On the Czech Logic in the 20th Century

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Abstract

In the first part, a historical overview of the development of the Czech logic from 1900 until nowadays is sketched. In the second part, they are listed Czech logicians, mentioning their key topics and books.

1   An overview

Omitting here the era before 1800, the first important Czech logician was **Bernard Bolzano** (1781–1848). Unfortunately, the influence of his thoughts on logic was quite insignificant.[1] Moreover, there was nearly no reception of modern symbolic logic within the Czech philosophical thinking between the world wars or earlier. This may seem rather surprising, since two well-known logicians, namely K. Gödel and R. Carnap, are closely related to the Czech region. **Kurt Gödel** (1906−1978) was born in Brünn (now Brno) having the Czechoslovak citizenship for some time. Nevertheless, Gödel's nationality was German and he had thus no relevant relationship with the Czech culture; in order to study in Vienna, he left Czechoslovakia in his 18 years. **Rudolf Carnap** (1891–1970) taught at the German University in Prague from 1931 to 1935 (he was visited there by Ch. Morris and W.v.O. Quine). Nevertheless, there are known no his Czech students or any other connection with the Czech philosophical community, thus his stay in Prague has no relevant impact for Czech logic in those times.[2]

The situation has considerably changed during the fiftieths. But due to the political situation in the Middle Europe, the development was far from being continuous. The 20th century Communistic regime in Czechoslovakia may be delimited by the two main periods. The former one covers two decades between 1948 (the Communistic Putsch) and 1968 (the Prague Spring, a time of a democratic renaissance) with the Stalinism in the fiftieths. The latter one covers two decades between 1968 (the beginning of

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[1]During the second half of the 20th century, several Czech philosophers of various sorts (e.g., the phenomenologist Jan Patočka) studied Bolzano's work; this reception had no logical aspect or impact.

[2]We may perhaps mention also **Ernest Mach** (1838−1916), born in Chrlice (now a part of Brno). He was partly reflected by the Czech philosophers of the first half of the 20th century, yet he had no follower.

the occupation by the Soviet Army in August 1968) and 1989 (the so-called Velvet Revolution in November 1989, a peaceful termination of the communistic regime) with the so-called Normalisation (a re-establishing of totalitarianism, a new era of political purges) in the seventieths. In 1990, the Czechoslovak Socialistic Republic was renamed to the Czech-Slovak Federative Republic; it was divided to the Czech Republic and Slovak Republic in 1993. As it is probably known, the European Communistic regimes were philosophically governed by the ideology called Marxism-Leninism which had its origins in the philosophies of K. Marx, F. Engels and V.I. Lenin. A part of that ideology, Dialectic Materialism, was quite antagonistic to any Positivistic tendency (due to the former Lenin's criticism of E. Mach), thus Logical Neopositivism of Wiener Kreis was an entirely undesirable and unacceptable philosophy. As a result, everything related to the analytical philosophy was condemned and ignored. The neglecting attitude to modern logic in the era of communism (or rather "communism") had also some connection with a Hegel-like dialectics incorporating trichotomies, which was a key part of Dialectic Materialism. It was often claimed to be a more valuable way of thinking than (ordinary) logic which treats only dichotomies.

These regrettable negative tendencies were firstly corrected by Otakar Zich jr. who is considered to be the father of the Czech logic. In 1948, he defended his habilitation based on a theme of modern logic.[3] He then began his tireless propagation of modern logic. In 1956, Zich established the Department of Logic at the Charles University in Prague. He concentrated there a group of young theoreticians − having their original education mostly in philosophy − namely Miroslav Jauris, Karel Berka, Miroslav Mleziva, Pavel Materna, Pavel Tichý, Ota Weinberger. All these theoreticians developed into valuable logicians, publishing their theses (or habilitations) in German or English (being printed, however, only in Prague; these books are not listed below). Zich initiated the creation of various introductory books on logic. The first books were written collectively, but in the next decades each of the aforementioned logicians published his own introduction to logic. During the political process with Ladislav Tondl,[4] the Department of Logic sided with Tondl. The Department was then persecuted as a whole: it was subsumed under the Department of Philosophy. Omitting here its short restoration in 1968, the Department of Logic was renewed after 1989.

During the sixtieths, the abovementioned logicians continued in their work, publishing various papers and books on logic or its applications; sometimes they presented their work abroad. Certain positive political development in the sixtieths culminated in the Spring 1968. Nevertheless, the attempt to establish socialism with a "human face" was suppressed

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[3]The subsequent French article was positively evaluated by Alonzo Church.

[4]Ladislav Tondl (1924−) worked mostly in the field of the philosophy of science, having also a special interest in semiotics. His book relevant to logic is [5] (Problems of Semantics, 1966, in 1981 published in Boston).

by the armies of communistic Warsaw Block (The Soviet Army occupied Czechoslovakia for the next twenty years). Tichý (doing his second Ph.D. at the Exeter's University in England) and Weinberger immediately decided to emigrate; Tichý and his wife migrated to New Zealand, Weinberger migrated to Austria.

During the Normalization, strong especially in the seventieths, some of these logicians were not allowed to teach; some of them lost their academic position entirely (to work as a programmer or in a similar position was a typical also for younger Czech logicians in those times). Some of them were not allowed to publish their scientific works, some of them published them in some secret manner (e.g., in quite unimportant Czech journals). At least three characteristics of these years should be mentioned here. Pavel Materna became to be well-acknowledged with the transparent intensional logic, the logical system developed by Tichý in his emigration. Another interesting phenomenon is Materna's cooperation with Prague's or Brno's (mathematical) linguists, Petr Sgall, Eva Hajičová, Jarmila Panevová and Karel Pala, Aleš Svoboda. The second inter-disciplinary movement initiated by Materna was carried out with computer scientists; the periodic conference named Sofsem (a shortcut for 'software seminaire') was an opportunity for presenting their work. An implementation of Tichý's logic into database systems, named HIT, was suggested. Though HIT was internationally positively appreciated, it had no commercial realization or distribution. Logicians or computer scientists involved in the development of HIT include Marie Duží, Jiří Chrz, Tomáš Vlk, Jaroslav Pokorný and Jiří Zlatuška.

After the Velvet Revolution, logicians mostly returned to universities or they obtained a position at the Czech Academy of Sciences (AV ČR) for the Research Group for Logic was established there as a part of the Philosophical Institute. The Department of Logic was reopened as a self-sustaining department of the Faculty of Arts (at Charles University). Originally, many mathematical logicians were engaged there (mathematical logicians are now concentrated mostly at the Mathematical Institute of AV ČR). There is no other department of logic at any other Czech university. However, most philosophical departments have its own logician who teaches introductory courses on logic.[5]

From 1998, the Prague department of logic publishes an annual logical journal "Miscellanea Logica". The journal "From the Logical Point of View" was published by AV ČR only from 1992 till 1994. The Research Group for Logic organizes an international conference Logica every year. A volume of the conference papers is published as "Proceedings of Logica n" (n being

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[5]It should be noted the close and lively cooperation of Czech and Slovak logicians during the second half of the 20th century. We mention here only a few Slovak logicians (in a chronological order): Vojtěch Filkorn, Pavel Cmorej (utilizing also Tichý's logic), Ján Szomolányi, Ján Šefránek, Václav Černík, Dodo Viceník, Vendelín Čunderlík, Igor Hanzel, František Gahér (utilizing Tichý's logic), Marián Zouhar.

the number of the year when the conference was held). Biannually, the Research Group for Logic organizes also international workshops devoted to various actual logical topics (such as, e.g., logical dynamics). In the ninetieth, a series of international conferences devoted to various themes from the philosophy of language were organized by Petr Koťátko (the chief of the Research Group for Analytical Philosophy at Philosophical Institute). There is also a tradition of annual Czech-Slovak conferences on analytical philosophy.

In nowadays, it seems that Czech logic has three main tendencies. The historically first one is the development and application of Pavel Tichý's transparent intensional logic, Pavel Materna and his colleague Marie Duží being the leading scholars. Materna has developed his theory of concepts and Petr Kolář published (in Czech) two important books where Tichý's logic was utilized as well. As a second main stream we may characterize activities of Jaroslav Peregrin (and perhaps Vladimír Svoboda) who develops ideas of Quine and other post-analytic philosophers. The third tendency is an increase of mathematical logic, especially fuzzy logic; see below the theoreticians who are naturally concentrated around Petr Hájek, a leading Czech mathematical logician. It should be added here that Czech mathematical logicians (Hájek, Petr Vopěnka and others, see below) have a very good international reputation. Another promising development consists in an increasing number of analytician philosophers who investigate various problems, in particular, in the philosophy of language.

2 Czech logicians

If not indicated otherwise, the following list of the most known Czech logicians (the list is perhaps not exhaustive enough) is constructed in a chronological order due to the years of their birth. Most data are selected from The Dictionary of Czech Philosophers [35], consult it for more information. Since this source is actually eleven years old, new data are added. Unfortunately, the list of all books would be too long for the present text, so only some their books are enumerated.

A special figure in the Czech logic was **Arnošt Kolman** (1892−1979), an enthusiastic communist until his emigration (1976) to Sweden; he spent many years in the Soviet Union, publishing there a number of books about modern development in natural sciences. As it was discussed already above (some fact will not be repeated here), **Otakar Zich jr.** (1908−1984)[6] is the father of Czech logic. His books include Introduction to the Philosophy of Mathematics [1] and introduction to modern logic [2]. **Ota Weinberger**

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[6]His father, Otakar Zich was an important Czech aesthetician and musicologist. It is noteworthy that O. Zich jr., playing violoncello, was an active member of Zich's Piano Trio.

(1919−), a lawyer and philosopher who migrated to Austria, being there a Professor at the University in Salzburg. He is internationally known especially for his work in logic of norms [26], deontic logic and action theory, e.g. [29]. Works of **Karel Berka** (1923−2003) cover mainly introductions to logic (e.g. [3], [14]) and translations; his main interest being also the history of logic [25], [8], especially Aristotle and Bolzano, [13]. **Vladimír Janák** (1927−) is known especially for his introductory books such as [10], aiming to provide there an optimalization of the education of logic. **Miroslav Mleziva** (1929−1990) was interested in the three-valued [4] and other non-classical logics [7].

The significant role of **Pavel Materna** (1930−) in the Czech philosophical logic was already discussed above. His application of Tichý's logic in the area logical analysis of natural language and philosophical logic can be found in [17], [36]. His theory of concepts and conceptual systems based on Tichý's logic was published in [20], [32], [48]. He authored also an introduction to logic [6]. **Stanislav Sousedík** (1931−) investigated works of Mediavel Czech logicians and he examined also possible connections of classical Aristotelian metaphysics (T. Aquinas, Duns Scotus) with modern analytical tradition. **Jan Šebestík** (1931−) was educated in Slovakia where he began to teach; in 1956 he migrated to France where he gave lectures (with A. Soulez) devoted to the philosophy of language; he investigated Bolzano's work in [22]. **Zdeněk Zastávka** (1933−) is specialized in the didactics of logic; his books include foundations of informal logic [21]. **Miroslav Jauris** is an author of various introductions to logics, selecting here the book [21]. **Ivo Zapletal** is known especially as a valuable organizer of conferences Logica and as an author of many logical examples introducing to logic ([14]).

Pavel Tichý (1936−1994) is arguably the most important philosophical logician of the 20th century. He is internationally known especially for his investigations of verisimilitude of theories. However, his system of intensional logic, transparent intensional logic (its first version was published already in 1971), which is based on Church's lambda calculus, is recognized by various scholars as a better system than the rivaling system developed earlier by Richard Montague. Tichý's logic is intensional logic in the sense that it models various empirical phenomena as functions from possible worlds. Moreover, Tichý proposed that language meanings are not just intensions (or extensions), but so-called constructions, i.e. (algorithmically) structured entities (they serve as models of so-called structured meanings). Tichý analyzed many phenomena of natural language (questions, subjunctive conditionals, time-discourse etc.) as well as many philosophical puzzles closely related to language (e.g., the logic of action published also with his former student Graham Oddie). The recent exposition of his system, showing its many advantages, can be found in his only published book [16]. Some of his papers (all published in the leading logical journals) were translated in

Czech, [30]. His collected papers were published as [50].

Petr Jirků (1942−) is specialized in the alternative methods of reasoning, especially non-monotonic reasoning. **Kamila Bendová** (1946−) is known for her interest in syllogistic. As it was already mentioned above, **Marie Duží** (1948–) is one from a group of computer-science oriented logicians who applied Tichý's logic.[7] Her actual interest are wider, she investigates (by means of Tichý's logic) also semantics of natural language. **Jan Štěpán** (1948−), educated also in mathematics, was originally interested in mathematical computer science and software engineering, investigating then deontic logics, construction of normative systems, e.g. [23], and inquiring also Tichý's logic, e.g. [38]. He published also introductions to logics, e.g. [24].

The dominating figure of the middle-age generation of the Czech logicians is perhaps **Jaroslav Peregrin** (1957−). He originally studied mathematics, being then a programmer; in 1989, he joined the Research Group for Logic. Some facts about him have been mentioned already above. Adding here that he is specialized in logical semantics, [28], philosophical questions of logics and language, [29], [40], [48], and analytical philosophy [49]. **Vladimír Svoboda** (1960−) is interested in the logic of imperatives, deontic logics, meta-ethics [32] and epistemological problems. **Petr Kolář** (1961−) utilized Tichý's logical system in various topics from the logical analysis of natural language and philosophical logic [37], theory of facts and theory of truth [44], even meta-ethics [32]. **Prokop Sousedík** (1964−) popularizes logic and investigates its relationship to philosophy, [42]. **Ondrej Majer**, educated originally as a mathematician, is interested in the foundations of the probability theory, theory of conditionals, modal logics, and game theory.

The youngest generation of the Czech logicians includes mostly the logicians graduated at the Prague's Department of Logic (they are listed in a lexicographical order). **Libor Běhounek** is specialized in substructural and deductive fuzzy logics, higher-order fuzzy logic and axiomatic fuzzy set theory, erotetic, epistemic, dynamic, and deontic logics. **Marta Bílková** investigates modal logics and non-classical logics. **Petr Cintula** concentrates on mathematical foundations of fuzzy logics and fuzzy mathematics, abstract algebraic logics. The current work of **Ludmila Dostálová** lies in the popularization of logic; she develops an e-learning system for logic. Scientific interests of **Vojtěch Kolman** include philosophy and history of logic, in particular Frege [45], and the philosophy of mathematics, [56]. **Michal Peliš** is specialized in erotetic logic and some other non-classical logics. The key interest of **Marta Vlasáková** is logic of Bernard Bolzano, [53].

Though educated as philosophers, there are also theoreticians having a lively attitude to logic. **Petr Dvořák** investigates connections of modern

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[7]The other members of that group are **Tomáš Vlk**, **Jiří Chrz** and **Jiří Zlatuška** (he is a co-author of [17]).

philosophy of language and logic with their Medieval and Baroque developments; his book [54] is about formal and applied logic by Jan Caramuel Lobkovic. Using Tichý's logic, **Petr Kuchyňka** explicated the notion "good"; currently he develops foundations of the logic of norms. **Jiří Raclavský** utilizes Tichý's logic, investigating especially its capability to solve semantic paradoxes, to explicate truth; he provides also other applications in the philosophy of language and even analytical metaphysics. **Karel Šebela** is interested in the philosophical conception underlying Tichý's logic [54]. **Ondřej Tomala** investigates modal logics and their applications in philosophy.

A short overview of the Czech mathematical logicians. **Petr Vopěnka** ($1935-$) is specialized in mathematical logic, philosophy of mathematics, topology and set theory with a special interest in the phenomenology of infinity, developing an alternative set theory, [9], [12] which internationally well-known. His recent works are devoted to the popularization of science, especially mathematics, as a part of European intellectual heritage (selecting here [44], [39], [43], [57]. The interests of **Petr Hájek** ($1940-$) include mathematical logic and logical foundations of computer science; cf. e.g. [9], [11], [19], [25]. Hájek is internationally well-known also for his research in mathematical fuzzy logic as a many-valued logic with a comparative notion of truth, [33]. **Antonín Sochor** ($1942-2008$) was interested the axiom of choice (collaborating with Tomáš Jech), Vopěnka's theory of semi-sets and non-standard analysis; his recent work was devoted to top-level introduction to mathematical logic, [41], and metamathematics of set theories [52]. From the middle-age generation of the Czech mathematical logicians, **Pavel Pudlák** (e.g., [25]) and **Vítězslav Švejdar** ([46] is his book on incompletness, complexity, and necessity) are the best known.

3   Conclusion

To conclude, the contemporary Czech logic was in fact established after the World War II. Yet its subsequent development lacked suitable conditions. Despite this, some Czech mathematical or philosophical logicians reached an international level.

Postscriptum The final manuscript was submitted in 2008; new books and new logicians have appeared since that time, of course (I will add them in the future).

In a personal letter (2014), doc. Švejdar suggested to me an important supplementation which concerns Czech mathematical logicians (this topic was only sketched in my paper, since I expected that somebody other covers it in this book – see at least Vilém Novák's paper). One of the first Czech

mathematicians with interest in logic was **Ladislav Svante Rieger** (1916-1963) whose work in lattices is known, cf. e.g. Rieger-Nishimura lattices in intuicionistic logic. Vopěnka led an important seminar devoted to set theory; many contemporary Czech mathematical logicians visited it. The first main interest of Petr Hájek (and also Vítězslav Švejdar) was metamathematics of arithmetic, not fuzzy logic; the first focus on fuzzy logic, in a diseration finished in 1976, was made by **Jan Pavelka**. Together with Pudlák, **Jan Krajíček**, unfortunately also unmentioned in the paper, is one of the main middle aged Czech mathematical logicians. Nowdays, **Radek Honzík** and **Jonathan Verner** forms a strong Prague group of set-theoreticians. Needless to say that**Vilém Novák**, unfortunately also unmentioned in the paper, is a fuzzy logician who leads the institute of fuzzy modelling (IRAFM, Ostrava), founded in 1996.

References

[1] **1947**

O. Zich. *Úvod do filosofie matematiky*. Praha: Jednota českých *matematiků* a fyziků, 1947.

1958

[2] O. Zich a kol. *Moderní logika*. Praha: Orbis, 1958.

1962

[3] K. Berka, M. Mleziva. *Co je logika*. Praha: Nakladatelství pedagogické literatury, 1962.

1964

[4] M. Mleziva. *O trojhodnotové logice*. Praha: Nakladatelství Československá akademie věd, 1964.

1966

[5] L. Tondl. *Problémy sémantiky*. Praha: Academia, 1966.

1968

[6] P. Materna. *Umíte logicky myslet?* Praha: Stýtní pedagogické nakladatelství, 1968.

1970

[7] M. Mleziva. *Neklasické logiky*. Praha: Svoboda, 1970.

1972

[8] K. Berka, L. Kreiser. *Logik-Texte*. Berlin: Akademie Verlag Berlin, 1972.

[9] P. Hájek, P. Vopěnka. *The Theory of Semisets*. Amsterdam: North-Holland Publishing Company 1972.

[10] V. Janák. *Základy formální logiky*. Praha: Stýtní pedagogické nakladatelství, 1972.

1978

[11] P. Hájek, T. Havránek. *Mechanizing Hypothesis Formation*. Berlin, New York: Springer-Verlag, 1978.

1979

[12] P. Vopěnka. *Mathematics in the Alternative Set theory*. Leipzig: Teubner, 1979.

1981

[13] K. Berka. *Bernard Bolzano*. Praha: Horizont, 1981.

[14] K. Berka, V. Čechák, I. Zapletal. *Co víte o moderní logice*. Praha: Horizont, 1981.

1983

[15] P. Hájek, M. Chytil, T. Havránek. *Metoda GUHA - automatická tvorba hypotéz*. Praha: Academia, 1983.

1988

[16] P. Tichý. *The Foundations of Frege's Logic*. Berlin, New York: Walter de Gruyter, 1988.

1989

[17] P. Materna, K. Pala, J. Zlatuška. *Logická analýza přirozeného jazyka*. Praha: Academia, 1989.

[18] P. Vopěnka. *Rozpravy s geometrií*. Praha: Panorama, 1989.

1992

[19] P. Hájek, T. Havránek, R. Jiroušek. *Processing Uncertain Information in Expert Systems*. Boca Raton: CRC Press. 1992.

[20] P. Materna. *Svět pojmů a logika*. Praha: Filosofia, 1992.

[21] M. Jauris, Z. Zastávka. *Základy neformální logiky*. Praha: S & M, 1992.

[22] J. Šebestík. *Logique et mathématique chez Bernard Bolzano*. Paris. VRIN, 1992.

[23] J. Štěpán. *Klasická logika*. Olomouc: UP Olomouc, 1992.

[24] J. Štěpán. *Normativní logika a normativní systémy*. Brno: FF MU, 1992.

1993

[25] P. Hájek, P. Pudlák. *Metamathematics of First-Order Arithmetic*. Berlin, New York: Springer-Verlag, 1993.

[26] O. Weinberger. *Základy právní logiky*. Brno: Právnická fakulta MU, 1993.

1994

[27] K. Berka. *Stručné dějiny logiky*. Praha: Karolinum, 1994.

[28] J. Peregrin. *Úvod do teoretické sémantiky*. Praha: Karolinum, 1994.

1995

[29] J. Peregrin. *Doing Worlds with Words*. Dordrecht: Kluwer. 1995

1996

[30] P. Tichý. *O čem mluvíme?*. Praha: Filosofia, 1996.

[31] O. Weinberger. *Alternative Handlungstheorie*. Wien: Böhlhau, 1996

1997

[32] P. Kolář, V. Svoboda. *Logika a etika*. Praha: Filosofia, 1997.

1998

[33] P. Hájek. *Metamathematics of Fuzzy Logic*. Kluwer, 1998.

[34] P. Materna. *Concepts and Objects*. Helsinki: Acta Philosophica Fennica. 1998.

[35] P. Vopěnka. *Podivuhodný květ českého baroka*. Praha: Karolinum, 1998.

[36] J. Gabriel, J. Krob, H. Pavlincová, J. Zouhar (eds.). *Slovník českých filosofů*. Brno: Masarykova universita, 1998.

1999

[37] P. Kolář. *Argumenty filosofické logiky*. Praha: Filosofia, 1999.

2000

[38] P. Materna, J. Štěpán. *Filosofická logika: nová cesta?* Olomouc: UP Olomouc, 2000.

[39] P. Vopěnka. *Úhelný kámen evropské vzdělanosti a vědy*. Brno: Práh, 2000.

2001

[40] J. Peregrin. *Meaning and Structure*. Aldershot: Ashgate, 2001.

[41] A. Sochor. *Klasická matematická logika*. Praha: Karolinum, 2001.

[42] P. Sousedík. *Logika pro studenty humanitních oborů*. Praha: Filosofia, 2001.

[43] P. Vopěnka. *Meditace o základech vědy*. Brno: Práh, 2001.

2002

[44] P. Kolář. *Pravda a fakt*. Praha: Filosofia, 2002.

[45] V. Kolman. *Logika Gottloba Frega*. Praha: Filosofia, 2002.

[46] V. Švejdar. *Logika: neúplnost, složitost a nutnost*. Praha: Academia, 2002.

[47] V. Valenta. *Problémy analytické filosofie*. Olomouc: Nakladatelství Olomouc, 2002

2003

[48] J. Peregrin. *Filosofie a jazyk*. Praha: Filosofia, 2003.

2004

[49] P. Materna. *Conceptual Systems*. Berlin: Logos, 2004.

[50] V. Svoboda, B. Jespersen, C. Cheyne (eds.). *Pavel Tichý's Collected Papers in Logic and Philosophy*. Dunedin: University of Otago Press, Praha: Filosofia 2004.

2005

[51] J. Peregrin. *Kapitoly z analytické filosofie*. Praha: Filosofia, 2005.

[52] A. Sochor. *Metamatematika teorií množin*. Praha: Karolinum, 2005.

[53] M. Vlasáková. *Bernard Bolzano: cesta k logické sémantice*. Praha: Filosofia, 2005.

2006

[54] P. Dvořák. *Jan Caramuel z Lobkovic*. Praha: Filosofia, 2006.

[55] K. Šebela. *Filosofie logiky Pavla Tichého*. Olomouc: Filozofická fakulta UP, 2006.

2008

[56] V. Kolman. *Filosofie čísla*. Praha: Filosofia, 2008.

[57] P. Vopěnka. *Pojednání o jevech povstávajících na množstvích*. Plzeň: OPS, 2008.