and the Vienna Circle [VC],[1] despite it being clear that the topic offers interesting material for comparative analysis. Our goal is to present one of the possible points of view – the relation between the PLC and the VC as a source of tension with regard to their views on the theory of language function and discussions of the general nature of language and linguistic methodology.

We believe that both groups can be understood as prominent representatives of something which we refer to as the scientific variant of modernism. Although the notion is primarily structured with regard to its expressions found in the domains of literary and visual arts or architecture, we believe that some of the general features of modernism are manifested within the discourse of science: the PLC (Toman 2011, but see Sériot 2002) and the VC are exemplary instances of this phenomenon. Both groups were active in the same period (roughly 1920s through 1930s), in the same geographic area and broad philosophical tradition. The PLC and the VC both perceived their own activities as the birth of a radically new program of scientific knowledge and as a refusal of the existing tendencies in science, or as amplifying the resonance of selected indications of the contemporary paradigm shift in science (Carnap, Hahn, and Neurath 1973, Trnka 1948, Jakobson 1934). Both groups even published their program statements in the same year, and they both presented themselves as collectives. It is thus hardly surprising that the two circles actually came into direct contact in the mid-1930s, during the time of Rudolf Carnap's stay at the German University of Prague. The said contact involved (among other things) Carnap's lec-

[1] Literature dedicated to structuralism in Central Europe does however contain a few mentions, cf. e.g. Toman 2011, Sus 1964, Chvatík 1981.

ture at the PLC dedicated to the topic of syntax of logic (Über die logische Syntax, 20 May 1935; see Čermák, Poeta, and Čermák 2012).

In our presentation we would like to investigate the belief that the influence of the VC on the PLC is merely minimal, and confrontational at that (Toman 2011), and to analyze the (implicit) assumption that it at best involves a uni-directional movement from logical positivism towards structural linguistics. We believe that both of these opinions are questionable. The unifying conceptual pair of tension and paradox appears to us as the optimal framing device for an analysis of the relations in question. A pars pro toto of our statement is the varying and contradictory reaction of the PLC to the content of Carnap's lecture (and his work).

The goal of our presentation thus lies in the domain of historiography of science. From the conceptual standpoint, we shall focus on the conceptual agreements and differences revealed in the confrontation of the programs of Viennese 'logicism' and the PLC. We focus specifically on the historiographical reconstruction of the manner in which the 'Viennese program' was developed and transformed in contemporary Czechoslovak structuralism and the tension it produced. We identify these tensions and paradoxes on the level of relations between the PLC and the VC with respect to the terminology they shared as well as on the internal level of the reception of mainly Carnap's views within the PLC. We shall give special attention to the ambivalent relation of PLC members to the program of 'logicism' as well as the disputes raised within the PLC by its members' reception of Carnap's views on the nature of language.

The first part of the presentation identifies the points which are, in our opinion, shared by the general scientific foundations of the two groups. We shall strive to prove by means of analysis of program-stating and summarizing texts of the two circles that both approaches represent the aforementioned current of 'scientific modernism'. Having established this background, we shall then proceed to their specific 'image of the scientific period'. We shall nevertheless at the same time show the points where their reactions to challenges perceived in this manner differ. The text analysis will focus on the terms "positivism", "empiricism", "psychologism" and "teleology". This will result in a proof of the selective nature and certain eclecticism on part of the PLC in the domain of general science.

The second part of the presentation will focus on the level of transformation of the 'Viennese program' within Czech structuralism; or more precisely, on an analysis of the tensions within the PLC arising from the debate concerning Carnap's views. We shall base our investigation on the discussions led by members and program sympathizers of the PLC

regarding the relation between the goal of a message to the device of its expression (language) within the context of R. Carnap's book *Logische Syntax der Sprache* (1934). It is possible to identify a connection between Carnap's lecture at the PLC and the later discussion of language style in the journal *Slovo a slovesnost* (year 7, issue 1, 1941 – year 7, issue 4, 1941). This discussion followed up on the lecture (24 June 1940; On Substitution of Languages within the Individual Styles) and the subsequent article by Jiří Kořínek which directly referred to Carnap's lecture. The discussion took place between Jan Mukařovský and Jiří Kořínek and focused on the character of the relation between message to its goal and to language as the device of its expression, whereas the two extreme positions; (1) the goal lies outside the device, (2) the goal lies strictly within the device; were stated with respect to Mukařovský's definition of the so-called 'autotelism of language', i.e. the process of blending of the goal of message with its device of expression, whereas this is precisely what represents a specific attribute of the aesthetic (poetic) type of language style. Kořínek argues against the specificity of language aesthetic which lies in the 'blending' of the goal of a message with language as the device of its expression, as a manner of acquiring distance from the 'logicality of language'. Kořínek believes this to be manifested especially clearly in the working method of certain modern logicians, in particular that of R. Carnap, according to whom (scientific) logic is nothing else than the 'syntax of scientific language', and all of its propositions are considered to be 'propositions regarding language and language expressions'. The heart of the question lies therefore in whether the autotelism of language represents a specific quality of the language aesthetic as opposed to language logicality, or, to be more precise: whether the blending of the goal of a message with language as the device of its expression is a specific feature of the aesthetic type of language style, as opposed to the logical style. This discussion of one of the fundamental concepts of the PLC is then joined indirectly by Igor Hrušovský whose contributions can be seen as an idiosyncratic attempt at finding a common ground between the views of the PLC and the VC. Another topic he tackled prominently is the analysis of the relation between a poetic and a scientific understanding of language.

The method of 'archaeological' analysis of the discussion outlined above will thus serve as a means of reconstruction of its conceptual framework and at the same time allow us to identify the relevance of the VC's influence on this theoretical conception of language functions, fundamental with respect to the PLC.

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Carnap's Early Metatheory

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Rudolf Carnap's contributions to logic prior to his *Logical Syntax of Language* (Carnap 1934) contain, among other things, work on the formalization of axiomatic theories and their metatheory. His main contributions to this topic are documented in the unpublished manuscript *Untersuchungen zur Allgemeinen Axiomatik* (Carnap 2000) written in Vienna around 1928 as well as in his logic textbook *Abriss der Logistik* (Carnap 1929). The early metatheoretic results documented here were first presented by Carnap to an expert audience of logicians and mathematicians (including such eminent figures as von Neumann, Zermelo, Fraenkel, and Hahn) at the First Conference for the Epistemology of the Exact Sciences in Prague in 1929. Carnap's metatheoretic results outlined in Prague (in particular his so-called *Gabelbarkeitssatz*) are interesting in several respects: They are highly original given the fact that his results are formulated prior to Gödel's incompleteness results and to Tarski's subsequent work on formal truth and logical consequence. Moreover, Carnap's theory of "general axiomatics" shows several interesting points of contact with other, more well-known contributions to mathematical logic and early model theory of the time. This concerns, in particular, Tarski's contributions to the "methodology of the deductive sciences" from the 1930s. Similar to Tarski's metamathematical work, Carnap's main aim in *Untersuchungen* is to give an explication of several metatheoretical concepts under discussion in modern axiomatics and to specify their logical relation.

The general aim of the present talk is to reassess Carnap's early contributions to metalogic from a modern vantage point. Work on this will build on existing scholarship on Carnap's project of general axiomatics. Roughly speaking, the scholarly reception of the *Untersuchungen* manuscript can be segmented into three stages: The first stage consists in pioneering but rather critical work by (Coffa 1991) and (Hintikka 1991, Hintikka 1992). Both authors criticize the "monolinguistic approach" underlying Carnap's project, that is the attempt to express both axiomatic

theories and their metatheory in a single type-theoretic language.[1] This Russellian approach is, in their view, doomed to failure. A second stage set in with Awodey & Carus' paper on Carnap's main technical result in *Untersuchungen*, the so-called *Gabelbarkeitssatz* (Awodey & Carus 2001). It was followed by a number of articles that offer a more balanced account of the *Untersuchungen* manuscript that show not only the conceptual limitations of Carnap's approach but also its innovative aspects and influences on subsequent metalogical work (see, e.g., (Reck 2007) and (Schiemer 2013)). The third stage consists in fairly recent scholarship on Carnap's work on general axiomatics where attention is first drawn to the logical details of Carnap's early model theory as well as to its general significance in the historical development of metalogic.

The present talk wants to take stock and reevaluate Carnap's early metatheory, its limits, and remaining significance in light of the existing body of scholarly work. More specifically, the talk will have two principal objectives. The first one is to further specify the logical details and conceptual limitations of Carnap's attempt to formulate the metatheory of axiomatic theories in a type-theoretic framework. How precisely did Carnap explicate metalogical concepts in *Untersuchungen*? How was his account received by other mathematicians and logicians at the time, in particular by the other participants (such as Fraenkel, Zermelo, and Hahn) at the conference in Prague in 1929? Finally, in what ways does his account differ conceptually from modern model theory and proof theory?

Work on these questions will focus on three characteristic features of Carnap's approach that clearly distinguish it from the way metalogic is practiced today: The first concerns the fact that a clear-cut syntax-semantic distinction is still missing in *Untersuchungen*. This is evident, as we will show, in Carnap's specification of genuinely model-theoretic notions such as logical consequence and validity in purely syntactical terms, i.e. in terms of provability in his background logic. A second aspect to be reconsidered here is Carnap's monolinguistic approach and the missing distinction between an object language (used for the formulation of axiom systems and theorems) and a metalanguage (used for the formulation of metatheoretic concepts and metatheorems about such systems). A third feature characteristic of Carnap's pre-*Syntax* logic concerns his conception of logical languages. Type-theoretic languages are not yet conceived of by him as formal or disinterpreted in the modern

[1] As Coffa describes it, "Carnap's book was thus inspired by the somewhat epicyclic aim of showing that everything of value in metamathematics can (or should) be expressed within the monolinguistic framework of *Principia Mathematica*." (Coffa 1991, 274).

sense, but rather as "meaningful formalisms" that come with a fixed and intended interpretation. Given that Carnap expresses both theories and their metatheory in such a language, the question arises how the modern notion of model and domain variation is captured in Carnap's approach. Put differently, how is model variation for theories simulated in his type-theoretic framework?

The talk will address these three conceptual issues underlying Carnap's general axiomatics project and analyze their implications for his attempt to define metatheoretic concepts. The second objective of the paper is then more systematic in spirit. This is to give a modern reconstruction of Carnap's approach of formulating metatheoretic notions in a single (higher-order) language. Specifically, the main question addressed here is: How much model theory can actually be done if one adopts a monolinguistic approach as Carnap did in *Untersuchungen*? Can one define metatheoretic concepts (such as truth, validity, etc.) for theories in the higher-order fragments of a language in which also the theories themselves are expressed? This talk is based on joint work with Erich Reck and Richard Zach.

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Addenda

On Hania Frank

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Hania Frank called her husband Philippushka. It was an expression of endearment – Philipp and Hania were devoted to each other. She always listened to what he said with interest, and he always smiled and enjoyed what she said – no matter how fantastic or outlandish.

But Philippushka has also another meaning: Babushka in Russian means little grandmother, and Philippushka can perhaps be taken to mean little grandfather.

To be sure, Philipp was ten years older than Hania – he was born in Vienna in 1884, and Hania in Zamostin, Poland, in 1894; but that would hardly make him a Philippushka in the literal sense. So it has to be taken as an endearment. But he did look much older than Hania, with his bald head and short stature. And then of course she had been his student at the University in Prague, where he was professor of physics.

The report that Hania had studied physics is not what came to mind when one met her, got to know her, and heard her speak. In all the years that I knew her, not one word of science or philosophy came from her lips. Yet, Hania understood much of what Professor Frank wrote and spoke. I shall give you an example later.

Hania was lovely when she was a young woman, and remained a lively and cheerful presence throughout most of her life; she was an unforgettable woman. Hania's liveliness, her sense of fun and optimism must have sustained her husband always and particularly when they were in the United States.

Hania spoke several languages: Polish, her native language, but also Czech and Russian, and of course her own brand of German, which those who were privileged to hear it never forgot. This, plus the originality of her fantasizing – shall we say – could sometimes be quite astonishing.

Let me give you an example: When my husband first brought me to visit the Franks, Hania became very excited. She threw up her arms, embraced me, and exclaimed: "Ninotshka, you are the famous dancer, and you have come!"

"No," I answered, "you must have somebody else in mind. I am not a dancer. I took a lot of dancing lessons, but that is all." "No, no," she said, "I would never forget you. You were the tall, famous dancer that

came from Greece to St. Petersburg. I remember it exactly, it was 1851. I saw you with my own eyes."

When I looked over to Professor Frank, he seemed quite unperturbed. "You see," he said – this is how she always started – "during the times of the Tzars they had not only their own wonderful dancers, but many ballet companies from Europe visited St. Petersburg."

Several years later, when our first son, Thomas, was born, Hania came to visit me. She looked at my tiny baby and said sadly, "Ninotshka, I know you love this Gerry, and I know you love this Tommy, but what are you doing with your life? You are a dancer, you are a great and famous dancer."

At another time, she came to see me when I had a cold and laryngitis – I could hardly say a word. Hania picked up an Indian drum which was somewhere in the room and commanded, "Sing, Ninotshka, sing, you are not hoarse, you are not hoarse, you have no cold, sing with me," and she began to sing and dance around me.

My friend, Inge Hoffmann, originally from Vienna, who had wonderful red hair when she was a young woman, told me that Hania, who didn't know her, stopped her on the street in Cambridge and said, "You look very interesting. I would like to know you," and on the spot invited her to come to her apartment on a given afternoon for Kipferl and Kafé.

In a letter of May 1962 to Professor Frank, the famous Harvard astronomer Harlow Shapley wrote to Frank: "You have been my ghost thinker," and "your precious Frau has been our folk dance instructor" (meaning for himself and Mrs. Shapley).

The physicist and journalist Jeremy Bernstein, the author of *Hitler's Nuclear Club*, who was a student and great admirer of Philipp Frank, told us that he telephoned the Frank apartment one day. Hania answered the phone, and in her what he calls "monumental inimitable accent" said, "We are here singing English folk songs. Philipp has gone away."

At another time, she told Bernstein that Philipp "knew a great deal, for a physicist."

What might she have meant by "he knew a great deal, for a physicist"? Perhaps in his Prague years, Frank taught courses in philosophy of science also, which she may have taken. I don't know. And I am not sure anyone else knows. It would be good for someone in Prague to search the records at the University and find out.

There is a very interesting biography of Franz Kafka by Ernst Pawel, called *The Nightmare of Reason – A Life of Franz Kafka*. Somewhere in the book he writes about the brilliant sisters Berta and Ida Freund, who were among the first women in Prague to fight their way into the university, but were only allowed to *audit certain* courses. So, coming

back to Hania, perhaps she too audited certain courses. But we don't know.

I would now like to show you a few slides:

1) Here is Hania in 1912 at the age of 18. She is very attractive, even beautiful with her high Slavic cheekbones, broad forehead and sensuous mouth. Her hair is dark. But as the years go by, her hair gets lighter, blonder, blond – which happens, doesn't it?

As a sculptor, I must say that she ages well – as you will see. Her high cheekbones are like strong armatures which hold up the skin and prevent it from sagging too much as she ages.

2) Here she is in 1920 with her family: her father, A. Gerson; her sister-in-law, who will die during the war in one of the German concentration camps; her niece, Irena Fraydas; her brother Isaac Avramovitch Gerson, who somehow ended up in Moscow, I don't know how.

I recently spoke to one of Hania's nieces in the United States – May Fraydas – who told me that Hania came from a very large (many brothers and sisters), well-to-do and cultivated family.

3) Hania in Prague, 1930, with Professor Frank behind her, with mustache. In all the photos I have seen of him he is bald. He also had a slight limp from an injury from a brief encounter with an autobus. For some reason, Professor Frank rarely bothered to clean his eyeglasses. Maybe he felt that he saw enough as is. But on the other hand, every now and then, one does run the risk of walking in the way of a bus.

I don't know who the other people in the picture are. In front is a gentleman ready to strum his guitar. Hania looks pensive – that is how one is supposed to look in a posed photo. But after the photographer has left, she will no doubt break into a song.

4) Prague, 1930 – Hania, a handsome lady.

5) Prague, 1930 – with Professor Frank.

6) And here is a photo taken by friends just a few years later. A serious Hania. On the edge of the slide it says, "At home with Professor and Mrs. Philipp Frank, Vienna Coffee House, Cambridge, Mass. style."[1]

Ah, to find a good coffee house, or even a bad coffee house, in Cambridge, Mass!

In Prague in the time of Kafka there were apparently hundreds of different cafés catering to every conceivable taste. Ernst Pawel writes, "They served as nerve centers of its culture, politics and crime." I can't imagine criminals meeting in a coffeehouse, but it was probably an inexpensive place to meet, and it was heated in the winter.

[1] The photo is not available. (Eds.)

Pic. 1.

Pic. 2.

Pic. 3.

Pic. 4.

Pic. 5.

But the Café Arco in Prague became one of the great literary centers of the Continent. At its peak in 1912, Pawel writes, "Its regulars included most of Prague's artistic and literary elite: actors, painters, German-Jewish writers, also Czech and German avant guard writers."

Karl Kraus, the brilliant but fanatic, destructive and self-hating Jewish journalist, who founded the journal *Die Fackel*, made a poisonous attack on what he called "the Arconauts," and immortalized the Café Arco by writing: *"Es werfelt und brodet und kafkat und kischt."* (Egon Erwin Kisch was a schoolmate of Kafka, and became a well known journalist and champion of the left.)

Kraus accused all these writers of besmirching the purity of the German language, of which writes Pawel, "he was the self-appointed guardian and high priest." By the way, Kraus also accused Heinrich Heine, Herzl and Freud of perverting the German language.

So to come back to Cambridge and coffeehouses, in vain did Professor Frank look around for someone to talk with, or at least somewhere he could quietly sit and read a newspaper. No, there were no newspapers provided in the downtrodden cafeterias, the Hayes Bickford or the Albiani, which he frequented in Cambridge. But at least they didn't mind an elderly man with a limp sitting by the window, sipping a brew they called coffee, hoping someone would join him for a lively conversation, like in Vienna or Prague.

So the Vienna Coffeehouse – Cambridge-style, *was really* at the Franks' apartment. We visited them often and there were always other people. Hania served cool drinks or coffee and wonderful Viennese pastry, which was made at the Window Shop in Cambridge, run by elderly Austrian refugee ladies who made everything from Gugelhupf to Vanilla Kipferl, Linzertorte, Dobostorte, etc.

Hania was always very lively – she loved company and so did Professor Frank. "You see," he would say – and then he would begin to tell stories apropos any subject, jokes, reminiscences, and in all the years that we knew him I had never heard him repeat himself, as most people do. He was a veritable encyclopedia of reminiscences, stories, associations. Hania clearly enjoyed his stories.

In the photos I have shown you, Hania looked well dressed, but when we knew her she dressed more folklorically, with loose swinging skirts and blouses. Her hair was now streaked with grey, but at other times it had a blonder tinge.

I mentioned earlier that Hania understood what her husband wrote and when he lectured in public, she was often his perceptive sounding board. For example, in 1929 in Prague, at a meeting co-sponsored by the German Physical Society and by the Ernst Mach Association, which was

the legal organization of the *Vienna Circle*, Prof. Frank wanted to give a talk on the topic "Epistemology of the Exact Sciences," even though this was not to the liking of the German Physical Society, as Philipp Frank wrote in his book *Modern Science and Its Philosophy*, which he dedicated to Hania. Some of his friends also cautioned him, because German scientists knew little of philosophy of science, except, as Frank writes: "They had some sentimental ties to Kantianism." (p. 50)

Hania, in her role as sounding board, said to her husband after the lecture, "It was weird to listen. It seemed to me as if the words fell into the audience like drops into a well so deep that one cannot hear the drops striking bottom. Everything seemed to vanish without a trace."

It feels strange hearing myself quoting this, as it was written in English. I wonder in what language it was said. I never knew in what language Hania and Philipp talked to each other when alone.

I spoke earlier about the two sisters Berta and Ida Freund. Berta married a rich and eccentric man named Fanta, who owned the medieval Unicorn Pharmacy on Old Town Square in Prague. After her marriage, Berta Fanta's salon became the brilliant meeting place of a cosmopolitan elite which in later years included Einstein and Frank. Franz Kafka also turned up from time to time when urged by Max Brod. But he really disliked going there because Berta Fanta's Tuesdays-at-home evenings were like post-graduate, in-depth studies of Hegel and Kant, and that was not exactly in Kafka's interest.

When Hania was a student in Prague, she apparently got to know Kafka and had several rendezvous with him, as she told Jeremy Bernstein whom I quoted before.

I mentioned earlier that we were often invited for *Jause* at the Franks. But from time to time we also invited them to visit us. One evening – it must have been 1950 or 1951 – we had a large party with friends of our age, and Hania and Philipp came as sort of guests of honor. In the 1950s, everyone in our circle of friends read Kafka, and on that particular evening Kafka was widely discussed.

Hania pricked up her ears, and her eyes turned large with astonishment. "Kafka?" she shouted to someone sitting on the floor near her. "How do you know about Kafka?" The young man so addressed seemed rather embarrassed and replied: "You see, Madame, Franz Kafka is one of the greatest writers of this century. Everybody knows his work."

Hania listened with astonishment, then she turned to her husband and said, "Philippushka, what have we done with Franzl's letters to me?" "You see," Philippushka answered in his usual unperturbed way, "they were packed in our lift to be sent from Prague in 1938, and the lift never arrived."

Forever after, our friends knew that in *our* salon they met a wild-eyed lady who knew Franz Kafka and to whom Kafka wrote letters.

Many years later, in a conversation with Jeremy Bernstein, Hania told him that she did not think that Kafka was the most brilliant writer she knew in Prague. I wonder whom she might have had in mind?

As I said earlier, Hania spoke a number of languages – of course, her native Polish, Czech, Russian, and her inimitable German and English. From Prof. Bayara Manusevitch, who taught Russian literature at Harvard, I learned that Hania was a great favorite among the Russian intellectuals in Cambridge. She was lively and fun to be with. She spoke an excellent Russian and felt at home among them. They all loved Philipp, and they even Russified his name to Philipp Ignatievich.

Hania was close to Bayara Manusevitch's mother, to whom she expressed her fear that if Philipp were to die, she couldn't live alone. She would do anything to live among one of her Russian friends, even be a domestic, cook, anything!

There was a sense of foreboding in her fears. By the mid-sixties, Professor Frank, now 82 years old, became quite often confused and forgetful, but always tried to be cheerful. Hania, however, was in very poor shape. Bedridden, she suffered from a variety of gerontological problems. Both could no longer be left alone in their apartment.

In September 1965, through the efforts of some of their close friends and their physician, they were both placed in a Cambridge nursing home. Professor Frank died there on July 21, 1966. Hania was taken by her nephew, Stan Fraydas, to a nursing home in Freeport, NY, close to where Mr. Fraydas and his family lived.

Hania died December 27, 1967 at age 73.

They are both buried in the beautiful Mount Auburn Cemetery in Cambridge, at Azalea Path. May they rest in peace.

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Major Contacts with Stimulating Initiatives of Analytical Philosophy and the Vienna Circle

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1. Introductory Notes

In this country philosophy had been cultivated for a long time as an explication and very rarely as a process of fructification of the ideas that had already been expressed or written, as a repeated journey along the path traveled by other, better educated and undoubtedly wiser men. Nobody could object to that practice, as long as we try to find the limits, pitfalls and possible improvements of those journeys or other, more perfect and suitable paths and trends; as long as we also try to find new goals, procedures, devices and methods. Among the first stimulating contacts with the subject that can be comprehensively described as methodological themes figured my working and personal meetings with the colleagues of a group established at the Faculty of Natural Sciences of the Charles University in the early 1950s under the name "Cabinet of General Natural Science" and headed by the then associate professor O. Zich. There were others who were involved in its activities, namely A. Dratvová, M. Katětov and some other researchers. I myself was impressed by the work of M. Katětov on the logical construction of mathematics in which he singled out the works of R. Carnap and other members of the Vienna Circle. Shortly after my habilitation at the Faculty of Philosophy (1953) I was sent to a conference on what were called Lenin's philosophical notes, a gathering organized in Warsaw by the Polish Academy of Sciences. The conference was also addressed by the then Chairman of the Polish Academy of Sciences, Professor T. Kotarbiński. His lecture focused on Lenin's example of what was then billed as a "wonderful demonstration of dialectic", notably the sentence "Zhuchka iest sobaka" (in Czech translation "Alík je pes" which, loosely translated into English, reads "Bingo is a dog"). Kotarbiński agreed with Lenin's characteristic claiming that the singular is also universal and that, on the contrary, the universal is the singular too. He followed his affirmative

and appreciative comment by adding that he would like to supplement and extend Lenin's note by referring to the fact that what is also involved is the connection of the nominal and verbal components, the connection of a proper noun and a common noun, the concatenation of an element and a set, a part and a whole, and that, therefore, syntactic connection or concatenation does and can have a number of different functions. I went to speak to Professor Kotarbiński during a conference break and conveyed to him my thanks; I mainly thanked him because I now did understand the meaning and purpose of his supplementary notes. From that first meeting on I was regularly invited to seminars and minor conferences also attended by leading lights, adherents and supporters of analytical philosophy in Europe. These included A. J. Ayer, who later sent me his book *Language, Truth and Logic*, R. Aron who gave me, already in Warsaw, his book *L'Opium des intellectuels*, a critique of the fundamentalist ideologies.

When, after my forced departure from the Charles University, I had found decent employment and work in the Institute for the Theory of Information, I wrote a letter to Professor R. Carnap, asking him if he could kindly arrange for me some possible contacts and also make available his own works. This correspondence continued until the invasion of Czechoslovakia in 1968. In his letters Carnap formulated his personal opinions, criticism and sympathy as well as condemnation of some international events (for instance the assassination of President Kennedy), admiration for some phenomena or programmes of the so-called "Prague Spring", admiration and respect for T. G. Masaryk etc. During the 1960s I received from several American publishing centers anthologies or collections devoted to the philosophy and methodology of science, particularly the works of H. Feigl, A. Pap, H. Reichenbach, C. G. Hempel and other former members of the Vienna Circle who lived and worked in the United States.

Still in the 1960s I was invited to become a member of several editorial boards, both book editions (*Theory and Decision Library*) as well as magazines (*Erkenntnis*). I was also invited to take an active part in some editions, which resulted in the publication of two books in a series issued by the Boston University, a number of contributions to book publications on the philosophy and methodology of science (these were books dealing with the subjects of information and prediction in science, scientific thinking, the philosophy of technology) plus encyclopedias explaining systems and management concepts and principles. Availing ourselves of the freer and more liberal atmosphere prevailing in the country in the 1960s, me, my colleague and friend K. Berka and researchers active in the field of logic published Czech translations of the works of

some philosophers and thinkers from the orbit of the Vienna Circle and analytical philosophy, particularly R. Carnap, A. Tarski, B. Russell and some others. We did this in an effort to acquaint the Czech scientific and academic community with these works in a more detailed fashion. In addition to logicians these methodological initiatives were also supported by the representatives and followers of the Prague traditions of linguistic structuralism.

Back in 1955, in an atmosphere of sheer intellectual dark times, this country saw the publication of a Czech translation of *A Short Philosophical Dictionary* which precisely labeled whom to acknowledge or at least tolerate, whom and what to reject, and also whom and how to abuse. Seen in this context, great credit is due to the efforts and endeavors evolved by some medical specialists from the Faculty of Medicine of the Charles University keen on getting to know more about those condemned "bourgeois initiatives" that had been introduced by the pioneers of the theory of information, cybernetics, semantics, the theory of games and the theory of decision-making. This eventually gave rise to seminars, explications and debates that were originally held in the evenings in the faculty rooms in Prague's Kateřinská Street. A totally private and personal event was the visit to Prague by the founder of cybernetics Norbert Wiener who came to the Czechoslovak capital as a tourist. He had shortly stayed in Prague a long time before the war, during his brief study stay with local German mathematicians. His father L. Wiener, a Professor at Harvard University, was a good acquaintance of T. G. Masaryk.

I came to understand and appreciate the wisdom of some Czech universally educated and scientifically oriented medical doctors not only during discussions about new and stimulating trends in science but also during countless debates and conversations in the critical period of the so-called Prague Spring. When Professor MUDr. O. Starý, the then Chancellor of the Charles University, told me early in the summer of 1968 that I had been nominated for the post of regular professor, he stressed that the university should represent all the major philosophical trends, and he added that he had in mind not only what was then described as "neopositivism", but also phenomenology and reform Marxism and, therefore, also professorships for J. Patočka and K. Kosík.

As for the excesses and major turnarounds in academic posts and interventions of the official and monopoly ideology, these included both different forms of repudiation and condemnation as well as the practice of lavishing uncritical praise and kowtowing to those who served the monopoly power and its ideology, particularly its ideological arbiters and judges. I myself experienced such an act of ostracism in the late 1950s at a

large university assembly prepared and stage-managed by two employees of what was known here as the "Vokovice Sorbonne" (at that time a quite common and ironic nickname for the political university attached to the Central Committee of the ruling Communist Party and based in Vokovice, a Prague district). Held at the Faculty of Philosophy, this was a gathering of Prague philosophers and scientists from related disciplines. Those who wanted to keep their posts had to express their views in public, naturally kowtowing to the powers that be. Actual opposition to the ready-made "judgment of conviction" of the "culprit" was expressed solely by two people present, Professor O. Zich and one employee of the Institute of Philosophy of the Academy of Sciences. In retaliation, the then Department of Logic, whose employees had refused to take part in this public character assassination, was abolished as a punishment.

My arrival in the Institute for the Theory of Information meant for me leaving the atmosphere of control by fear and entering a lively and fruitful climate of searching for new ideas and lively discussions, which considerably changed my personal situation. The then Director of the Institute and Scientific Secretary of the Academy of Sciences J. Kožešník gave me an amicable welcome, naturally only at our face-to-face meeting: "Look, John Huss was burnt at the stake and you can quietly work here." I could link up to the famous work by R. Carnap on the semantic theory of information, a study he co-authored with his pupil and assistant Y. Bar-Hillel. (The latter then invited me in 1964 to give lectures and attend a conference at the Hebrew University in Jerusalem of which he was a professor. Later on we met at a philosophical congress in Vienna in 1968 where he chaired one of the congress panels.) A successful and stimulating intellectual milieu at the institute was also promoted by the fact that the subjects of the theory of information, information processes as well as decision-making procedures are known to possess many general and hence also philosophical dimensions. This involves not only the fact that the measure of information may be grasped and also conceived as negative entropy, that decision-making may be viewed as a search for, evaluation and selection of possible and acceptable alternatives, that the well-known statement (unjustifiably attributed to A. Einstein), that "God doesn't play dice" does not actually hold, and that it is not always possible or necessary to seek "hidden parameters".'

A summarization of some of my results concerning the possibilities of using semantic information is the study "Some Methods of Information Evaluations of Scientific Results", which appeared in the journal *Computers and Artificial Intelligence*, No. 5, 1986, pp. 185–194. This study was also reprinted in an extended (American) version of the book *Prob-*

lems of Semantics, published by the Boston University, as well as in the Czech version published by the Charles University in 2006.

Needless to say, the initiatives stimulated and promoted by different trends and centers of analytical philosophy can hardly be confined only to the intellectual hubs in such cities as Vienna, Prague and Berlin, or the two other cities involved: Lvov and Warsaw; they are, indeed, connected with many other names of the leading thinkers in the Anglo-Saxon world, among whom we cannot omit such names as B. Russell, A. J. Ayer, the Austrian L. von Bertalanffy and L. Wittgenstein, the Finnish thinker G. H. von Wright and many others, traditionally classified rather as "soloists". Nevertheless, even science and philosophy is, just like music, the product of outstanding soloists, especially if they have their pupils and followers.

2. Major Contributions and Stimuli of the Main Currents of Analytical Philosophy

When assessing and analyzing the key results achieved by the leading trends and currents of analytical philosophy, we can hardly avoid asking which significant and stimulating findings those currents have brought to contemporary scientific thinking, and whether or how they have contributed to the advancement of scientific methodologies. Naturally, this does not concern only that single and particularly specific trend, which the Vienna Circle undoubtedly was and still is. When mentioning the sum-total of sources and breeding grounds of major new initiatives and stimuli, we should also, quite definitely, refer to the centers and groups of the so-called Lvov (Lemberg)-Warsaw School, the Prague linguistic structuralism groups, as well as areas of literature and aesthetic. One could also consider factoring in other initiative currents of all the Central European countries whose leading lights were forced to leave their homes and go to Western Europe and, in most cases, further west across the Atlantic to America. (An interesting insight into this particular shift of intellectual initiatives is given in the book written by R. Mattessich and called *Instrumental Reasoning and Systems Methodology*, published in the series *Theory and Decisions Library* in 1978.)

The conceptual notions and methodological procedures associated with the currents and trends of analytical philosophy are connected with a number of major accents on the cognitive and decision-making processes applied in the intellectual spheres of human actions in education and in social, economic and technological development. The following accents and procedures are involved in particular:

- accents on *analytical approach* requiring a more profound insight into the genesis of knowledge, into components, elements and parts of larger wholes, into systems or complexes bound up with concatenation of partial and, frequently, also diverse elements;

- the necessity of accurate *linguistic formulation*, conceptual devices and the structure of linguistic performance;

- attention devoted to *concepts*, to the *generation as well as use of knowledge*, including appropriation, confirmation and application of knowledge, hence those information processes connected with knowledge and cognition, with verification and application processes;

- specification of requirements for the *subjects of action* in the spheres of knowledge acquisition, verification and utilization.

In actual fact, the analytical approach represents both an old tradition and heritage of man's oldest steps in science. Man has always been curious to know what was the stuff Mother Nature used to create its works, he has learnt to distinguish elements or partial components as well as manners and forms of their concatenation that lead to the formation of new structures guaranteeing the genesis of not only new wholes but also new properties and desirable functions. It was Newton who distinguished *corpora* and *vires impressae*, their status (*quiescendi vel movendi*) and thus also the structure generated by concatenating the nominal phrase and verbal phrase.

In addition to the analytical approach, of great importance for both communication and the use of linguistic performance as well as for the wide-ranging and multifarious field of practical actions is connection, whether we have in mind connection of real elements, states, processes or functions. New structures, wholes or complexes created by a specific and also admissible and practicable type of concatenation of originally separate elements, components or future parts can ensure a new meaning or a new function of a statement. (In these contexts, R. Carnap pointed out the connection of words and expressions which he described as "meaning postulates".)

The analytical approach is important not only for a better way of learning, understanding and explaining events, processes and changes occurring around and inside us, in our lives and our actions. Therefore, it constitutes a key and stimulating factor of human actions, our own intentions, wishes and target orientations of all forms and types of cognitive and creative pursuits. This naturally also encompasses the spheres of creating and utilizing the world of our constructs and, therefore, using the realm of our artifacts. That also explains why all the centers, groups and schools of analytical philosophy and analytical thinking devoted considerable attention to communication processes, to language

and to linguistic performance. After all, it is precisely in these contexts that the sentence from Wittgenstein's famous *Tractatus* "Worüber man nicht sprechen kann, darüber muss man schweigen" holds.

The subjects of debates, topics of interest and concerns examined in the discussion centers of analytical philosophy, the philosophy of science, the foundations of mathematics and modern mathematical logic gave rise to a climate conducive to integration and cooperation of different scientific disciplines in an effort to search for bridges and other common areas of what were formerly strictly divided branches and disciplines, namely different forms of expansion of mathematics, numerical, quantum and probabilistic approaches to different spheres which had previously been the domain of strictly verbal manifestations. I myself felt this very strongly when I had been banished from the philosophy and humanities community, disciplines then dominated by the monopoly of the only permitted and infallible ideology, and when I later found warm reception and acknowledgement in the exact spheres of mathematics and technology. Therefore, I welcomed an invitation extended to me by the editorial board of the then popular Czech periodical *Literární noviny* to write "something" about the relationship among the exact, natural scientific and humanities branches. My essay bearing the Latin title *Humanum et naturele* was published in *Literární noviny* in the summer of 1965. A similar spirit of mutual relations and respect prevailed already in the discussions on cybernetics and the related thematic fields, held at the Faculty of Medicine, and later, during debates and paper presentations organized by the Cybernetics Committee, which then transformed itself into a respected scientific society. The relatively numerous participation and involvement of medical specialists proved to be quite remarkable and undoubtedly also highly useful for such discussions and subjects under scrutiny.

The topics and focus of research in analytical philosophy were very close to – and had, for all practical purposes, affected – the origin and development of the field which used to be described as the "science on science" or research into the relations between science, technology and society. Standing in the limelight was also the sphere characterized as "science policy", a domain which was also connected with the orientation of goals, directions and preferences of the subjects that were well supported and grant-funded. This thematic field developed comparatively quickly in the 1960s as an important international topic, backed up by international organizations, for instance the UNESCO. But these concerns and tendencies have come out into the open in a more pronounced fashion after the establishment of the European Union. Support has been given primarily to the exchange of respected professors, especially for the

purpose of postgraduate studies and, hence, for the training of Ph.D. students and budding scientists. These trends have also confirmed the need of having a universally available international language of science. It has now become a matter of course in many European countries that higher levels of studies, always attended by many foreign students and applicants, are conducted in English. Publishing one's own results and primarily publishing them in internationally respected book series and journals has grown to be an inevitable – and now also the only much-acclaimed – prerequisite for the acquisition of a specific level of professional qualification and associated competence, and for the achievement of worthwhile scientific results in all spheres of science and their international recognition. (In these contexts, we speak of the so-called peer reviews. Also membership in editorial boards of such journals or book series is perceived as a considerably great and internationally highly regarded acknowledgement.)

A major trait – as well as a useful advantage – of analytical thinking and reasoning is what can be termed as opposition to perceiving the world solely in the light of one's own resources, one's own perception and hearing. In actual fact, virtually all of us are condemned to moving within such barriers or – to put it more aptly – limitations. What is still worse: such restrictions are co-generated by the fundamentalist ideology. Without any doubt whatsoever, one may claim that each of us has sometimes met and had to work with people suffering the disease of self-confidence in their own opinions and attitudes, people for whom the only true facts are those they know themselves. That is also why it is crucial to stimulate what we usually call curiosity, an urge to see and know more and better. At the same time, it holds that when submitting proposals, when reasoning and when evaluating our own steps, namely steps of intellectual and material nature, we lack any a priori guarantees of anticipated consequences and impacts. To put it in other words, it is vital to incorporate into our thinking such steps within a broader scope, and not only in factual aspects, but also in the light of spatial, time-related and some other value-related criteria.

This mode of evaluating, proposing and decision-making has eventually led to the establishment of several new and important thematic domains in science, management and decision-making. These are primarily considerations about possible ecological, health-related, technological and other impacts, hence concerns for environmental protection, health risks, restrictions of civic freedoms and citizens´ human rights, or – more precisely – respect for what H. Reichenbach, one of the founders of analytical philosophy in Berlin (from where he had to flee and emigrate), called "the direction of time". (To mark his birth anniversary his Berlin

colleagues organized a gathering, while a book of articles and studies was published on the occasion of the event. This contained contributions not only by German scientists but also studies by authors from many other countries, including my own study on the subject of technological time, linking up to the works of H. Reichenbach.)

Putting accent on the direction, nature of the rhythm of time, focus placed on the length of time requirements of some important intervals, on the boundaries of their reliable establishment proves to be a major component of both individual and strictly personal decision-making, as well as the decision-making on some social projects, for instance large-scale building projects, major investments etc.

3. Analytical Philosophy and Language Communication

The pioneers of analytical philosophy and hence also of the philosophy of science have greatly contributed to an analysis of communication processes and, therefore, have helped in shedding light on the nature and function of language and language communication, and also the creation of that thematic field referred to as the philosophy of language. That is why it was vital to distinguish the language, as a system of verbal signs and a set of rules of semantic, syntactic and pragmatic nature, and what used to be described as the "metalanguage", i.e. designation and expression concerning the structure and function of language.

This particular distinction was spelt out by A. Tarski, one of the founders of the Lvov-Warsaw School. The same author also came up with the significant specifications of such concepts as "truth", "logical inference" and other important results. The significant role played by syntax was singled out by R. Carnap in his work on the logical syntax of language. Similarly important was the accentuation of the great importance of syntactic connectivity, i.e. mutual relations of words, their types and forms in word concatenation, an aspect highlighted by K. Ajdukiewicz, another figure of the Lvov-Warsaw School.

Efforts to promote perspicuity, semantic precision as well as the quality and reliable interpretative prerequisites of language, used to express the outcome of learning, acquisition and confirmation of established conclusions, have always figured prominently among the good traditions and target orientations of all the currents and directions espousing the traditions of the Central European focal points and centers of stimulating initiatives of analytical philosophy and the philosophy of science.

In addition to language and language performance, analytical philosophy and the philosophy of science have always cultivated very close and intertwined relations with logic, and primarily modern or mathematical logic. The very center of these efforts is constituted by relations and contexts associated with the procedures of logical inference, with the possibilities and forms of derivation, notably in the contexts of processing data of various provenances, with the generation of conclusions coupled with the evaluation of their acceptability and reliability.

Analytical philosophy has turned the spotlight of attention on cognitive procedures associated with operations involving production of generalizations and their use in those areas operating both with generalizations, i.e. the so-called nomological sentences, and also with a set of singular empirical findings. These are primarily procedures of explanation, prediction, the structure of medical diagnosis, the process of proposing a therapy, analyses of problem situations and proposals, plus plans and projects for their solution. These subjects were introduced especially by the work of C. G. Hempel, to which the author of this study has also linked up. (As a matter of interest, C. G. Hempel also visited Prague, called me and we took a long walk through Prague, partly engaged in discussions of our common interests. In fact, during the totalitarian regime in this country, ostensibly tourist visits by foreigners proved to be a frequent form of direct and quite personal contacts, facilitating transfer of manuscripts and texts that could then be published in the free world. The greatest credit for the transfer – or rather "smuggling" – of my texts and their subsequent publication abroad is due to the Dutch editor D. Reidel and my German colleague Professor F. Rapp.)

Seen in a broader perspective, those were primarily the far-reaching civilizational changes, the wide-ranging development and growing expansion of the information technologies that facilitated a huge broadening of the fields and available horizons of language communication and, thus, their functions and possibilities of mutual intellectual contacts and exchange of knowledge. In this respect, an important part was played by shorter or longer periods of political thaw and relaxation in my country, particularly in the 1960s. Already in 1964 I was invited by Professor Y. Bar-Hillel, a pupil and colleague of R. Carnap and co-author of a major study on semantic information, to attend a conference at the Hebrew University in Jerusalem. Meetings outside the conference made it possible for me to get acquainted with a number of interesting personalities and representatives of the centers of analytical philosophy, logic and the methodology of science, notably with A. Tarski. I was also approached by S. Körner, Professor at the Bristol University in Britain, an émigré from post-war Czechoslovakia who had taken part in the anti-fascist re-

sistance movement during World War II. As a matter of interest, his wife was my classmate at an elementary school and during the first years at a grammar school in Znojmo. She had saved her life before the war by promptly emigrating from Czechoslovakia in 1938 at the instigation of my father.

Of great importance for what became a thematic and methodological affinity, mutual relationship and stimuli have always been the links to the topics and problems concerning cognitive procedures, the field of data and knowledge processing and use, their verification, confirmation and application. This has been reflected quite distinctly in the inception of approaches, methods and results of all the thematic fields of information science, information technologies and modes of application of such technologies. This only confirms that the notions and principles of cybernetics, whose author is Norbert Wiener, were born at a seminar on the philosophy of science which saw the birth of the well-known and famous anticipation of cybernetics, namely the work called *Behavior, Purpose and Teleology* penned by three authors: W. Rosenblueth, N. Wiener, J. Bigelow, two of whom had proceeded from the knowledge of physiology and medicine, while N. Wiener was a mathematician. This fact alone just shows that analytical philosophy of science is capable of participating in the construction of bridges connecting disciplines that study different subjects. Indeed, analytical philosophy and its methodological constituents take part in using the devices of information technologies in processing acquired results, in generating important relations and dependences of empirical findings on the formation of generalizations and their verification and confirmation.

4. A Few Personal Remarks

As things stood in the past, neither analytical philosophy, the methodology of science nor related modern logic enjoyed any favor with the leaders and adherents of the fundamentalist ideology and, hence, the monopoly ideology of the European totalitarian dictatorships. The latter are exemplified by the Nazi and racist ideology, practiced by the Third Reich in Germany, or the fascist ideologies in Italy and Spain, and the communist ideologies pursued in the countries of the Soviet bloc. It was immensely fortunate that large numbers of those creative personalities from the Central European intellectual centers and hubs, known as sources of such leading scientific initiatives, had managed to emigrate before the outbreak of World War II to the Anglo-Saxon world, where such scientists and university teachers were not only very well received

but were also able to establish and stimulate large groups of gifted pupils and followers.

The totalitarian regimes and their ideological arbiters were guilty of whipping up various witch-hunts and organizing acts of ideological reprobation of those who had failed to live up to their ideological principles and requirements. Ideological criticism and expulsion from a university or academy was also followed by the seizure of one's passport and a ban on publishing. Fortunately, one could fall back on a relatively wide-ranging solidarity given by foreign colleagues who visited Prague as tourists and who were in a position to meet their "captive" colleagues. As mentioned above, this system ensured the transfer – or rather smuggling – of my works, which were then published by the Boston University, as well as other works on the philosophy of science and technology. As a member of editorial boards of some international serial publications I received foreign literature published in the given and related thematic fields. These acts of solidarity also serve as an excellent proof of the links existing between these particular scientific domains and their authors and pioneers on the one hand and the best human values on the other.

Významné kontakty se stimulujícími iniciativami analytické filosofie a Vídeňského kruhu

Ladislav Tondl

Akademie věd České republiky

1. Úvodní poznámky

U nás byla filosofie dlouhodobě pěstována jako vysvětlování a jen zřídka jako fruktifikace vysloveného nebo napsaného, jako opakovaná cesta tím proudem, kterým již prošli jiní, vzdělanější a nepochybně moudřejší. Nic proti tomu, pokud se snažíme nalézt meze, úskalí i možná vylepšení těchto cest nebo jiné, dokonalejší a výhodnější cesty i směry, pokud se snažíme nalézt také nové cíle, postupy i prostředky a metody. Jedním z prvních stimulujících kontaktů s tematikou, kterou lze souhrnně charakterizovat jako metodologickou tématikou, byla moje pracovní i osobní setkání se spolupracovníky skupiny, která byla na počátku padesátých let na přírodovědecké fakultě UK zřízena pod názvem „Kabinet obecné přírodovědy" pod vedením tehdejšího docenta O. Zicha, do níž také docházeli A. Dratvová, M. Katětov a další. Zaujala mě práce M. Katětova o logické výstavbě matematiky, v níž se upozorňuje na práce R. Carnapa a dalších z Vídeňského kruhu. Krátce po mé habilitaci na filosofické fakultě (1953) jsem byl vyslán na konferenci o tzv. Leninových filosofických sešitech, kterou pořádala ve Varšavě Polská akademie věd, na níž vystoupil také tehdejší předseda Polské akademie věd profesor T. Kotarbiński. Jeho přednáška se týkala Leninova příkladu „skvělé demonstrace dialektiky", a to věty „Žučka jest sobaka" (český překlad má formulaci „Alík je pes"). Kotarbiński vyslovil souhlas s Leninovou charakteristikou, že jedinečné je také obecné a že naopak obecné je také jedinečné. Ke své souhlasné a oceňující poznámce dodal, že by rád ještě doplnil a rozšířil Leninovu poznámku poukazem na to, že jde také o spojení nominální a verbální složky, o souvislost vlastního jména a obecného jména, o zřetězení prvku a množiny, části a celku, a že tudíž syntaktické spojení nebo zřetězení má a může mít řadu velmi rozmanitých funkcí. O přestávce jsem k profesoru Kotarbińskému přišel, vyslovil jsem své díky a hlavně to, že jsem pochopil smysl i účel jeho doplňu-

jících poznámek. Od tohoto prvního setkání jsem byl pravidelně zván na semináře a malé konference, na které byli zváni významní představitelé i podporovatelé analytické filosofie z Evropy. Byl mezi nimi A. J. Ayer, který mi později zaslal svoji knihu *Language, Truth and Logic*, R. Aron, který mi již ve Varšavě věnoval svoji knihu *L'Opium des intellectuels*, což je kritika fundamentalistických ideologií.

Když po nuceném odchodu z Karlovy univerzity jsem nalezl od počátku šedesátých let slušné umístění v Ústavu teorie informace, napsal jsem profesorovi R. Carnapovi dopis s prosbou o možné kontakty a také jeho práce. Korespondence pokračovala až do invaze v roce 1968. V dopisech Carnap vyjadřoval své osobní názory, kritiku i sympatie, v nichž nechyběla ani kritika některých událostí (například atentát na prezidenta Kennedyho), obdiv některým jevům nebo programům tzv. "pražského jara", obdiv a úcta k T. G. Masarykovi aj. Během šedesátých let jsem dostal z několika amerických center publikace sborníků z filosofie a metodologie vědy, zejména práce H. Feigla, A. Papa, H. Reichenbacha, C. G. Hempela a dalších bývalých účastníků Vídeňského kruhu, kteří působili v USA.

Ještě v šedesátých letech jsem byl přizván a stal jsem se členem některých edičních rad, a to jak knižních edic (*Theory and Decision Library*), tak také časopisů (*Erkenntnis*). Byl jsem přizván k aktivní účasti v některých edicích, jejichž výsledkem byly dvě knižní práce v edici bostonské univerzity, řada příspěvků do knižních publikací z filosofie a metodologie vědy (šlo o knižní publikace k tématice informace a predikce ve vědě, vědeckého myšlení, filosofie techniky) a encyklopedické publikace k pojmům a principům systémů a řízení. Pro bližší seznámení české vědecké a akademické obce jsme s kolegou a přítelem K. Berkou a přáteli z oblasti logiky vydali ve volnějším a svobodnějším ovzduší šedesátých let české překlady prací několika filosofů a myslitelů ze sféry Vídeňského kruhu a analytické filosofie, zejména R. Carnapa, A. Tarského, B. Russella a dalších. Vedle logiků se stali podporovateli těchto metodologických iniciativ také reprezentanti a pokračovatelé pražských tradic lingvistického strukturalismu.

V atmosféře intelektuálního temna, kterou reprezentoval český překlad Krátkého filosofického slovníku z roku 1955, který přesně rozlišoval, koho uznávat nebo alespoň tolerovat, koho a co odmítat a také komu a jak spílat. Je třeba vysoce ocenit snahy a úsilí některých lékařských specialistů z lékařské fakulty Karlovy univerzity blíže se seznámit se zatracovanými „buržoazními iniciativami", které představovali průkopníci teorie informace, kybernetiky, sémantiky, teorie her a teorie rozhodování. Tak vznikly semináře, výklady a diskuse, které se původně konaly ve večerních hodinách ve fakultních místnostech na Kateřinské ulici. Zcela

soukromou a osobní záležitostí byla také pražská návštěva zakladatele kybernetiky Norberta Wienera, který přijel do Prahy jako turista a který zde krátce pobýval již dávno před válkou, když byl na krátkém studijním pobytu u německých matematiků. Jeho otec L. Wiener jako profesor Harvardské univerzity se dobře znal s T. G. Masarykem.

Moudrost některých všestranně vědecky orientovaných lékařů jsem pochopil a ocenil nejen na diskusích o nových a stimulujících proudech vědy, ale také na řadě diskusí a rozhovorů z kritického období tzv. pražského jara. Když mi na počátku léta roku 1968 oznamoval tehdejší rektor Karlovy univerzity prof. MUDr. O. Starý, že jsem navrhován řádným profesorem, zdůraznil, že univerzita musí být reprezentována všemi významnými filosofickými proudy, poukázal na to, že jde nejen o to, co bylo tehdy označováno jako „novopozitivismus", ale jde také o fenomenologii a reformní marxismus a tudíž také o profesorská jmenování J. Patočky a K. Kosíka.

K přemetům a zásadním změnám v postech a projevech oficiální a monopolní ideologie patřily jak formy zatracování a odsuzování, tak také přehnané vychvalování a poklonkování těm, kteří sloužili monopolní moci a její ideologii, zejména těm, kteří sloužili jako ideologičtí arbitři a rozhodčí. Zatracení jsem prožil koncem padesátých let na velkém shromáždění na univerzitě, které zajišťovali dva pracovníci tzv. „vokovické Sorbony" (což bylo tehdy běžné a ironické označení vysoké školy ústředního výboru vládnoucí komunistické strany) na velkém shromáždění pražských filosofů a pracovníků blízkých oborů na Filosofické fakultě. Své názory museli vyjádřit ti, kteří si chtěli zachovat svá místa. Nesouhlas s předloženým odsudkem vyjádřili pouze dva přítomní, profesor O. Zich a jediná pracovnice z Filosofického ústavu Akademie věd. Za trest zrušili tehdejší katedru logiky, jejíž pracovníci se odmítli tohoto veřejného odsouzení účastnit.

Můj přechod do Ústavu teorie informace znamenal opuštění atmosféry kontroly pomocí strachu a vstup do živé a plodné atmosféry hledání, živých diskusí a změnilo významně mou osobní situaci. Již tehdejší ředitel a vědecký sekretář Akademie J. Kožešník mě uvítal sympaticky, přirozeně jen ve vzájemném rozhovoru: „Jana Husa upálili a ty zde můžeš klidně pracovat." Mohl jsem navázat na slavnou práci R. Carnapa o sémantické teorii informace, kterou napsal se svým žákem a asistentem Y. Bar-Hillelem. (Ten pak mě v roce 1964 pozval k přednáškám a účasti na konferenci na Hebrejské univerzitě v Jeruzalémě, kde byl profesorem. Později jsme se setkali na filosofickém kongresu ve Vídni v roce 1968, kde byl předsedou jedné z kongresových sekcí.) Úspěšnému a stimulujícímu prostředí také prospělo, že tématika teorie informace, informačních procesů i rozhodovacích postupů mají mnoho obecných a tedy také filoso-

fických dimenzí. Jde nejen o to, že míru informace lze chápat a také koncipovat jako negativní entropii, že rozhodování je možno chápat jako vyhledání, posouzení a volbu možných a přijatelných alternativ, že neplatí známý výrok (neprávem přisuzovaný A. Einsteinovi), že „přece Pánbůh kostky nehází“ a není vždy možné nebo nezbytné hledat „skryté parametry“.

Shrnutím některých mých výsledků o možnostech využití sémantické informace je studie „Some methods of Information Evaluations of Scientific Results“, která vyšla v časopise *Computers and Artificial Inteligence*, č. 5, 1986, s. 185–194. Tato studie byla také přetištěna v rozšířené (americké) verzi knihy *Problems of Semantics* vydané universitou v Bostonu i v české verzi vydané Karlovou univerzitou v roce 2006.

Iniciativy vyvolané a rozvíjené různými proudy a centry analytické filosofie nelze přirozeně omezit jen na centra spojené s městy Vídeň, Praha a Berlín, s dvojicí Lvov a Varšava, ale jsou spojena s řadou dalších jmen významných myslitelů anglosaského světa, z nichž rozhodně nelze pominout jména B. Russell, A. J. Ayer, Rakušany L. von Bertalanffy, L. Wittgensteina, Fina G. H. von Wrighta a mnohé další, tradičně považované spíše za „sólisty“. Nicméně i věda a filosofie jsou podobně jako hudba také dílem významných sólistů, zejména mají-li své žáky a pokračovatele.

2. Významné přínosy a stimulace hlavních směrů analytické filosofie

Při posouzení a rozboru hlavních výsledků důležitých směrů a proudů analytické filosofie se nevyhneme otázce, co významného a podnětného tyto směry přinesly soudobému vědeckému myšlení a čím přispěly k rozvoji vědeckých metodologií. Nejde přirozeně jen o jediný, zvláště specifický směr, kterým je nesporně Vídeňský kruh. Do okruhu zdrojů i kolébek významných nových iniciativ a podnětů patří centra a skupiny tzv. Lvovsko-Varšavské školy, skupiny pražského strukturalismu v lingvistice, v literárních oblastech a estetice. Lze také uvažovat o dalších iniciativních směrech všech zemí střední Evropy, jejichž představitelé byli nuceni odejít a uchýlit se na západ Evropy a většinou ještě dále přes Atlantik do Ameriky. (Zajímavý pohled na tento přesun intelektuálních iniciativ poskytuje kniha R. Mattessiche nazvaná *Instrumental Reasoning and Systems Methodology* vydaná v edici *Theory and Decisions Library* v roce 1978.)

S konceptuálními a metodologickými prostředky spojenými se směry a proudy analytické filosofie je spojena řada důležitých akcentů na pozná-

vací a rozhodovací prostředky uplatňované v intelektuálních sférách lidských činností v oblastech poznání, vzdělání a společenského, ekonomického i technického rozvoje. Jde zejména o tyto akcenty a postupy:

- akcenty na *analytický přístup* požadující hlubší pohled na geneze znalosti, na součástky, prvky a části větších celků, systémů nebo komplexů spojených se zřetězením dílčích a často i různorodých prvků,

- potřeby přesného *jazykového vyjádření*, pojmových prostředků a struktur jazykového provozu,

- pozornost věnovaná *koncepcím, tvorbě i využití znalostí* včetně osvojení, potvrzení a aplikací znalostí, tedy informačním procesům spojených se znalostí, poznáním, ověřovacím a aplikačním procesům,

- stanovení nároků na *subjekty činností* ve sférách získání, ověření i využití znalostí.

Analytický přístup je starou tradicí i dědictvím nejstarších kroků vědy. Člověk byl vždy zvědav, z čeho matka Příroda tvoří svá díla, naučil se rozlišovat prvky nebo dílčí složky i způsoby i podoby jejich zřetězení tak, aby vznikaly nové struktury garantující genezi nejen nových celků, ale také nových vlastností a žádoucích funkcí. Již Newton rozlišil *corpora* a *vires impressae*, jejich status (*quiescendi vel movendi*) a tím také strukturu vzniklou zřetězením nominální fráze a verbální fráze.

Vedle analytického přístupu je jak pro komunikační činnosti a využití jazykového provozu, tak také pro širokou a rozmanitou oblast praktických činností důležité spojení, ať již máme na mysli také spojení reálných prvků, stavů, procesů nebo funkcí. Nové struktury, celky nebo komplexy vytvořené jistým a také přípustným a proveditelným typem zřetězení původně oddělených prvků, složek nebo budoucích součástí, může zajistit nový význam nebo novou funkci sdělení. (R. Carnap v těchto souvislostech poukazoval na spojení slov a výrazů, které charakterizoval jako „významové postuláty“.)

Analytický přístup je důležitý nejen pro lepší poznání, pochopení i vysvětlení dění, procesů i změn, které probíhají kolem nás a v nás, našem životě i v naší činnosti. Je proto klíčovým a stimulujícím faktorem lidské činnosti, našich záměrů, přání i cílové orientace všech podob a typů kognitivních i kreativních činností. To pochopitelně také zahrnuje sféry tvorby i využití světa našich děl a tedy využití světa našich artefaktů. To také vysvětluje, proč všechna centra a skupiny i školy analytické filosofie a analytického myšlení věnovaly velikou pozornost komunikačním procesům, jazyku i jazykového provozu. Ostatně právě v těchto souvislostech platí známá věta slavného Wittgensteinova *Traktátu*, „Worüber man nicht sprechen kann, darüber mass man schweigen“.

Tématika diskusí, zájmů a pozorností rozvíjená na diskusích center analytické filosofie, filosofie vědy, základů matematiky a moderní

matematické logiky vytvářela příznivé prostředí pro integraci i spolupráci různých oblastí vědy pro hledání mostů a dalších společných prostorů dříve přísně oddělovaných oborů a disciplín, šlo o různé formy expanze matematiky, numerických, kvantových a probabilistických přístupů do různých oborů, které byly dosud doménou ryze verbálních projevů. Pocítil jsem to velmi výrazně, když jsem byl koncem padesátých let vyobcován z filosofie a humanitních oborů, v nichž tehdy vládl monopol jediné povolené a neomylné ideologie, a nalezl jsem dobré přijetí a uznání v exaktních oblastech matematiky i techniky. Uvítal jsem proto pozvání členů redakce časopisu *Literární noviny* napsat „něco" o vztazích exaktních, přírodovědných a humanitních oborů. Esej s latinským názvem *Humanum et naturele* vyšla v létě roku 1965 v časopisu *Literární noviny*. Podobný duch vzájemných vztahů a respektu dominoval již v diskusích o kybernetice a s ní spjatých tematických oblastech na lékařské fakultě a později v diskusích a referátech organizovaných kybernetickou komisí, která se později přeměnila v uznávanou vědeckou společnost. Pozoruhodná a nesporně také velice prospěšná pro tyto diskuse i jejich tématiku byla poměrně velká účast lékařů.

Tématika a orientace výzkumu analytické filosofie nebo filosofie vědy měla velmi blízko a také prakticky ovlivnila vznik a rozvoj toho okruhu, který býval charakterizován jako „věda o vědě" nebo výzkum vztahů vědy, techniky a společnosti. V centru pozornosti byla také sféra charakterizovaná jako „vědní politika", s níž byla svazována také orientace cílů, směřování i preference podporovaných a grantově zajištěných témat. Tato tématika se rozvíjela poměrně rychle v šedesátých letech i jako důležitá mezinárodní problematika s podporou mezinárodních organizací, například organizace UNESCO. Ještě výrazněji se tyto zájmy i tendence projevily po vzniku Evropské unie. Podporovaná byla zejména výměna uznávaných profesorů, zvláště pro účely postgraduálních studií a tedy pro přípravu doktorandů a budoucích vědeckých pracovníků. Tyto proudy také potvrdily potřebu obecně dostupného mezinárodního jazyka vědy. V řadě evropských zemí se již stalo samozřejmostí, že vyšší úrovně studia, na nichž je ovšem vždy mnoho zahraničních studentů a uchazečů, probíhají v angličtině. Pro dosažení a uznání výsledků ve všech oblastech vědy a výzkumu se stala publikace výsledků, a to především publikace v mezinárodně uznávaných edicích knižních a časopiseckých nezbytným a také jedině uznávaným předpokladem dosažení jistého stupně kvalifikace a s ní spojené kompetence. (V těchto souvislostech jde o publikace v tzv. peer reviews. Také členství v edičních radách takových časopiseckých nebo knižních edic je považováno za vysoké a mezinárodně uznávané ocenění).

Důležitým rysem a také prospěšnou výhodou analytického myšlení a usuzování je to, co by bylo možno nazvat odporem vůči vidění světa jen ve světle vlastních zdrojů, vlastního vidění a slyšení. K takovým bariérám nebo lépe omezením jsme vlastně odsouzeni všichni. Ještě horší je to, když taková omezení spoluvytváří fundamentalistická ideologie. Nepochybně každý člověk zažil kolem sebe osoby, které trpí sebejistotami vlastních názorů a postojů, pro které existuje jen to, co samy vědí a znají. Proto je důležité to, co obvykle nazýváme zvědavostí, vidět a vědět více a lépe. Současně však platí, že při návrzích, uvažování, posouzení svých kroků a to kroků intelektuální i materiální povahy, nemáme žádné apriorní garancie očekávaných důsledků a dopadů. Jinak řečeno, je třeba nahlížet takové kroky v širších souvislostech, a to nejen věcných, ale také prostorových, časových a některých dalších hodnotových kritérií.

Tento způsob posuzování, navrhování a rozhodování vedl k vytvoření některých nových a důležitých tematických oblastí vědy, řízení a rozhodování. Jde zejména o ohledy na možné ekologické, zdravotní, technické i ekologické dopady, tedy o péči o životní prostředí, zdravotní ohrožení, omezení svobody a lidských práv občanů, respektive také o respektování toho, co jeden ze zakladatelů analytické filosofie v Berlíně (odkud byl nucen uprchnout a emigrovat) H. Reichenbach nazval „směrem času". (K výročí jeho narození pořádali berlínští kolegové setkání a vyšla kniha příspěvků k tomuto setkání s účastí nejen německých, ale také účastníků i autorů z řady dalších zemí i mou osobní účastí k tématice technického času navazující na dílo H. Reichenbacha.)

Vnesení ohledů na směr, na povahu časového rytmu, ohledů na délku časových nároků některých důležitých intervalů, na meze jejich spolehlivého zajištění jsou důležitou složkou jak individuálního a zcela osobního rozhodování, tak také rozhodování některých společenských akcí, například velkých staveb, významných investic apod.

3. Analytická filosofie a jazyková komunikace

Průkopníci analytické filosofie a tedy také filosofie vědy významně přispěli k analýze sdělovacích procesů a tedy také k osvětlení povahy a funkcí jazyka a jazykové komunikace a také k tvorbě tematické oblasti, která může být označována jako filosofie jazyka. Proto bylo důležité rozlišit jazyk jako soustavu slovních znaků a souborů pravidel sémantické, syntaktické a pragmatické povahy a to, co bylo označeno jako „metajazyk", tj. vyjádření o strukturách a funkcích jazyka.

Toto rozlišení vyslovil A. Tarski, jeden ze zakladatelů lvovsko-varšavské školy. Týž autor předložil také důležité specifikace pojmů „pravda",

logické vyplývání a další důležité výsledky. Na významnou úlohu syntaxe ukázal R. Carnap ve své práci o logické syntaxi jazyka. Podobně důležité bylo upozornění na velký význam syntaktické konektivity, tj. vzájemnou souvislost slov, jejich typů i podob v zřetězení slov, na již úlohu poukázal jiný představitel lvovsko-varšavské školy K. Ajdukiewicz.

Úsilí o zřetelnost, významovou přesnost a také o kvalitní a spolehlivé interpretační předpoklady jazyka, kterým vyjadřujeme výsledky poznání, zjištění a potvrzení zjištěných závěrů, patřilo vždy k dobrým tradicím i cílovým orientacím všech proudů a směrů, které se hlásí k tradicím středoevropských ohnisek a zdrojů stimulujících iniciativ analytické filosofie nebo filosofie vědy.

Vedle jazyka a jazykového provozu měly analytická filosofie a filosofie vědy vždy velmi těsný a vzájemně se prostupující vztah k logice a to především k moderní nebo matematické logice. Centrum této pozornosti tvoří vztahy a souvislosti spojené s procedurami logického vyplývání, s možnostmi i podobami odvození, a to zejména v souvislostech zpracování dat různé povahy i provenience, s generováním závěrů i s posuzováním jejich přijatelnosti a spolehlivosti.

Analytická filosofie obrátila pozornost na kognitivní procedury spojené s operacemi tvorby generalizací a jejich využití v těch oblastech, které operují jak generalizacemi, tj. tzv. nomologickými větami, tak také souborem singulárních empirických zjištění. Jde zejména o procedury vysvětlení, predikce, o struktury lékařské diagnózy, navrhování terapie, o analýzy problémových situací a návrhy, plány a projekty jejich řešení. Tuto tématiku otevírala zejména práce C. G. Hempela, na kterou navázal také autor tohoto textu. (Také C. G. Hempel navštívil Prahu, ozval se a absolvovali jsme rozsáhlou procházku Prahou, zčásti také diskusí o našich společných zájmech. Turistické návštěvy byly ovšem za dob totality častou formou přímých a zcela osobních kontaktů, umožňovaly transfer rukopisů, textů, které pak mohly být publikovány ve svobodném světě. (Největší zásluhy o transfer mých textů a jejich publikaci měli nizozemský editor D. Reidel a německý kolega profesor F. Rapp.)

Byly to zejména dalekosáhlé civilizační změny, široký rozvoj a rostoucí rozšíření informačních technologií, které umožnily obrovské rozšíření okruhů i dostupných horizontů jazykové komunikace a tím i jejich funkce a možnosti vzájemných intelektuálních i znalostních kontaktů. Důležitou úlohu v těchto souvislostech měly kratší i delší období jistého uvolnění, zejména v šedesátých letech. Již v roce 1964 jsem byl pozván žákem a spolupracovníkem R. Carnapa a spoluautorem jeho významné studie o sémantické informaci na konferenci na Hebrejské univerzitě v Jeruzalémě profesorem Y. Bar-Hillelem. Mimokonferenční setkání umožnilo řadu zajímavých osobních seznámení s řadou reprezentantů

center analytické filosofie, logiky a metodologie vědy, zejména s A. Tarski. Hlásil se ke mně také československý emigrant a za druhé světové války účastník zahraničního odboje S. Körner, profesor na univerzitě v Bristolu ve Velké Británii. Jeho žena byla mou spolužačkou ze základní školy a prvních tříd gymnázia ve Znojmě, která se zachránila rychlou emigrací v roce 1938 na doporučení mého otce.

Pro tematickou a metodologickou blízkost a vzájemné vztahy a podněty byly vždy důležité vazby k tematice a k problémům poznávacích procedur, k sférám zpracování a využívání dat i znalostí, jejich ověření, potvrzení i aplikace. To se projevilo zcela zřetelně v tvorbě přístupů, metod i výsledků všech tematických oblastí informatiky, informačních technologií i způsobů využití těchto technologií. To potvrzuje skutečnost, že myšlenky a principy kybernetiky, jejichž autorem byl Norbert Wiener, se zrodily na semináři filosofie vědy, kde vznikla známá a slavná anticipace kybernetiky, tj. práce *Behavior, Purpose and Teleology* trojice autorů W. Rosenblueth, N. Wiener, J. Bigelow, z nichž dva vycházeli ze znalostí fyziologie a medicíny a N. Wiener byl matematik. Již to prokazuje, že analytická filosofie vědy se může podílet na stavbě mostů mezi obory zabývajícími se různou tématikou. Analytická filosofie a její metodologické složky se podílejí na využití prostředků informačních technologií při zpracování zjištěných výsledků, na generování důležitých vztahů a závislostí empirických zjištění na tvorbě generalizací a jejich ověření a potvrzení.

4. Několik osobních poznámek

Analytická filosofie, metodologie vědy a s ní spjatá moderní logika se netěšily přízni představitelů a příznivců fundamentalistické ideologie a tedy i monopolní ideologie evropských totalitních diktatur. Jejich příkladem je nacistická a rasistická ideologie německé Třetí říše nebo fašistické ideologie v Itálii a Španělsku a komunistické ideologie v zemích sovětského bloku. Bylo obrovským štěstím, že se velké části tvůrčích osobností středoevropských center a míst zdrojů těchto významných vědeckých iniciativ podařilo ještě před vypuknutím druhé světové války emigrovat do anglosaské sféry, kde se těmto vědcům a vysokoškolským učitelům nejen podařilo nalézt dobré přijetí, ale také vytvořili velké skupiny nadaných žáků a pokračovatelů.

Totalitní režimy a jejich ideologičtí arbitři prováděli různé honičky a organizovali ideologické zatracení těch, kteří nevyhovovali jejich ideologickým principům. Ideologická kritika a vyhazov z univerzity nebo akademie byl také spojován s odebráním cestovního pasu a se zákazem

publikací. Existovala však poměrně rozsáhlá solidarita zahraničních kolegů, kteří jako turisté navštěvovali Prahu a mohli vyhledat své kolegy. Jak již bylo uvedeno, takto byl zajišťován transfer mých prací, které vydávala univerzita v Bostonu a další práce z filosofie vědy a techniky. Jako člen edičních rad některých mezinárodních edicí jsem dostával zahraniční literaturu v uvedených nebo blízkých tematických oblastech. Tato solidarita byla také skvělým dokladem spojení této tématiky a jejich autorů a průkopníků s nejlepšími lidskými hodnotami.

Vědecké pojetí světa – Vídeňský kroužek*

Vydáno Společností Ernsta Macha

Věnováno Moritzi Schlickovi

Předmluva

Na počátku roku 1929 obdržel Moritz Schlick velice lákavé povolání do Bonnu. Po delším váhání se rozhodl zůstat ve Vídni. Jak on tak i my jsme si při této příležitosti poprvé uvědomili, že existuje něco jako *Vídeňský kroužek* vědeckého pojetí světa, který tento způsob myšlení ve své společné práci dále rozvíjí. Kroužek nemá pevnou organizaci; jeho členové jsou lidé stejného základního vědeckého postoje. Každý vyzdvihuje to, co nás spojuje, a nikdo nechce narušit soudržnost svým specifickým zaměřením. V mnohém může jeden zastupovat druhého a druhý může pokračovat v práci prvního.

Vídeňský kroužek se snaží navázat spojení s lidmi stejně smýšlejícími a působit na ty, jejichž postoje jsou vzdálenější. Tato snaha je vyjádřena spoluprací v rámci *Společnosti Ernsta Macha*; předsedou společnosti je Schlick a v předsednictvu je zastoupeno několik členů Schlickova kroužku.

Společnost Ernsta Macha spolu se Společností pro empirickou filosofii (Berlin) pořádají 15. a 16. září 1929 *Konferenci o epistemologii exaktních věd*, jež je spojena s konáním sjezdu Německé fyzikální společnosti a Německé matematické společnosti. Vedle speciálních otázek mají být diskutovány i základní problémy. Při příležitosti této konference jsme se rozhodli zveřejnit předkládaný spis o Vídeňském kroužku vědeckého pojetí světa. Spis bude předán Moritzi Schlickovi v říjnu 1929 při jeho návratu z hostování na Stanfordské univerzitě v Kalifornii jako znamení vděčnosti a radosti z jeho setrvávání ve Vídni. Druhá část sešitu obsahuje bibliografii, která byla vytvořena ve spolupráci se zúčastněnými.

*Německý originál manifestu *Wissenschaftliche Weltauffassung. Der Wiener Kreis* vyšel tiskem poprvé v roce 1929 zásluhou Společnosti Ernsta Macha (Wien: Artur Wolf Verlag). Naposledy byl vydán v roce 2012 Friedrichem Stadlerem a Thomasem E. Uebelem (Wien: Springer-Verlag). Jim také patří poděkování za laskavé svolení publikovat zde český překlad. Tento text je revidovanou verzí překladu Jiřího Fialy, který byl vydán v rámci *první čítanky Analytické filosofie* v roce 1999 (Plzeň: ZČU, str. 14–37) a v roce 2005 (Plzeň: OPS/ZČU, str. 14–37). Podobně jako v původním Fialově překladu i zde je vynechána souhrnná bibliografie, jež je součástí německého originálu. Naproti tomu jsou zde vypuštěny Fialovy poznámky a doplněn překlad předmluvy. (Pozn. S. Dach a R. Schuster.)

Má poskytnout přehled o problémových oblastech, v nichž pracují členové nebo příznivci Vídeňského kroužku.

Ve Vídni, v srpnu 1929.

Za Společnost Ernsta Macha:

Hans Hahn
Otto Neurath
Rudolf Carnap

I. Vídeňský kroužek vědeckého pojetí světa

1. Prehistorie

Mnoho lidí tvrdí, že *metafyzické* a teologizující myšlení dnes opět sílí nejen v životě, ale i ve vědě. Jedná se při tom o nějaký všeobecný jev, nebo pouze o proměnu, která je omezena jen na určité kruhy? Tvrzení samotné snadno potvrdíme pohledem na témata přednášek na univerzitách a na názvy filosofických publikací. Současně však mohutní i protikladný duch osvícenství a *antimetafyzického zkoumání faktů*, přičemž si je vědom své existence a svého úkolu. V některých kruzích je způsob myšlení, zakládající se na zkušenosti a oproštěný od spekulace, živější než kdy jindy, posílen právě tímto zvedajícím se odporem.

Tento *duch vědeckého pojetí světa* je živý ve výzkumné práci všech odvětví zkušenostní vědy. Systematicky promýšlen a zásadně zastáván je však jen malým počtem vůdčích myslitelů, kteří jsou jen zřídka kdy s to shromáždit kolem sebe kroužek stejně smýšlejících spolupracovníků. Antimetafyzické snahy nacházíme především v *Anglii*, kde ještě stále žije tradice velkých empiristů; zkoumání Russella a Whiteheada v logice a v analýze skutečnosti si získaly mezinárodní význam. V *USA* nabývají tyto snahy nejrozmanitějších podob; v jistém smyslu do toho lze počítat i Jamese. Nové *Rusko* plně usiluje o vědecké pojímání světa, byť zčásti opřené o starší materialistické proudy. V kontinentální Evropě můžeme najít soustředění produktivní práce směrem k vědeckému pojímání světa zvláště v *Berlíně* (Reichenbach, Petzold, Grelling, Dubislav a jiní) a ve *Vídni*.

To, že *Vídeň* byla zvláště vhodnou půdou pro takový vývoj, je historicky pochopitelné. V druhé polovině 19. století byl ve Vídni dlouho vládnoucím politickým směrem *liberalismus*. Jeho myšlenkový svět pocházel z osvícenství, empirismu, utilitarismu a anglického hnutí vol-

ného obchodu. Ve vídeňském liberálním hnutí stanuli na vůdčích pozicích učenci světového věhlasu. Zde byl pěstován antimetafyzický duch; připomeňme Theodora Gomperze, který přeložil Millova díla (1869–80), Sueße, Jodla a další.

Tomuto duchu osvícení je třeba děkovat za to, že Vídeň stanula v čele vědecky zaměřeného *lidového vzdělávání*. Ve spolupráci s Victorem Adlerem a Friedrichem Jodlem byl tehdy založen a rozvíjen spolek pro lidové vzdělávání. Známý historik Ludo Hartmann, jehož antimetafyzický postoj a materialistické pojetí dějin se projevili v celém jeho působení, zřídil „lidové univerzitní kurzy" a „lidový domov". Ze stejného ducha vzniklo také hnutí „Volné školy", které se stalo předchůdcem dnešní školní reformy.

V této liberální atmosféře žil Ernst Mach (nar. 1838), který byl ve Vídni jako student a jako soukromý docent (1861–64). Do Vídně se vrátil až ve stáří, kdy pro něj byla vytvořena vlastní profesura filosofie induktivních věd (1895). Obzvláště usiloval o to, aby empirická věda, v první řadě fyzika, byla očištěna od metafyzických myšlenek. Připomeňme jeho kritiku absolutního prostoru, jíž se stal Einsteinovým předchůdcem, dále jeho boj proti metafyzice věcí o sobě a proti pojmu substance, stejně tak jako jeho zkoumání výstavby vědeckých pojmů z posledních prvků, smyslových dat. V některých bodech mu nedal vědecký vývoj za pravdu, např. v jeho postoji proti atomistice a v jeho očekávání toho, že fyzika bude podpořena fyziologií smyslů. Podstatné body jeho pojetí však další vývoj zhodnotil kladně. Na Machově katedře pak působil Ludwig Boltzmann, který zastával výslovně empirické ideje.

Působení fyziků Macha a Boltzmanna na filozofické katedře ukazuje, že panoval živý zájem o epistemologické a logické problémy související se základy fyziky. Tyto problémy základů vedly i ke snahám o obnovu logiky. Těmto snahám byla ve Vídni připravena půda i ze zcela jiné strany Franzem Brentanem (1874 až 1880 profesor filosofie na teologické fakultě, později docent na filosofické fakultě). Brentano měl jako katolický duchovní pochopení pro scholastiku; navázal bezprostředně na scholastickou logiku a na Leibnizovy snahy o reformu logiky, zatímco Kanta a idealistické systematické filosofy nechával stranou. Pochopení, které měli Brentano a jeho žáci pro muže jako byl Bolzano (*Vědosloví* [*Wissenschaftslehre*] 1837) a další, kteří usilovali o přísné nové založení logiky, se projevovalo stále zřetelně. Zejména Alois Höfler (1853 až 1922) zdůraznil tuto stránku Brentanovy filosofie před shromážděním, v němž byli pod Machovým a Boltzmannovým vlivem silně zastoupeni přívrženci vědeckého pojetí světa. Ve *Filosofické společnosti* na univerzitě ve Vídni se konaly pod Höflerovým vedením četné diskuse o otázkách základů fyziky a příbuzných epistemologických a logických problémech.

Filosofická společnost vydala *Předmluvy a úvody ke klasickým dílům mechaniky* [*Vorreden und Einleitungen zu klassischen Werken der Mechanik*] (1899), jakož i jednotlivé Bolzanovy spisy (Höflerem a Hahnem, 1914 a 1921). Ve vídeňském Brentanově kroužku žil (1870–1882) mladý Alexius von Meinong (později profesor v Grazu), jehož *Teorie předmětů* [*Gegenstandstheorie*] alespoň prokazuje jistou příbuznost s moderními teoriemi pojmů a jehož žák Ernst Mally (Graz) rovněž pracoval v oblasti logistiky. Také spisy mladého Hanse Pichlera (1909) pocházejí z těchto myšlenkových kruhů.

Přibližně současně s Machem působil ve Vídni jeho vrstevník a přítel Josef Popper-Lynkeus. Vedle jeho fyzikálně technických výkonů je třeba zmínit jeho velkorysá, i když nesystematická filosofická zkoumání (1899) a racionalistický hospodářský plán (všeobecná vyživovací povinnost, 1878). Sloužil vědomě duchu osvícenství, jak dosvědčuje i jeho kniha o Voltairovi. Odmítání metafyziky sdílel s mnohými jinými vídeňskými sociology, např. s Rudolfem Goldscheidem. Pozoruhodné je, že i v oblasti *národního hospodářství* byla ve Vídni pěstována školou marginalizmu přísná vědecká metoda (Carl Menger, 1871). Tato metoda byla používána v Anglii, Francii a Skandinávii, nikoli však v Německu. Ve Vídni však byla se zvláštním důrazem pěstována a budována i marxistická teorie (Otto Bauer, Rudolf Hilferding, Max Adler a jiní).

Tyto vlivy z různých stran měly ve Vídni především na přelomu století za následek, že větší počet lidí hojně a horlivě diskutoval o obecnějších problémech v těsné souvislosti se zkušenostní vědou. Šlo především o epistemologické a metodologické problémy fyziky, např. Poincarého konvencionalismus, Duhemovo pojetí cíle a struktury fyzikálních teorií (jeho překladatelem byl Vídeňák Friedrich Adler, Machův přívrženec, tehdy soukromý docent fyziky v Curychu); dále i o problémy základů matematiky, problémy axiomatiky, logistiky apod. Uvádíme zde jmény zastánce některých linií v dějinách vědy a filosofie, jejichž díla byla zde čtena a projednávána.

1. *Pozitivismus a empirismus*: Hume, osvícenství, Comte, Mill, Richard Avenarius, Mach.

2. *Základy, cíle a metody empirické vědy* (hypotézy ve fyzice, geometrie atd.): Helmholtz, Riemann, Mach, Poincaré, Enriques, Duhem, Boltzmann, Einstein.

3. *Logistika a její použití na skutečnost*: Leibniz, Peano, Frege, Schröder, Russell, Whitehead, Wittgenstein.

4. *Axiomatika*: Pasch, Peano, Vailati, Pieri, Hilbert.

5. *Eudaimonismus a pozitivní sociologie*: Epikúros, Hume, Bentham, Mill, Comte, Feuerbach, Marx, Spencer, Müller-Lyer, Popper-Lynkeus, Carl Menger (otec).

2. Kroužek kolem Schlicka

V roce 1922 byl z Kielu do Vídně povolán Moritz Schlick. Jeho působení dobře zapadlo do historického vývoje vídeňské vědecké atmosféry. Sám původně fyzik, probudil k novému životu tu tradici, která byla započata Machem a Boltzmannem a v určitém smyslu dále rozvíjena antimetafyzicky zaměřeným Adolfem Stöhrem. (Ve Vídni následovali po sobě: Mach, Boltzmann, Stöhr, Schlick; v Praze: Mach, Einstein, Ph. Frank). Během let se kolem Schlicka soustředil *kroužek*, který spojoval různá úsilí ve směru vědeckého pojímání světa. Tato koncentrace vedla k plodnému vzájemnému podněcování. Členové kroužku, pokud něco publikovali, jsou uvedeni v bibliografii. Žádný z nich není tzv. uvčistým filosofem, nýbrž všichni působili v jednotlivých vědních oborech. Pocházejí z různých vědeckých odvětví a původně z různých filosofických zaměření. Během let se však ukazovala vzrůstající jednota, která byla důsledkem specificky vědeckého postoje: „Co se vůbec dá říci, dá se říci jasně“ (Wittgenstein); při rozdílnosti názorů je konečně shoda možná, tudíž i žádoucí. Stále zřetelněji se ukazovalo, že cílem všech není jen postoj bez metafyziky, nýbrž postoj antimetafyzický.

I v postoji vůči otázkám života se ukazuje pozoruhodná shoda, i když tyto otázky se nenacházejí v popředí témat zkoumaných kroužkem. Tyto postoje mají totiž s vědeckým pojímáním světa příbuznost užší, než by se na první pohled mohlo zdát z hlediska čistě teoretického. Tak např. snahy o nové utváření hospodářských a společenských vztahů, o sjednocení lidstva, o obnovu školy a výchovy, ukazují vnitřní souvislost s vědeckým pojetím světa; ukazuje se, že členové kroužku přitakávají těmto snahám, sledují je se sympatiemi a někteří je i rázně podporují.

Vídeňský kroužek se nespokojuje s tím, že bude vykonávat kolektivní práci jakožto uzavřený okruh. Snaží se také sbližovat se s živoucími hnutími současnosti, pokud se stavějí přátelsky k vědeckému pojetí světa a odvracejí se od metafyziky a teologie. *Společnost Ernsta Macha* je dnes tím místem, z něhož může kroužek oslovovat širší veřejnost. Tato společnost chce, jak hlásá ve svém programu, „podporovat a šířit vědecké pojetí světa. Bude pořádat přednášky a vydávat zprávy o aktuálním stavu vědeckého pojetí světa, aby tím ukázala význam exaktního bádání pro sociální a přírodní vědy. Tak by se měly utvářet myšlenkové nástroje moderního empirismu, jichž je zapotřebí i pro veřejné a soukromé utváření života.“ Volbou svého názvu vyznačuje

společnost své základní zaměření: věda bez metafyziky. Tím však tato společnost neprohlašuje nějaký programový souhlas s jednotlivými Machovými naukami. Vídeňský kroužek je přesvědčen, že svou spoluprací se Společností Ernsta Macha plní aktuální požadavek: vytvářet myšlenkové nástroje pro všední den, pro všední den učenců, ale i pro všední den všech, kteří nějak spolupracují na vědomém utváření života. Intenzita života, patrná ve snahách o racionální přetváření společenského a vědeckého řádu, proniká i hnutím vědeckého pojetí světa. Současné situaci ve Vídni odpovídá, že při založení Společnosti Ernsta Macha v listopadu 1928 byl jejím předsedou zvolen Schlick, kolem nějž se nejsilněji soustředila společná práce v oblasti vědeckého pojímání světa.

Schlick a Ph. Frank společně vydávají edici *Spisy k vědeckému pojetí světa* [*Schriften zur wissenschaftlichen Weltauffassung*], v níž jsou převážně zastoupeni členové Vídeňského kroužku.

II. Vědecké pojetí světa

Vědecké pojetí světa není ani tak charakterizováno vlastními tezemi, jako spíše zásadním postojem, hledisky a výzkumným směrem. Cílem je *jednotná věta*. Usiluje se o to, aby se výsledky jednotlivých badatelů v různých vědních oblastech dostaly do vzájemných souvislostí a do souladu. Z tohoto vytyčeného cíle vyplývá důraz na *kolektivní práci* a odtud také důraz na to, co je intersubjektivně uchopitelné; odtud vychází hledání neutrálního formálního systému, symboliky osvobozené od škváry historických jazyků; odtud dále hledání všeobsáhlého systému pojmů. Usiluje se o čistotu a jasnost, temné dálky a nevyzpytatelné hlubiny jsou odmítány. Ve vědě nejsou žádné „hlubiny“, vše je na povrchu: vše prožívané tvoří složitou, ne vždy přehlednou a často jen v jednotlivostech uchopitelnou síť. Vše je člověku dostupné; a člověk je mírou všech věcí. Zde se ukazuje spřízněnost se sofisty, nikoli s platoniky; s epikurejci, nikoli s pythagorejci; se všemi, kteří zastávají pozemské bytí a pozemskost. Vědecký světový názor nezná *žádné neřešitelné záhady*. Vyjasnění tradičních filosofických problémů vede k tomu, že se zčásti demaskují jakožto pseudoproblémy, zčásti se promění na problémy empirické a tím spadající pod soud zkušenostní vědy. V tomto vyjasňování problémů a výroků spočívá úloha filosofické práce, nikoli v budování vlastních „filosofických“ výroků. Metoda tohoto vyjasňování je metodou *logické analýzy*, o níž Russell říká, že „pronikla postupně do filosofie kritickým zkoumáním matematiky. Domnívám se, že představuje týž druh pokroku, jaký byl do fyziky zaveden Galileim: jednotlivé ověřitelné

výsledky nastupují na místo netestovatelných obecností, doporučovaných pouze jistým odvoláváním se na fantasii.“[1]

Tato *metoda logické analýzy* je tím, čím se nový empirismus a pozitivismus liší podstatně od dřívějšího empirismu a pozitivismu, jež byly více biologicko-psychologicky orientované. Tvrdí-li někdo, že „Bůh neexistuje“, „prazákladem světa je nevědomí“, „v živých bytostech existuje entelechie jakožto vůdčí princip“, neřekneme mu: „to, co říkáš, je nepravdivé“, nýbrž se ho zeptáme: „co svými výroky míníš?“ A pak se ukáže, že existuje ostrá hranice mezi dvěma druhy výroků. K jedněm patří ty výroky, které činí empirická věda; jejich smysl lze zjistit pomocí logické analýzy, přesněji: pomocí převedení na nejjednodušší výroky o empiricky daném. Ostatní výroky, k nimž náleží výše citované, se ukáží být zcela bez významu, bereme-li je tak, jak je míní metafyzici. Často lze tyto výroky číst tak, že se z nich stanou výroky empirické; pak ovšem ztrácejí ten pocitový obsah, který je právě pro metafyziky podstatný. Metafyzici a teologové věří, sami sebe nechápajíc, že svými výroky něco vypovídají, že vyjadřují nějaký stav věcí. Analýza však ukazuje, že tyto věty neříkají nic, nýbrž jsou jen výrazem nějakého životního pocitu. Vyjádřit něco takového může jistě být významným úkolem v životě. Avšak adekvátním výrazovým prostředkem je zde umění, např. lyrika nebo hudba. Použije-li se místo toho jazykový háv nějaké teorie, pak tu hrozí nebezpečí, že se bude předstírat teoretický obsah tam, kde žádný není. Chce-li metafyzik nebo teolog zachovat obvyklé jazykové odění, musí si toho být jasně vědom a zřetelně dát najevo, že se nejedná o výklad, nýbrž o výraz, nikoli o teorii, sdělení nějakého poznatku, nýbrž o báseň či mýtus. Tvrdí-li nějaký mystik, že má zážitky nacházející se nad nebo za všemi pojmy, pak se s ním nelze přít. Ale nemůže o nich mluvit, neboť mluvit znamená uchopovat v pojmech, převádět zpět na vědecky začlenitelné fakty.

Vědecké pojetí světa odmítá metafyzickou filosofii. Jak se ale mají vysvětlit bludné cesty metafyziky? Tuto otázku lze klást z mnoha hledisek: psychologického, sociologického nebo logického. Zkoumání v psychologickém směru se nacházejí teprve v počátečním stádiu; zárodky hlubšího vysvětlení spočívají snad ve zkoumáních Freudovy psychoanalýzy. Stejně tak je tomu i se zkoumáními sociologickými; zmiňme teorii „ideologické nadstavby“. Na tomto otevřeném poli se vyplatí další výzkumy. Více rozvinuté je vyjasnění *logického původu metafyzických bludných cest*, zvláště pracemi Russella a Wittgensteina. V metafyzických teoriích a už i v kladení otázek se skrývají dvě základní logické chyby: příliš těsná vazba na formu *tradičních jazyků* a nejasnost

[1] Russell, Bertrand. 1914. *Our Knowledge of the External World*, str. 4. (Pozn. SD a RS).

logických výkonů myšlení. Obyčejný jazyk používá např. touž slovní formu, substantivum, jak pro věci („jablko“), tak pro vlastnosti („tvrdost“), vztahy („přátelství“), průběhy („spánek“); tím svádí k chápání funkčních pojmů jako pojmů pro věci (hypostazování, substancializace). Lze uvádět četné podobné příklady toho, jak jazyk svádí na bludnou cestu, které se staly pro filosofy stejně osudové.

Druhá základní chyba metafyziky spočívá v pojetí, podle nějž by mohlo *myšlení* vést samo od sebe, bez použití jakéhokoliv zkušenostního materiálu, k poznatkům, nebo že by alespoň mohlo z daných stavů věcí dospět usuzováním k novým obsahům. Logické zkoumání však vede k výsledku, že veškeré myšlení, veškeré usuzování nespočívá v ničem jiném, než v přechodu od jedněch vět k větám jiným, které neobsahují nic, co by už nebylo skryto v oněch větách (tautologické transformace). Není tudíž možné vyvinout metafyziku z „čistého myšlení“.

Tímto způsobem je pomocí logické analýzy překonána nejen metafyzika ve vlastním, klasickém smyslu slova, zvláště metafyzika scholastická a metafyzika systémů německého idealismu, nýbrž i skrytá metafyzika kantovského a moderního *apriorismu*. Vědecké pojetí světa nezná žádné nepodmíněně platné poznání z čistého rozumu, žádné „syntetické soudy a priori“, jako jsou ty, které jsou základem kantovské, a tím spíše veškeré před- a po-kantovské, ontologie a metafyziky. Soudy aritmetiky, geometrie, jisté principy fyziky, které Kant bral jako příklady apriorního poznání, budou probrány za okamžik. Právě v odmítnutí možnosti syntetického poznání a priori spočívá základní teze moderního empirismu. Vědecké pojetí světa zná jen zkušenostní věty o předmětech všeho druhu a analytické věty logiky a matematiky.

V odmítání otevřené metafyziky a skryté metafyziky apriorismu jsou všichni přívrženci vědeckého pojetí světa zajedno. Vídeňský kroužek však zastává nadto pojetí, že i výroky (kritického) *realismu* a *idealismu* o realitě a nerealitě vnějšího světa a psychiky jiných lidí, mají metafyzickou povahu, neboť podléhají týmž námitkám jako výroky staré metafyziky: jsou beze smyslu, neboť nejsou verifikovatelné, nejsou věcné. *Něco je „skutečné“ tím, že je začleněno do celkové výstavby zkušenosti.*

Intuici, metafyziky zvláště zdůrazňovanou jakožto zdroj poznání, vědecké pojetí světa vůbec neodmítá. Vyžaduje však, aby krok za krokem bylo provedeno dodatečné racionální zdůvodnění těchto intuitivních poznatků. Hledajícímu jsou dovoleny všechny prostředky. Nalezené však musí podstoupit přezkoušení. Odmítá se pojetí, které spatřuje v intuici vysoce hodnotný a do hloubky pronikající způsob poznání, který může sahat za smyslové zkušenostní obsahy a který by neměl být svazován těsnými pouty pojmového myšlení.

Vědecké pojetí světa jsme v podstatném charakterizovali *dvěma určeními. Za prvé* je *empirické a pozitivistické*: existuje jen zkušenostní poznání, které spočívá na bezprostředně daném. Tím je vedena hranice pro obsah legitimní vědy. *Za druhé* se vědecké pojetí světa vyznačuje používáním určité metody, totiž metody *logické analýzy.* Úsilí vědecké práce směřuje k dosažení cíle jednotné vědy použitím této logické analýzy na empirický materiál. Protože se smysl každého vědeckého výroku musí dát určit převedením tohoto výroku na výrok o daném, musí se i smysl každého jednotlivého pojmu, ať už náleží jakékoli vědní oblasti, dát určit postupným převedením pojmu na jiné pojmy, až nakonec na pojmy nejnižšího stupně, které se vztahují na dané samo. Kdyby se taková analýza provedla pro všechny pojmy, byly by tím začleněny do reduktivního systému, do „konstitučního systému". Zkoumání zaměřená na takový konstituční systém, „konstituční teorie", tvoří rámec, v němž se používá logická analýza vědeckého pojetí světa. Provádění takových zkoumání velmi brzy ukazuje, že tradiční, aristotelovsko-scholastická logika je pro tento účel zcela nedostačující. Teprve v moderní symbolické logice (*„logistice"*) se podařilo získat požadovanou ostrost definic pojmů a výroků a formalizovat intuitivní proces usuzování obyčejného myšlení, tj. dovést ho do přísné formy, která je automaticky kontrolována znakovým mechanismem. Zkoumání konstituční teorie ukazují, že k nejnižším vrstvám konstitučního systému patří pojmy psychických prožitků a kvalit vlastní mysli; nad nimi jsou uloženy fyzické předměty; z nich se pak konstituují předměty jiných myslí a nakonec předměty věd sociálních. Začlenění pojmů různých odvětví vědy do konstitučního systému je v hrubých rysech už patrné, zbývá však mnoho práce pro přesnější provedení. Ukázáním možnosti a formy celkového systému pojmů se stává patrným současně i vztah všech výroků k danému, a tím i forma výstavby *jednotné vědy.*

Součástí vědeckého popisu se může stát jen *struktura* (forma řádu) objektů, nikoli jejich „podstata". To, co spojuje lidi v jazyce, jsou strukturní formule; v nich se reprezentuje obsah společného poznání lidí. Subjektivně prožívané kvality – červeň, slast – jsou jako takové právě jen prožitky, nikoli poznatky; do fyzikální optiky patří jen to, co je v zásadě pochopitelné i pro slepého.

III. Problémové oblasti

1. Základy aritmetiky

Práce a diskuse Vídeňského kroužku se zabývají velkým množstvím různých problémů, jež pocházející z různých vědních odvětví. Snahou

je vnést do těchto různých problémových směrů systematickou jednotu a tím vyjasnit problémovou situaci.

Problémy základů aritmetiky nabyly zvláštního dějinného významu pro vývoj vědeckého pojetí světa tím, že to jsou ony, které daly popud k rozvoji nové logiky. Poté, co v 18. a 19. století prodělala matematika zvláště plodný vývoj, při němž se kladl větší důraz spíše na bohatství výsledků než na jemné ověření pojmového základu, se nakonec ukázalo toto ověření jako nezbytné, pokud neměla matematika ztratit proslavenou jistotu své výstavby. Toto ověření se stalo ještě naléhavějším, když se objevily určité rozpory, „paradoxy teorie množin". Brzy se muselo ukázat, že nejde jen o potíže v jedné oblasti matematiky, nýbrž o obecné logické rozpory, „antinomie", jež ukazovaly na podstatné chyby v základech tradiční logiky. Úkol odstranit tyto rozpory byl zvláště silným popudem k dalšímu rozvoji logiky. Tak se zde setkávala úsilí o *vyjasnění pojmu čísla* s vnitřní *reformou logiky.* Od Leibnize a Lamberta byla neustále živá myšlenka ovládnutí skutečnosti pomocí zvýšené ostrosti pojmů a deduktivní metody a dosažení této ostrosti pomocí symboliky, napodobující symboliku matematickou. Po Boolovi, Vennovi a dalších pracovali na tomto úkolu zvláště Frege (1884), Schröder (1890) a Peano (1895). Na základě těchto přípravných prací mohli Whitehead a Russell (1910) vybudovat souvislý systém logiky v symbolickém tvaru (*logistiku*), který nejen znemožnil rozpory staré logiky, nýbrž ji daleko překonal bohatstvím a praktickým využitím. Z tohoto logického systému odvodili pojmy aritmetiky a analýzy, aby tím poskytli matematice bezpečný základ v logice.

Při tomto pokusu o překonání krize základů aritmetiky (a teorie množin) však přetrvaly určité potíže, které dodnes nenalezly žádného uspokojivého definitivního řešení. V současné době se v této oblasti nacházejí tři protikladné směry: vedle Russellova a Whiteheadova „logicismu" stojí Hilbertův „formalismus", který pojímá aritmetiku jako hru s formulemi podle určitých pravidel, a Brouwerův „intuicionismus", podle nějž spočívají poznatky aritmetiky na dále neredukovatelné intuici jednoty dvojího. Rozpory mezi těmito třemi směry se ve Vídeňském kroužku sledují s velkým zájmem. Kam nakonec povede rozhodnutí je stále ještě v nedohlednu, v každém případě v něm bude spočívat i rozhodnutí o výstavbě logiky; proto je to důležité pro vědecké pojetí světa. Někteří se domnívají, že tyto směry si vůbec nejsou tak vzdálené, jak se zdá. Domnívají se, že podstatné rysy těchto tří směrů se v dalším vývoji navzájem sblíží, patrně s využitím dalekosáhlých myšlenek Wittgensteina, až se v konečném řešení sjednotí.

Pojetí, podle nějž má matematika tautologickou povahu, tedy pojetí spočívající na zkoumáních Russella a Wittgensteina, je zastáváno

i Vídeňským kroužkem. Je třeba zdůraznit, že toto pojetí není jen v protikladu k apriorismu a intuicionismu, nýbrž i ke staršímu empirismu (například Millovu), který chtěl v jistém smyslu odvodit matematiku a logiku experimentálně-induktivně.

V souvislosti s problémy aritmetiky a logiky se nacházejí také zkoumání o podstatě *axiomatické metody* obecně (pojmy úplnosti, nezávislosti, monomorfie, nevětvení apod.), jakož i tvoření systému axiomů pro určité matematické oblasti.

2. Základy fyziky

Původně patřil největší zájem členů Vídeňského kroužku problémům metody vědy o skutečnosti. Povzbuzeni myšlenkami Macha, Poincarého, Duhema diskutovali členové kroužku problémy ovládnutí skutečnosti vědeckými systémy, zvláště pak pomocí *systémů hypotéz a axiomů*. Systém axiomů lze zpočátku chápat zcela odděleně od všech empirických aplikací jakožto systém implicitních definic, čímž se míní toto: pojmy vyskytující se v axiomech jsou těmito axiomy určeny nikoli obsahově, nýbrž jen svými vzájemnými vztahy; tím jsou jistým způsobem definovány. Významu pro skutečnost nabývá takový systém teprve doplněním o další definice, totiž o „přiřazovací definice“, jimiž se udává, které předměty skutečnosti se mají brát za členy tohoto systému axiomů. Vývoj empirické vědy, která chce reprodukovat skutečnost co nejjednotnější a nejjednodušší sítí pojmů a soudů, se může, jak se dějinně ukazuje, ubírat dvěma směry. Změny vynucené novými zkušenostmi lze promítnout buďto do axiomů nebo do přiřazovacích definic. Tím se dotýkáme problému konvencí, jímž se zabýval zvláště Poincaré.

Metodologický problém aplikace axiomatického systému na skutečnost přichází v úvahu v zásadě v každém odvětví vědy. Avšak to, že tato zkoumání byla plodná dosud téměř výhradně ve fyzice, je pochopitelné ze současného stavu dějinného vývoje vědy, neboť fyzika je co do ostrosti a jemnosti tvoření pojmů daleko před ostatními vědami.

Epistemologická analýza hlavních pojmů přírodovědy osvobozovala tyto pojmy stále více od *metafyzických příměsí*, které na nich odpradávna ulpívaly. Především díky Helmholtzovi, Machovi, Einsteinovi a jiným byly očištěny pojmy *prostoru*, *času*, *substance*, *kauzality*, *pravděpodobnosti*. Nauka o absolutním prostoru a času byla překonána teorií relativity; prostor a čas už nejsou absolutní schránky, nýbrž jen pořádající struktury elementárních procesů. Materiální substance se rozplynula v atomové teorii a v teorii pole. Kauzalita byla zbavena svého antropomorfního charakteru „působení“ nebo „nezbytného spojení“ a převedena na vztahy podmínek, na funkcionální přiřazení. Dále na místo ně-

kterých přírodních zákonů, považovaných za přísné, nastoupily zákony statistické, dokonce se v souvislosti s kvantovou teorií množí pochybnosti o použitelnosti pojmu přísně kauzální zákonitosti jevů v nejmenších časoprostorových oblastech. Pojem pravděpodobnosti byl převeden na empiricky uchopitelný pojem relativní četnosti.

Díky použití *axiomatické metody* na zmíněné problémy se nám oddělují empirické části vědy od částí pouze konvencionálních a obsah výroků od definic. Pro syntetický soud a priori už nezbývá místo. To, že je poznání světa možné, nespočívá v tom, že lidský rozum vtiskuje materiálu svou formu, nýbrž v tom, že je tento materiál uspořádán určitým způsobem. O způsobu a stupni tohoto uspořádání nelze předem nic vědět. Svět by mohl být uspořádán mnohem více, než tomu je; mohl by však být uspořádán i mnohem méně, aniž by ztratil svou poznatelnost. Jen krok za krokem dále pronikající výzkum empirické vědy nás může poučit o tom, do jaké míry je svět zákonitý. Metoda *indukce*, usuzování ze včerejška na zítřek, z místa zde na místo tam, je ovšem platná jen tehdy, panuje-li nějaká zákonitost. Tato metoda však nespočívá na nějakém apriorním předpokladu této zákonitosti. Může být použita všude tam – bez ohledu na to, zda je zdůvodněná uspokojivě či neuspokojivě, kde vede k výsledkům; jistotu však nezaručuje nikdy. Epistemologická svědomitost však vyžaduje, aby se induktivnímu usuzování přikládal význam jen potud, pokud může být dodatečně empiricky testováno. Vědecké pojetí světa nechce zavrhnout úspěch nějaké výzkumné práce jen proto, že ho bylo dosaženo pomocí nedostatečných, logicky neuspokojivě objasněných nebo empiricky nedostatečně zdůvodněných prostředků. Bude však vždy požadovat a podporovat ověření pomocí vyjasněných prostředků, totiž přímé či nepřímé převedení na prožívané.

3. Základy geometrie

Mezi základními problémy fyziky nabyl v posledních desetiletích zvláštního významu problém *fyzikálního prostoru*. Výzkumy, které prováděli Gauß (1816), Bolyai (1823), Lobačevský (1835) a další, vedly k *ne-eukleidovské geometrii*, k poznání, že dosud samostatně vládnoucí klasický geometrický systém Eukleida je jen jedním z nekonečně mnoha logicky stejně oprávněných systémů. Tím se vynořila otázka, která z těchto geometrií je geometrií skutečného prostoru. Už Gauß chtěl rozhodnout tuto otázku proměřením součtu úhlů velkého trojúhelníku. Tím se stala *fyzikální geometrie* empirickou vědou, tj. větví fyziky. Tyto problémy byly dále zkoumány především Riemannem (1868), Helmholtzem (1868) a Poincarém (1904).

Poincaré zdůrazňoval zvláště svázanost fyzikální geometrie se všemi ostatními větvemi fyziky: Otázka po povaze skutečného prostoru je zodpověditelná pouze ve spojitosti s celkovým systémem fyziky. Einstein pak nalezl takový celkový systém, jímž byla tato otázka zodpovězena, a to ve smyslu určitého neeukleidovského systému. Zmíněným vývojem se fyzikální geometrie stále zřetelněji oddělovala od čistě *matematické geometrie*. Ta byla dalším vývojem logické analýzy postupně stále více formalizována. Nejprve byla aritmetizována, tj. vyložena jako teorie určitého systému čísel. Poté byla axiomatizována, tj. representována systémem axiomů, které pojímají geometrické prvky (body atd.) jako neurčité předměty a stanovují jen jejich vzájemné vztahy. A nakonec byla geometrie logizována, totiž vyložena jako teorie určitých relačních struktur. Geometrie se tak stala nejdůležitější oblastí aplikací axiomatické metody a obecné teorie relací. Dala tak nejsilnější podnět k vývoji obou těchto metod, jež byly tak důležité pro vývoj logiky samé a tím i obecně pro vědecké pojetí světa.

Vztahy mezi matematickou a fyzikální geometrií vedly přirozeně k problému použití systému axiómů na skutečnost, který pak sehrál, jak již bylo zmíněno, v obecných výzkumech o základech fyziky důležitou roli.

4. Problémy základů biologie a psychologie

Biologie byla vždy metafyziky s oblibou využívána jako zvláštní oblast. Vyjádřením toho byla nauka o zvláštní životní síle, *vitalismus*. Moderní zastánci této nauky se ji snaží vyvést z nejasné a zamotané formy minulosti do formy s jasnějšími pojmy. Na místo životní síly nastupují „dominanty“ (Reinke, 1899) nebo „entelechie“ (Driesch, 1905). Protože tyto pojmy nevyhovují požadavku převoditelnosti na danosti, odmítá je vědecké pojetí světa jako metafyzické. Totéž platí o tzv. „psychovitalismu“, který učí o zasahování duše, o „vedoucí roli duchovního v materiálním“. Když ale vyloupneme z metafyzického vitalismu empiricky uchopitelné jádro, zbude nám teze, že procesy v organické přírodě probíhají podle určitých zákonů, které nelze redukovat na fyzikální zákony. Přesnější analýza ukazuje, že tato teze znamená tolik jako tvrzení, že určité oblasti skutečnosti nepodléhají jedné jednotné a všeplatné zákonitosti.

Je pochopitelné, že vědecké pojetí světa v těch oblastech, které už dosáhly pojmové ostrosti, může prokázat své základní názory zřetelněji, než v oblastech jiných: v oblasti fyziky znatelněji než v psychologii. Jazykové formy, jimiž ještě dnes hovoříme v oblasti psychického, byly vytvořeny v minulosti na základě určitých metafyzických představ o duši. Tvoření pojmů v psychologii je ztěžováno těmito nedostatky jazyka:

metafyzická zátěž a logická rozpornost. K tomu ještě přistupují těžkosti věcné. Následkem toho je, že většina pojmů používaných v psychologii je zatím nedostatečně definována; u některých dokonce není jasné, zda jsou smysluplné, nebo zda se za smysluplné vydávají na základě jejich používání v řeči. Pro epistemologickou analýzu v této oblasti zbývá ještě téměř vše udělat; tato analýza je zde zajisté těžší než v oblasti fyzického. Pokus behaviorální psychologie pochopit vše psychické z tělesného chování, tedy z hlediska toho, co je dostupné vnímání, je blízké vědeckému pojetí světa.

5. Základy sociálních věd

Jak jsme viděli zvláště u matematiky a fyziky, dospěje každé odvětví vědy ve svém vývoji dříve či později k nutnosti epistemologického prověření svých základů, k logické analýze svých pojmů. To platí i pro sociologické oblasti vědy, v prvé řadě pro dějiny a národní hospodářství. Už asi sto let je v chodu proces odstraňování metafyzických příměsí. Zde sice nebylo dosaženo téhož stupně očisty jako ve fyzice, avšak na druhou stranu je možná tato očista méně naléhavá. Zdá se, že ani v dobách rozkvětu metafyziky a teologie nebyla tato oblast nijak zvlášť silně metafyzicky zasažena. Možná to spočívá v tom, že pojmy v této oblasti jako: válka a mír, dovoz a vývoz, se nacházejí bezprostřednímu vnímání ještě blíže, než takové pojmy, jako atom a éter. Není nijak obtížné odstranit takové pojmy jako „duch lidu“ a místo nich vzít za předmět skupiny jednotlivců určitého druhu. Quesnay, Adam Smith, Ricardo, Comte, Marx, Menger, Walras, Müller-Lyer, abychom zmínili badatele nejrůznějších směrů, působili v duchu empirického antimetafyzického postoje. Předmětem dějin a národního hospodářství jsou lidé, věci a jejich uspořádání.

IV. Ohlédnutí a výhled do budoucna

Z prací na uvedených problémech se vyvinulo moderní vědecké pojetí světa. Viděli jsme, jak se fyzika zprvu s nedostatečnými nebo ještě ne dostatečně vyjasněnými vědeckými nástroji ve snaze o získání uchopitelných výsledků cítila být stále silněji nucena k metodologickým zkoumáním. Tak došlo k vývoji metody vytváření hypotéz a pak dále k vývoji axiomatické metody a logické analýzy; tím nabývalo tvoření pojmů na stále větší jasnosti a přesnosti. K týmž metodologickým problémům vedl, jak jsme viděli, i vývoj zkoumání základů ve fyzikální geometrii, matematické geometrii a aritmetice. Především z těchto zdrojů vzešly problémy, jimiž se nyní přednostně zabývají

představitelé vědeckého pojetí světa. Je pochopitelné, že ve Vídeňském kroužku stále ještě zůstává znatelný jejich původ v jednotlivých rozmanitých problémových oblastech. Tím jsou také dány často rozdílnosti zaměření zájmů a hledisek, které vedou k rozdílům v názorech. Charakteristické však je, že snahou o přesnou formulaci, o používání exaktního logického jazyka a symboliky, o zřetelné rozlišování teoretického obsahu nějaké teze od pouhých doprovodných představ, se zmenšuje to, co tyto názory rozděluje. Krok za krokem se zvětšuje množství společných pojetí, která tvoří jádro vědeckého pojetí světa, a ke kterému se připojují vnější vrstvy, kde nacházíme větší subjektivní divergence.

Při zpětném pohledu je nám *podstata nového vědeckého pojetí světa* v protikladu k běžné filosofii zřetelná. Neformulují se vlastní „filosofické věty", nýbrž věty se jen vyjasňují, a to věty empirické vědy, jak jsme to viděli u různých dříve zmíněných problémových oblastí. Aby se ještě více zdůraznil protiklad k systémové filosofii, nechtějí mnozí zastánci vědeckého pojetí světa pro označení své práce vůbec slovo „filosofie" používat. Ať už se tato zkoumání nazvou jakkoli, jedno je jisté: *neexistuje žádná filosofie, která by byla základní či universální vědou vedle nebo nad různými oblastmi jedné zkušenostní vědy*, neexistuje žádná cesta k obsahovému poznání než zkušenost; neexistuje žádná říše idejí, která by se nacházela nad nebo za zkušeností. Přesto zůstává práce na „filosofických" nebo „základových" zkoumáních ve smyslu vědeckého pojetí světa důležitá. Logické vyjasňování vědeckých pojmů, vět a metod osvobozuje od brzdících předsudků. Logická a epistemologická analýza neklade vědeckému bádání žádná omezení, naopak: dává mu k dispozici co nejúplnější oblast formálních možností, z nichž se má vybrat ta, která souhlasí s určitou zkušeností (příklad: neeukleidovská geometrie a teorie relativity).

Zastánci vědeckého pojetí světa stojí rozhodně na půdě prosté lidské zkušenosti. S důvěrou konají práci na odklizení metafyzických a teologických trosek tisíciletí. Nebo, jak si myslí někteří: vrátit se po metafyzickém mezidobí k jednotnému, pozemskému obrazu světa, který byl v jistém smyslu už základem protohistorické magické víry nezatížené teologií. Nárůst metafyzických a teologických sklonů, které se dnes projevují v mnoha spolcích a sektách, v knihách a časopisech, na přednáškách a v universitních kursech, se zdá spočívat na úporných sociálních a hospodářských zápasech současnosti: jedna skupina bojujících, držící se v sociální oblasti minulého, pečuje také o obsahově dávno překonané názory metafyziky a teologie, zatímco druzí, soustředění na novou dobu, zvláště ve střední Evropě tento postoj odmítají a staví se na půdu zkušenostní vědy. Tento vývoj souvisí s rozvojem moderního výrobního procesu, který nabývá stále více strojově-technické podoby a ponechává

stále méně prostoru metafyzickým představám. Tento vývoj souvisí i se zklamáním širokých mas o postojích těch, kteří hlásají překonané metafyzické a teologické nauky. Tak dochází k tomu, že masy v mnoha zemích odmítají tyto nauky nyní mnohem vědoměji než dříve a v souvislosti se svým socialistickým postojem se přiklánějí k pozemštějšímu empirickému pojetí. V dřívějších dobách byl výrazem tohoto pojetí *materialismus*; mezitím se ale moderní empirismus vyvázal z mnoha nedokonalých podob a ve *vědeckém pojetí světa* nabyl trvalé podoby.

Tak se vědecké pojetí světa nachází blízko života současnosti. Ohrožují jej sice těžké zápasy a útoky. Přesto existuje mnoho těch, kteří neztrácejí odvahu vzdor sociologické situaci současnosti a s nadějí hledí v ústrety dalšímu vývoji. Zajisté, ne každý přívrženec vědeckého pojetí světa bude bojovníkem. Někteří, kteří mají rádi samotu, povedou život v ústraní na ledových pláních logiky; někteří budou dokonce odsuzovat splynutí s masou a budou litovat, že při šíření dochází k nevyhnutelné „trivializaci“. Ale i jejich výkony se začlení do dějinného vývoje. Zažíváme, jak ve stoupající míře proniká duch vědeckého pojetí světa formy osobního i veřejného života, vyučování, výchovy, architektury, jak pomáhá utvářet hospodářský a sociální život podle racionálních principů. *Vědecké pojetí světa slouží životu a život je přijme.*

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