

Debate “How to Teach Logic? Diagnosis of the Current State and Prospects of Logical Education in Poland” (14.01.2024):

Report edited by Marek Porwolik

The reported debate on teaching logic took place on 14 January 2024, as part of the celebrations for the 6th World Logic Day, at the Faculty of Philosophy of the University of Warsaw. The circumstances of the event allowed the participants to feel the symbolic presence of Jan Łukasiewicz and Kazimierz Ajdukiewicz – two prominent representatives of the Lvov-Warsaw School and at the same time two logicians who were highly active in the formation of the education system in Poland, and, in particular, in the teaching of logic.¹ The celebrations began on 12 January 2024 with a two-day symposium dedicated to Kazimierz Ajdukiewicz. On that day, a ceremony was held to name room 108 at the Faculty of Philosophy of the University of Warsaw as the “Jan Łukasiewicz Hall” and to unveil a commemorative plaque above its entrance. The discussion took place in this very hall.

Teaching logic in Poland has a centuries-old tradition, but the greatest progress in this area occurred in the 20th century: a period when the practice of logic in Poland was also at its highest level. The beginning of the 20th century was a time when modern mathematical logic was born, and Polish scholars – pri-

¹ In 1918, Jan Łukasiewicz took charge of the Section for Science and Higher Education in the Ministry of Religious Affairs and Public Education, established by the Regency Council. In 1919, he served as the Minister of Religious Affairs and Public Education in the government of Ignacy Paderewski. He also served twice as the Rector of the University of Warsaw. In the post-war period, Kazimierz Ajdukiewicz was arguably the most important figure in Polish logical education: he not only promoted the dissemination of logic but also influenced the educational system by advocating for the constant presence of logic courses in all master's degree programmes. For four years, he served as the Rector of the University of Poznań (since 1956, Adam Mickiewicz University in Poznań).

marily Jan Łukasiewicz and Stanisław Leśniewski, along with their student Alfred Tarski – played a fundamental role in this development. Before the outbreak of World War II, Poland had three departments specializing in mathematical logic: two in Warsaw (Łukasiewicz's and Leśniewski's) and one in Lvov (Leon Chwistek's). The logical education in these centres was comprehensive and intensive, and the emerging young talents enabled the formation of the famous Warsaw School of Logic, an unprecedented phenomenon of global significance. Unfortunately, World War II caused a dramatic rupture in the continuity of this school. After the war, Tarski became a co-creator of the success of American logic (supervising 22 PhD students in logic in the USA), and Łukasiewicz continued his work for several more years in Dublin. In Poland, their students remained (including Andrzej Mostowski, Jerzy Śłupecki, Andrzej Grzegorzczak, and Helena Rasiowa²), thanks to whom logical research was revived in the post-war period, although Warsaw never regained its position as the world capital of logic.

The emergence of mathematical logic in Poland did not hinder the parallel development of research in the field of traditional, philosophical, and informal logic. In the circles of Polish scholars in logic, logical topics are usually understood broadly, encompassing not only formal logic but also issues in logical semiotics and the general methodology of science. A great advocate of this broad understanding of logic and of its widest possible application was Kazimierz Twardowski, a Lvov philosopher and teacher of Łukasiewicz and Leśniewski. His lectures concerning the latest trends in logic (1899/1900) and his textbook *Zasadnicze pojęcia dydaktyki i logiki* [Basic Concepts of Didactics and Logic], published in 1901, had an enormous influence on the development of these disciplines. In turn, his “pragmatic” attitude towards logic and his caution when it comes to applying formal methods (see *Symbolomania i pragmatofobia* [Symbolomania and Pragmatophobia] (1921)) contributed not only to the development of pragmatic logic in Poland alongside mathematical logic but also to the fact that Polish mathematical logicians, in contrast to their colleagues from other countries, were much more concerned with providing solid philosophical and intuitive foundations for their systems. The philosophical school initiated by Twardowski, known as the Lvov-Warsaw School, and related to the Warsaw Logical School at least

² It is worth noting that in the post-World War II period, besides Helena Rasiowa, three other women associated with the Lwów-Warsaw School held chairs in logic: Janina Kotarbińska (in Warsaw), Seweryna Łuszczewska-Romahnowa (in Poznań), and Maria Kokoszyńska (in Wrocław).

by genetic ties, specialized in broadly understood logic and the application of logical tools in philosophy. It is worth noting that Twardowski's interdisciplinary approach, combining elements of logic, psychology, and linguistics in philosophical research, shared many features with today's cognitive science research programmes. Among Twardowski's students, a pragmatic approach combined with excellent knowledge of mathematical logic was exemplified by distinguished scholars such as Tadeusz Kotarbiński, Kazimierz Ajdukiewicz, and Tadeusz Czeżowski. All of this made logical research and logical teaching in Poland develop in various directions. While mathematical logic was considered the prime example of scientific rigor, pragmatic logic was considered the foundation of the morality of thinking and an essential element of every person's education.

For these reasons, only seemingly do the views of Łukasiewicz and Ajdukiewicz on logic education diverge. Łukasiewicz was an advocate of teaching mathematical logic, while Ajdukiewicz favoured teaching practical skills. The dispute between the "elite" teaching of logic under the formal rigor of mathematical logic and "egalitarian" familiarization with the practical side of this discipline recurs in many discussions. However, it is not a genuine dispute in the sense that both types of education are needed.

The involvement of academic teachers in the logical education of school and university students has a rich tradition in Poland. Among the issues related to the teaching of logic undertaken by Polish academics within the School were: what logic should be taught – formal logic or rather logic *sensu largo*; whether to emphasize teaching so-called pure logic or rather focus on the practical applications of logic; whether limit education to classical logic or to expand it to include non-classical logics; what methods to use in didactics of logic. Various resolutions were adopted. Regardless of the chosen approaches, many excellent textbooks were created and logic teaching programmes were realized at Polish Universities. Many renowned Polish logicians of the post-war period also undertook important activities in the field of logical education. Among the didactic publications of this time, let us mention textbooks written by Kazimierz Ajdukiewicz, Andrzej Grzegorzczak, Andrzej Mostowski, Jerzy Śłupecki, Ludwik Borkowski, Kazimierz Trzęsicki, Zbigniew Ziemiński, Barbara Stanosz, and Teresa Hołówka, which are still highly respected by Polish academic teachers and continue to be widely used.³

³ K. Ajdukiewicz, *Zarys logiki* [Outline of Logic], *Logika pragmatyczna* [Pragmatic Logic]; A. Grzegorzczak, *Zarys logiki matematycznej* [Outline of Mathematical Logic], *Logika popular-*

The current interest of the international academic community in issues related to logic education was institutionally expressed in 2023: within the Division of Logic, Methodology and Philosophy of Science and Technology (IUHPST/DLMPST, <https://dlmps.org/>), the Commission on Logic Education (CLE) was established, whose members are: Valentin Goranko (Stockholm University), Cathy Kessel (Association for Women in Mathematics), Fenrong Liu (Tsinghua University, Beijing), Maria Manzano (University of Salamanca), Joao Marcos (Federal University of Rio Grande do Norte, Brazil), Ram Ramanujam (Louisiana State University, chair), and Sara L. Uckelman (Durham University). The primary goal of the CLE is to promote broadly understood logic education in high schools and universities worldwide. In response to this initiative, a reported debate was organized, to which CLE representative Prof. Maria Manzano and a group of Polish specialists in the field of logic, who also have extensive teaching experience, were invited. The Polish participants in the debate were: Prof. Andrzej Indrzejczak (University of Łódź), Prof. Tomasz Jarmużek (Nicolaus Copernicus University in Toruń), Prof. Jerzy Pogonowski (Adam Mickiewicz University, Poznań), Dr. Irena Trzcieniecka-Schneider (University of the National Education Commission, Kraków), Dr. Bartłomiej Skowron (Warsaw University of Technology), Prof. Krzysztof Wieczorek (University of Silesia), and Dr. Marcin Koszowy (Warsaw University of Technology).

It can undoubtedly be said that Polish logicians have been unanimous for many years in their opinion that logic is undergoing a “retreat”: it is being taught less and less, and in some educational paths where logic should be taught, it is

na: przystępny zarys logiki zdań [Popular Logic: An Accessible Outline of Propositional Logic]; A. Mostowski, *Logika matematyczna: kurs uniwersytecki* [Mathematical Logic: University Course]; J. Śłupecki, L. Borkowski, *Elementy logiki matematycznej i teorii mnogości* [Elements of Mathematical Logic and Set Theory]; J. Śłupecki, K. Hałkowska, K. Piróg-Rzepecka, *Logika matematyczna* [Mathematical Logic], *Logika i teoria mnogości: podręcznik dla kierunku matematyki wyższych szkół pedagogicznych i specjalności nauczycielskiej uniwersytetów* [Logic and Set Theory: Textbook for Mathematics Department of Higher Pedagogical Schools and Teaching Specializations at Universities]; K. Trzęsicki, *Elementy logiki dla humanistów* [Elements of Logic for Humanists], *Logika z elementami semiotyki i retoryki* [Logic with Elements of Semiotics and Rhetoric], *Logika* [Logic]; Z. Ziemiński, *Logika praktyczna* [Practical Logic]; B. Stanosz, *Wprowadzenie do logiki formalnej: podręcznik dla humanistów* [Introduction to Formal Logic: Textbook for Humanists], *Ćwiczenia z logiki* [Logic Exercises]; B. Stanosz, A. Nowaczyk, *Logiczne podstawy języka* [Logical Foundations of Language]; T. Hołówka, *Kultura logiczna w przykładach* [Logical Culture in Examples], *Kultura logiczna w ćwiczeniach* [Logical Culture in Exercises]. An attempt at a comprehensive list of Polish logic textbooks is included in the Appendix of this report.

absent altogether. It must also be acknowledged that the Polish academic community has been aware of the phenomenon of diminishing logic education and the many misunderstandings regarding the scope of the material taught and the methods of teaching. Representative statements on these topics can be found in a series of texts published in "Filozofia Nauki" [The Philosophy of Science] 10/2, 2002, which refer to the conference "University Teaching of Logic" that took place in Warsaw in 2001.

This report comprises the collected and authorized statements of the participants of our debate. As the reader will notice, some themes, observations, and conclusions are new compared to those expressed in 2001. We also hope that these new elements will be of interest to CLE.

In statements regarding the specifics of Polish logic education, attention is drawn to the low quality of presentation of logical issues at the high school level (I. Trzcieniecka-Schneider), as well as the problem of the insufficient availability of modern informal logic textbooks (K. Wieczorek). A fundamentally new contribution is made by the discussion of specific experiences in using modern IT tools to make the material more engaging and accessible (B. Skowron). It is also noted that the university-level curriculum should be tailored to the usefulness of the presented concepts for a given group of students (B. Skowron, A. Indrzejczak). The multitude of functions (both hidden and explicit) of logical education is highlighted by T. Jarmużek. In turn, M. Koszowy presents new observations on the role of teaching logic in developing students' social competences. J. Pogonowski notes a tendency that may prove important from the perspective of the future development of logical centres in Poland, namely the increasing (including institutional) connections between some of these centres and teaching and research units dealing with cognitive science. We also want to draw attention to the emphasis on teaching formal logic, formal semiotics, and the metatheory of deductive systems (J. Pogonowski, A. Indrzejczak). This focus on contemporary formal tools follows the proud traditions of the Polish School of Logic.

There is no answer today to the question of whether the problems indicated in the statements of the participants in our debate will be at least partially resolved within a timeframe achievable for the current reader. It also remains an open question whether the suggestions and ideas formulated by the debate participants will result in any specific solutions implemented into the teaching practice. The main goal of the organizers, however, was to update the discussion and inspire

Polish academic logic teachers who, considering the institutional support from CLE, will want to attempt to bridge the gap between academic discussions on logic teaching and concrete actions to improve the state of Polish logic education.

Anna Brożek, University of Warsaw

Dorota Leszczyńska-Jasion, Adam Mickiewicz University, Poznań

Kordula Świątorzecka, Cardinal Stefan Wyszyński University, Warsaw

We present the statements of the debate participants in the same order in which they spoke.

How to Teach Logic?

Maria Manzano

Unfortunately, I do not have the answer to the leading question of our debate, I guess that is why some of us are here today. Probably we all agree in that Logic is the interdisciplinary subject par excellence, the clue of any rational reasoning, and the nucleus of the emerging science of the creation and transmission of information.

The main reason I am here is to tell you about the existence of the Commission on Logic Education (<https://dlmps.org/pages/commissions>). It was proposed to the Division of Logic, Methodology Philosophy of Science and Technology in the general assembly during the 17th Congress of LMSPST, Buenos Aires, July 2023.

The commission aims to: (1) have a broad representation both geographically and in the main areas of logic (philosophical, mathematical, and applied computational); (2) be concerned with education at all levels, with a focus on secondary and tertiary education; (3) provide guidance and support for the development of methods, curricula, teaching materials (including textbooks, lecture notes, digital tools, etc.) for logic courses on various levels, for teacher education, and for various target audiences; (4) collect global data on the extend and impact of logic teaching at all levels, but with a focus on secondary and tertiary education, and in all disciplines (e.g., computer science, mathematics, philosophy).

The members of the steering group are: Valentin Goranko (Stockholm University); Laura Hernández Martín (University of Amsterdam); Cathy Kessel (University of California); Benedikt Lowe (University of Cambridge); Fenrong Liu (Tsinghua University); Maria Manzano (University of Salamanca), Joao Marcos (UFSC Florianopolis); Balder ten Cate (University of Amsterdam); Ram Ramanujam (chair, Azim Premji University, India) and Sara L. Uckelman (Durham University).

I will tell you about the European ALFA project on Tools for Teaching Logic that we had last century and about the International TTL Congresses that we held in 2000, 2006, 2011, 2015, and 2023.

The first goal of the ALFA project was to share our experience as teachers among Aracne members. We proposed: (1) the preparation of a metabook (with hypertext version), (2) the design of an online dictionary of logic terms, (3) the investigation of the existing software for the teaching of logic, (4) the translation of both elementary and interdisciplinary texts and software, (5) to help potential authors to write lecture notes, (6) the dissemination of our project both within our academic community and outside it (high school), thus bolstering a good image of Logic, and (7) to support women's participation in higher education.

The network we created was interdisciplinary and included professors and researchers from philosophy, mathematics, computer science, and linguistics. Holland, Italy, Great Britain and Spain were the European countries of the project. Argentina, Brazil, Mexico, Peru and Uruguay were the Latin American. Some of the results of the project can be consulted on the Aracne website: aracne.usal.es and others in the Summa Logicae digital library (<https://logicae.usal.es>)

The Summa Logicae contains a library organized by branches including: Applications, Studies on Logic, Fundamentals, Logical Systems, and Exercises. Pedagogy of Logic is included in Studies on Logic and in there you can find some of the Proceedings of the several Tools for Teaching Logic conferences we organized when the project finished.

Tools for Teaching conferences:

- First International Congress on Tools for Teaching Logic (<https://aracne.usal.es/congress/congress>), University of Salamanca, 14–17 June 2000,
- Second International Congress on Tools for Teaching Logic (<https://logicae.usal.es/SICTTL/>), University of Salamanca, 26–30 September 2006,

- Third International Congress on Tools for Teaching Logic (<https://logicae.usal.es/TICTTL/>), University of Salamanca, 1–4 June 2011,
- Fourth International Congress on Tools for Teaching Logic (<https://ttl2015.irisa.fr>), Rennes 9–12 June 2015,
- Fifth International Congress on Tools for Teaching Logic (<https://toolsforteachinglogic23.weebly.com>), Complutense University of Madrid, 23–24 March 2023.

We also published:

- 1) *Special Issue: Tools for Teaching Logic*, “Logic Journal of the IGPL,” Volume 15, Issue 4, August 2007 (<https://Academic.oup.com/jigpal/issue/15/4/>),
- 2) *Tools for Teaching Logic: Lecture Notes in Artificial Intelligence*, Springer, 2011,
- 3) *Special Issue: Tools for Teaching Logic*, “Journal of Applied Logics – If-CoLog,” Volume 4, Number 1, January 2017 (<https://collegepublications.co.uk/ifcolog/?00010/>).

Being in the year 2024, it would be interesting to consider: current needs, new tools we have as well as the evolution of logic and logic teaching over this century. The main question being: What can be done today?

How to Teach Logic?

Andrzej Indrzejczak

The remarks presented below regarding the teaching of logic are certainly not groundbreaking, but I hope they will not prove controversial either. Perhaps many people believe that teaching logic more extensively today is unnecessary. Modern logic is a complex scientific discipline, and its dissemination should be limited to a narrow circle of specialists or those aspiring to this title. For ordinary people, even those with higher education, this knowledge is redundant. Of course, these views are not new or specific to our times; after all, Descartes believed that every person has innate critical thinking skills and does not need a course in logic. The systematic reduction of logic courses in the curricula of many academic majors seems to reflect this belief. Logic is slowly becoming an extremely elite discipline, even though it would seem its subject matter should be relevant to everyone. However, it is worth emphasizing that we live in times of

easy access to information of very different cognitive values. In the case of young people, this often leads to a state of mental laziness and lack of discipline. Therefore, teaching logic seems more necessary nowadays than it was when access to information was limited. Logic can (or at least should) promote the development of habits for approaching information critically, filtering it, avoiding dogmatism, and presenting one's views in a rationally justified manner. But how to achieve such goals? This boils down, simply put, to two issues: how to teach logic and what to teach in a logic course.

How to teach? To put it simply – in an attractive and engaging way. The difficulty of presenting certain topics should always be alleviated by using well-chosen, funny examples. Of course, the currently available means of presentation should not be neglected. However, these are universal guidelines. In the case of logic, it should be emphasized that it is a very practical subject. I do not believe that anyone can learn logic just by listening to lectures or reading textbooks without independently undertaking the effort to solve problems and exercises on their own. I often tell students that logic is knowledge that enters the head through the hand. Someone who does not face the effort of solving a certain number of problems can only acquire a mistaken belief that they understand. Their errors will become apparent during the next test (hopefully not the exam). Of course, difficulties should be gradually increased, and one should try to encourage students to develop the habit of gradually mastering the material; “sleeping through” the entire semester and then attempting to desperately master all the material a week before the exam does not lead to success. This is the source of widespread beliefs about logic: that it's incomprehensible, extremely difficult, and ultimately unnecessary. Logical knowledge at a basic level, properly taught and dosed, is neither incomprehensible nor difficult. Hence, the basic requirement of a well-conducted logic course should be to divide the material into parts, each of which must always be mastered before moving on to the next step.

What to teach? Logic is not a monolith; the term itself is ambiguous, and the discipline is extremely rich and diverse. And since we are dealing with something akin to Wittgenstein's family of meanings, logic courses should also reflect this. For example, in terms of content, a logic course for philology students should look different from one for computer science students. It's not just about different language skills or knowledge, but primarily about the needs of students in a particular field. For example, in the case of philology students, the presenta-

tion of formal logic can be limited to a minimum, but it is worth putting greater emphasis on knowledge of language, presented with the help of modern formal tools, or methodological problems of analysis and interpretation. In contrast, in the case of computer science, emphasis on the presentation of formal logic, methods of automated reasoning, etc., is entirely justified. This also has implications concerning logic instructors, who represent different temperaments, research inclinations, and interests. It is therefore important task of departments heads to entrust logic courses (with varied material) to individuals who are best equipped to handle them.

What Is the Purpose of Teaching Logic?

Tomasz Jarmużek

Since our discussion is taking place, it is no longer necessary to answer the question of whether to teach logic. Apparently, we all have agreed that logic should be taught. However, I believe that this alone is not sufficient to effectively answer the question of how to teach logic.

To answer the question of how we should teach logic, we must first ask ourselves why, for what reason, or with what purpose should we teach logic. This question does not contest the need for teaching logic, but the answer to it is essential if we want to systematically address the question of how to teach.

The question about the purpose or reason for teaching logic fits into the problem of the functions of social institutions. And although practising logic is largely an introverted, internal, and very personal activity, teaching logic largely loses this character. Teaching in schools or universities is an institutionalized social activity based on formal interactions.

On the other hand, if we ask about the functions of teaching logic, a wide range of answers appears. We can talk about explicit and hidden functions. Hidden functions usually provoke the greatest controversy. So, let's mention two possible ones at the outset.

Firstly, teaching logic provides and can provide employment for many people. Although it seems that this is not the reason we want to teach logic, it cannot be taught without it. Simply considering this topic is engaging and draws us into discussion. The development of logic education will attract and engage even more

people. Secondly, another hidden function related to teaching logic is building the prestige of one's own discipline. By teaching pupils, students and other lay-people about our logical art, we instil in them the belief that it is important or even very important. Among the adepts, there will probably be those who will decide the fate of our world in the future, as well as the institutional fate of logic. Probably every discipline should care about its reception, validity and promotion. In a world where so many commercial, social and ideological projects vie for attention and interest, even the most valuable endeavours – and we consider logic to be such – cannot attract significant interest on their own. Therefore, this function – though implicit – seems important.

Among the explicit functions of teaching logic, we can also mention two. Firstly, we want to increase the knowledge of recipients and secondly, we want to increase their skills. These two functions seem complementary, but they actually are independent. Teaching knowledge about logic in an encyclopaedic sense is something different (and not insignificant) than teaching the application of logic. Certainly, teaching knowledge enhances the prestige and significance of our discipline in social awareness, especially considering the history of logic in Poland. On the other hand, skills seem to be what the modern world expects. What skills and for what purpose would we like to teach? This is a problem of separate importance.

Summarising my voice in the discussion, I believe that before we move on to answering the question of how to teach logic, we should thoroughly answer the question of what functions logic education should fulfil. Then, more systematically and operationally, we can answer the titular question. I have listed here a few obvious functions that are immediately visible to those interested. However, we can look for less obvious answers. Usually, these are the interesting ones, that change the perspective.

Logic and Cognitive Science – A Promising Love Affair

Jerzy Pogonowski

During the five decades of my teaching service, I have participated several times in discussions like the one today on teaching logic. I mention this because – as I remember – similar (or even the same) problems accompanying this educa-

tional adventure were always pointed out. I believe that this fact should be a significant signal for the current attempts to improve this type of teaching. Why have we been constantly complaining about the same difficulties for at least half a century, which still cannot be overcome (by both lecturers and students)?

My proposals regarding the didactics of (mathematical) logic were recently presented in the article *Jak nauczać logiki formalnej?* [How to Teach Formal Logic?], in: *Logika* [Logic], vol. II: *Kultura logiczna* [Logical Culture], eds. S. Janeczek, M. Tkaczyk, A. Starościc, Wydawnictwo KUL, Lublin 2018, pp. 281–295. In addition to some specific practical recommendations, I propose there that the concept of the proof method should be deemed most important. Students should be provided with information on the most important contemporary methods used (axiomatic method, natural deduction, resolution, analytical tableaux, and sequent calculi), of course, along with sets of exercises solved together with the lecturer or recommended for independent solving. I consider it essential in the didactics of formal logic to also pay attention to metatheoretical issues, such as: validity and completeness of proof methods, consistency, soundness, (un)decidability of mathematical theories, as well as the connections between the concept of proof and representations of the concept of computability.

In recent years, we have observed a reduction in the role of logic departments at many faculties of Polish universities. However, it is worth noting that newly established departments supporting cognitive studies are eager to be called departments of logic and cognitive science. Perhaps this is the beginning of a lasting trend, and logic is beginning to be seen as closely related to research on cognitive structures, just as it was previously mainly associated with the methodology of sciences. At the Poznań cognitive science department, we have at least seven semester-long courses on logical issues.⁴ Therefore, even if there is no chance for logic to be an independent academic major, its connections with cognitive science may contribute to raising its importance in academic teaching.

⁴ This number has changed with the evolution of the cognitive science curriculum; however, since the establishment of the cognitive science programme at UAM in 2005, it remains one of the richest offerings in terms of logic available at Polish universities within a single field of study (note by Dorota Leszczyńska-Jasion).

Logic as a Forgotten Dimension of Educational Culture

Irena Trzcieniecka-Schneider

I have been a member of the Textbook Evaluation Committee of the Polish Academy of Learning since its establishment in 2001, and I would like to share the image of teaching logic that emerges from textbooks and curricula of various subjects.

In the core curriculum, there is quite a lot of logic, wherein those are mainly skills in the field of logical culture: defining, justifying, drawing conclusions, etc. For example, in the History core curriculum for high school: "The student creates a historical narrative in a cross-sectional or problem-oriented approach; identifies the problem and constructs argumentation." Teaching contents of Polish Language include recognizing argumentative statements, where the student "indicates the thesis, arguments and conclusions," and in high school, "distinguishes arguments, key concepts and theses in argumentative text, and makes its logical summary." Similar formulations can be found in the core curricula of Biology and Physics. However, on the way from the curriculum to the textbook, these logical skills and educational goals often disappear or appear ultimately in an incorrect form. Perhaps it is our (logicians') years of neglect that resulted in the fact that the authors of textbooks simply do not know logic. On the Polish publishing market, one can find, for example, a Polish Language textbook in which the description of knowledge concerning argumentation and inferences is fundamentally incorrect. Fragments of classical propositional calculus, which were once present in mathematics textbooks for high schools and technical schools, are now obligatory only at the extended level. My fellow reviewer said that when reading mathematics textbooks, he gets the impression that in some of them, the word "proof" has been subject to censorship. There are no proofs or symbolic calculations, and mathematics seems to be only mathematics for accountants. Students educated with such textbooks have enormous difficulty mastering symbolic representations. It would seem that knowledge of logic could be supplemented by philosophy textbooks, but this is not necessarily the case. Taking once again an example from the Polish publishing market: in a certain textbook, there is no word "syllogistic" for Aristotle, no word "logic" for Leibniz, while Lvov-Warsaw School is mentioned only once and only during a rather cursory description of

the views of the Vienna Circle, where the authors write that the ideas of the Vienna Circle were spread in Poland by representatives of the Lvov-Warsaw School. The authors apparently did not notice that the Lvov-Warsaw School was established, counting roughly, about 30 years earlier, and when the Vienna Circle was formed, it already had a significant body of work. Moreover, when reading this textbook, one cannot help but recall the words of Kazimierz Ajdukiewicz that the most common offence against logical culture is the lack of substantive precision in thought and speech. The textbook is riddled with logical errors and flaws, most of which could have been avoided with greater linguistic discipline.

Each of the textbooks I mentioned had ministerial reviewers who did not notice often bizarre logical errors, so we should consider how the community of logicians in Poland can improve this situation. My second postulate is the publication of texts jointly written with a representative of a specific discipline, demonstrating the role of logic along with the methodology of science in that discipline and its teaching.

When to teach logic? I believe we should start as early as possible – in early education, beginning from the concept of sets using examples of sets of concrete objects – and gradually introduce more complex concepts, keeping in mind the stages of student development. It is important to apply the so-called spiral teaching method – so that at each subsequent stage of teaching the same concepts return in a richer, more developed way, because concepts introduced at a young age, in earlier stages of teaching, become natural concepts. Then there is no need to remind oneself: “Oh, there was such a definition!,” because the concept is simply assimilated, that is, “made one’s own.” Both logical knowledge and skills should be conveyed across various subjects of teaching, as some can be done in the Polish Language classes, and a lot of methodology can be taught in natural science classes, although most in Mathematics classes. Gradually, in the eighth grade, concepts such as satisfiability and model could be introduced. Then, in high school, in selected classes, it would be possible to introduce a separate course in formal logic. I think that the dispute within the Lvov-Warsaw School about which logic to teach is now solely a historical dispute because we are facing a different problem: how to simultaneously educate excellent formal logicians who will push our field forward and make new discoveries, and at the same time, take care of the logical culture of the entire society. One must be connected to the other because – using a football analogy – to produce one Lewandowski, hun-

dreds of thousands of boys must first train on school fields or in football schools. It is only for this purpose that one can emerge from them. Therefore, we also need to teach logic to as wide a group of students as possible.

Five Responses to Student Complaints about My Formal Logic Courses

Bartłomiej Skowron

Among the criticisms of the courses I teach in elementary formal logic are the following complaints: that logic is useless and impractical, too abstract and formal, and too difficult.

I have developed five responses to these criticism:

I use large language models (LLMs), like ChatGPT, Gemini, and others, in every class. An LLM can serve as an interactive logical assistant. LLMs are helpful tools for practising critical thinking. One can think of them as omniscient yet deceptive demons that produce truths indistinguishable from falsehoods. Moreover, in doing so, they pose a significant challenge to our sense of truthfulness, which is the primary cognitive apparatus of critical thinking. If you do not know how to use them, ask them.

I supplement logic classes with creative training tasks, which put the mind in a state of open exploration, rather than merely staring blankly at the rigid framework of logic in horror. Creativity training integrates students in class and allows original and surprising contributions to what are often monotonous and automated deliberations. It also helps to dispel the notion that logic is uncreative. I use the book by Krzysztof Szmidt: *Trening kreatywności. Podręcznik dla pedagogów, psychologów i trenerów grupowych* [Creativity Training: Handbook for Educators, Psychologists and Group Trainers], Sensus, Gliwice 2013. This book serves as a practical guide featuring proven exercises.

I point out the normative and ethical dimensions of logic. By cautioning students, I emphasize that illogical reasoning can lead to insanity – after all, no one wants to go insane. I also motivate students positively with the existentialists' motto: "Be free" and "Do not let others lead you." To be free, one needs to understand the framework because "one who is not guided by logos is instead dragged by it." Living in accordance with logos leads to a more flourishing life.

I emphasize the role of logical connectives in searching the Internet using Google, for example. We practise using logical connectives (OR, AND, NOT) in search databases available online. I mention the logical foundations of integrated circuits (microchips) and their role in digital civilization. And then I ask again: is logic really impractical?

Repetitio est mater studiorum. Logic is difficult for many students; therefore, repeated reasoning is essential for mastery. I provide YouTube recordings of the logical problems I have solved. These recordings, available 24 hours a day, allow students to watch the solution to the same problem multiple times, ultimately leading to a deeper understanding of the material.

Lack of a Modern Textbook on Informal Logic

Krzysztof A. Wieczorek

A serious problem that many people teaching logic must face is the lack of textbooks that would discuss topics worth presenting in classes on this subject. While there are many works on formal logic intended for students at various levels of advancement, it is difficult to find books that exhaustively cover issues in the broadly understood area of informal logic, especially in logical semiotics (with a particular emphasis on pragmatics) and argumentation theory. The creation of modern textbooks covering these often-neglected branches of logic seems to be an urgent necessity. It is very important that these textbooks, in accordance with the specificity of the topics discussed in them, be as practice-oriented as possible, so that their authors are able to show how logical theory relates to the everyday problems each of us encounters. They should equip students with tools that they can actually use outside university lecture halls.

A very important part of logic textbooks, especially those proposed above, is vivid examples and exercises. However, gathering a large number of diverse examples and devising interesting tasks that develop various skills poses a huge challenge for one person – the author of the book. Therefore, it seems like a good idea that the creation of the textbooks should be accompanied by the creation of an online database, which would be continually expanded by the community of people involved in teaching logic. The database would contain authentic utterances illustrating various broadly understood logical errors (equivocations, in-

correct definitions, significantly ambiguous or unclear statements, etc.), as well as showing abuses related to language and logic (misleading by making literally true statements with false implicature, using persuasive definitions, etc.). Such a database would also include various arguments (both strong and weak, burdened with various known logical errors) taken from newspaper articles, public debates, or even heard in private conversations. Such an online collection of authentic statements would be a great addition to textbooks on broadly understood logic. People teaching logic could use it to draw examples for the theory discussed in classes, as well as for creating exercises, quizzes, or exams. Additionally, building such a collection could contribute to the integration of the logic community in Poland, and the platform on which it would be placed could become a place for many interesting discussions related to the didactics of logic.

An Attitude to Think Logically as a Key Component of the Logical Education

Marcin Koszowy

It goes almost without saying that any teaching of logic should cover both the component of the *knowledge* of logic as well as the element of the *skills* of applying that knowledge while expressing one's thoughts, reasoning, and evaluating the language use, definitions, questions, inferences, and other outcomes of the cognitive processes. In what follows, we will provide some reasons for the claim that although the concept of an *attitude* to employ the knowledge of logic is *implicite* present in most of the accounts of the logical education, in order to get students more into the logical abilities and dispositions to be employed in their social interactions, logical attitudes and dispositions should be explicitly mentioned and thoroughly discussed with students as one of the key goals of the logical curricula, in addition to the typical emphasis put on the knowledge and skills of logic.

The notion of an attitude as one of the key aims of logical education is explicitly mentioned by Trzęsicki (*Wprowadzenie* [Introduction], in: *Logika* [Logic], Wydawnictwo UwB, Białystok 2012) according to whom logical knowledge and logical skills alone are not sufficient and thus should be complemented by a certain *attitude* which manifests itself in the pursuit of improvement of the knowledge of logic and the logical skills. Among the specific signals of such an attitude,

Trzęsicki lists: recognizing the importance of reflecting on thinking about beliefs and actions, engaging in debates about the logical fallacies and established thinking habits, and analysis of language and abstract concepts. Conversely, the expression of the lack of this kind of attitude includes such behaviours as, for example: waiting for the correct answers instead of striving to find them independently, failing to reflect on logical fallacies we committed, as well as failing to respond to criticism properly. Given the importance of the notion of an attitude to think and use language logically as a key goal of teaching logic, our claim is that the overall idea of the logical dispositions along with the detailed list of most typical and crucial logical dispositions should be emphasized to a greater extent during logic courses. In other words, the presence of the idea of shaping logical dispositions conceived as a persistent tendency to think logically might be important for students in terms of their social communication skills.

This postulate concurs with the example division of the general teaching effects within the Polish education system. Those effects are divided into three categories: (i) knowledge, (ii) skills, and (iii) social competences (see, e.g., *Potwierdzanie efektów uczenia się w szkolnictwie wyższym* [Confirming Learning Outcomes in Higher Education], <https://prk.men.gov.pl/potwierdzanie-efektow-uczenia-sie-w-szkolnictwie-wyzszym/>). In our view, the notion of an attitude to think logically, as explained above, concurs with the “social competences” category to be associated with the education in the field of logic, as being inclined or disposed towards performing any societally vital activity entails a list of certain competences that are crucial for an apt performance of certain attitudes and dispositions to be enabled when needed under particular circumstances. Thus, we think that the logic courses curricula should explicitly define a list of typical logical attitudes and dispositions to be achieved as a key component of the social competences related to logic. Importantly, such a specified, and optimally quite detailed list of dispositions could play a vital role within a logic course. For instance, at the beginning of a logic class, a lecturer may point to the list of crucial logical dispositions that are to be achieved during the course. Next, let us imagine that during each class particular dispositions are being practised. Finally, towards the end of a course, students may be asked what dispositions they find most relevant and important in both their expected professional activities and everyday efficient, rational, and reasonable communication. The example part of any logic course are the dispositions to identify the logical fallacies such as a false dilemma, *petitio principii*,

and *ignoratio elenchi*. In their case, a logical thinking attitude would mean being capable of immediately employing a defence procedure towards a given communication strategy that contains a certain fallacy type. Thus, at least in the case of logical fallacies, a general attitude to think logically would encompass a list of specific sub-attitudes to deal with a particular fallacy.

Although the attitude component in question lies at the heart of logic teaching, putting more emphasis on practising the various sub-attitudes associated with matching skills can help students become more aware of the specific social competencies inherent in logic education.

Logic Textbooks in Poland

Anna Brożek

Note: The list does not include unpublished manuscripts. For works from the 16th–19th centuries, the names of the publishing houses are not provided.

16th Century

Jan z Głogowa [John of Głogów] (1445–1507)

1499 – *Quaestiones super „Priora analytica” Aristotelis*, Leipzig.

1500 – *Exercitium super omnes tractatus „Parvorum logicalium” Petri Hispani*, Leipzig.

1507 – *Exercitium novae logicae*, Kraków.

Górski, Jakub [Gorscius, Jacobus] (1525–1586)

1563 – *Commentariorum artis dialecticae libri decem*, Leipzig.

Jan ze Stobnicy [Jan of Stobnica] (~1470–1519)

1504 – *Generalis doctrina de modis significandi grammaticalibus*, Kraków.

Twaróg, Michał [Michael Parisiensis] (~1450–1520)

1507 – *Quaestiones veteris ac novae logicae*, Kraków.

1507 – *Quaestiones in tractatus „Parvorum logicalium” Petri Hispani*, Kraków.

17th Century

Burski, Adam [Bursius, Adam] (~1560–1611)

1604 – *Dialectica Ciceronis*, Zamość.

Keckermann, Bartłomiej [Keckermann, Bartholomäus] (1572–1609)

1600 – *Systema logicae compendiosa methodo adornatum*, Hannover.

1605 – *Systema logicae tribus adornatum*, Gdańsk.

Korona, Marek (~1590–1651)

1639 – *Directorium albo raczej wprawowanie do pojęcia terminów elementów logicznych i filozoficznych* [Directorium or Rather Introduction to Understanding Terms of Logical and Philosophical Elements], Lwów.

The oldest known logic textbook written in Polish, notably published in Lwów.

Młodzianowski, Tomasz (1622–1686)

1671 – *Praelectiones metaphysicae et logicae*, Gdańsk.

1682 – *Praelectiones philosophicae de metaphysica et logica*, Mainz-Gdańsk.

Mościcki, Mikołaj (1559–1632)

1606 – *Rudimenta logices seu institutiones logicae libri septem*, Kraków.

1625 – *Elementa logices libri septem*, Kraków.

Szczaniecki, Stefan (1683–1737)

1694 – *Fragmenta ex logica*, Kalisz.

Śmiglecki, Marcin [Smiglecius, Martinus] (1564–1618)

1618 – *Logica selectis disputationibus et questionibus illustrata*, Ingolstadt.

This work, over 1,500 pages long, was published three times in Oxford during the 17th century. John Locke studied logic from it.

Tylkowski, Wojciech [Tylkowski, Adalberto] (1624–1695)

1669 – *Logica curiosa*, Kraków. Republished in 1692 in Oliwa.

Wierzchoński, Samuel (~1589–1642)

1620 – *In universam Aristotelis logicam quaestiones scholasticae*, Köln.

18th Century

Benisławski, Jan (1736–1806)

1744 – *Institutiones logicae*, Wilno.

Bohomolec, Jan (1724–1795)

1763 – *Conclusiones ex universa logica et metaphysica. Ex logica*, Warszawa.

Dobszewicz, Benedykt (1722–1794)

1761 – *Praelectiones logicae*, Warszawa.

Konarski, Hieronim Stanisław (1700–1773)

1767 – *De arte bene cogitandi ad artem dicendi bene necessaria*, Parts I–III, Warszawa.

Narbutt, Kazimierz (1738–1807)

1769 – *Logika, czyli rozważania i rozsądzania rzeczy nauka* [Logic, or Science of Considering and Judging Things], Wilno.

The second logic textbook written in Polish, after Marek Korona's. NB. The former was published in Lwów, and this one in Wilno.

Nikuta, Marcin (1741–1812)

1798 – *Sciographie de l'art de penser*, Warszawa.

Stęplowski, Kazimierz (1700–1772)

1753 – *Logica incipientium*, Kraków.

Włodek, Ignacy (1723–1780)

1780–1814 – *O naukach wyzwolonych w powszechności i szczególności księgi dwie* [On the Liberal Arts in General and in Particular: Two Books], Roma.

The first comprehensive textbook on scientific methodology written in Polish.

19th Century

Baranowski, Mieczysław (1851–1898)

1895 – *Dydaktyka uzupełniona zasadami logiki* [Didactics Supplemented with the Principles of Logic], Warszawa.

Biegański, Władysław (1857–1917)

1894 – *Logika medycyny* [The Logic of Medicine], W. Kowalewski Printing House, Warszawa. Subsequent edition: 1908. German translation: *Medizinische Logik*, C. Kabitzsch, Würzburg 1909.

Borzęcki, Teofil (1800–1887)

1862 – *Treść logiki popularnej poprzedzona krótkim wykładem psychologii* [The Content of Popular Logic Preceded by a Brief Lecture on Psychology], Warszawa.

Chałubiński, Tytus (1820–1889)

1874 – *Metody wynajdywania wskazań lekarskich* [Methods of Discovering Medical Indications], Warszawa.

The earliest Polish work dedicated to the logic of medicine.

Cyankiewicz, Andrzej (~1740–1825)

1784 – *Logika czyli myśli z Locke’a „O rozumie ludzkim” wyjęte* [Logic, or Thoughts Extracted from Locke’s “An Essay Concerning Human Understanding”], Kraków.

Dowgird, Anioł (1776–1835)

1828 – *Wykład przyrodzonych myślenia prawideł, czyli logika teoretyczna i praktyczna* [Exposition of the Natural Rules of Thinking, that is Theoretical and Practical Logic], Połock.

The best logic textbook of the first half of the 19th century. Again, it’s characteristic that it was published in Połock.

Gabryl, Franciszek (1866–1914)

1899 – *Logika formalna* [Formal Logic], UJ, Kraków.

Heryng, Zygmunt (1854–1931)

1896 – *Logika ekonomii* [The Logic of Economics], Warszawa.

Jankowski, Józef (1790–1847)

1822 – *Krótki rys logiki wraz z jej historią ułożony* [A Brief Outline of Logic along with Its History Arranged], Kraków.

Kozłowski, Władysław (1832–1899)

1891 – *Logika elementarna* [Elementary Logic], Lwów.

Kremer, Józef (1806–1875)

1849 – *Wykład systematyczny filozofii. T. I. Fenomenologia. Logika* [Systematic Exposition of Philosophy. Vol. I: Phenomenology. Logic], Kraków.

1876 – *Początki logiki dla szkół średnich* [The Beginnings of Logic for Secondary School], Kraków.

1878 – *Nowy wykład logiki* [New Exposition of Logic], Warszawa.

Kudasiewicz, Adolf (1820–1965)

1858 – *Próbki filozofii mowy* [Samples of the Philosophy of Speech], Warszawa.

The first Polish textbook addressing semiotic issues.

Molicki, Antoni (1847–1924)

1879 – *Wykład systematyczny tagmatologii. Część fundamentalna. Metodologia* [Systematic Exposition of Tagmatology: Fundamental Part. Methodology], Kraków.

Pechnik, Aleksander (1755–1835)

1897 – *Logika elementarna z dodatkiem objaśniającym* [Elementary Logic with an Explanatory Appendix], Tarnów.

Przeczytański, Patrycy (1750–1817)

1816 – *Logika, czyli sztuka rozumowania* [Logic, or the Art of Reasoning], Warszawa.

Struve, Henryk (1840–1912)

1863 – *Logika poprzedzona wstępem psychologicznym* [Logic Preceded by a Psychological Introduction], Warszawa.

1870 – *Wykład systematyczny logiki czyli nauka dochodzenia do prawdy*. T. I *Część wstępna* [Systematic Exposition of Logic, or the Science of Reaching the Truth. Vol. I: Introductory Part], Warszawa.

Trentowski, Bronisław (1808–1869)

1844 – *Myślini, czyli całokształt logiki narodowej* [Thoughtness, or the Overall National Logic], Vols. I–II, Poznań.

This textbook contains many neologisms; some of them have been adopted into Polish logical terminology.

Wiszniewski, Michał (1794–1865)

1834 – *Bacona metoda tłumaczenia natury* [Bacon's Method of Explaining Nature], Kraków.

Zagórzański, Józef (1835–1884)

1873 – *Logika formalna dla wyższych gimnazjów* [Formal Logic for Higher Gymnasia], Rzeszów.

Translations:

Bain, Alexander

– *Logika* [Logic], Warszawa.

Condillac, Étienne de

1802 – *Logika czyli pierwsze zasady sztuki myślenia* [Logic, or the First Principles of the Art of Thinking], Wilno.

This textbook was written by the author in French at the request of the Committee of National Education [Komisja Edukacji Narodowej].

Descartes, René

1878 – *Rozprawa o metodzie* [Discourse on the Method], Lwów.

Jevons, William Stanley

1886 – *Logika objaśniona figurami i pytaniami* [Logic with Illustrations], Warszawa.

Liard, Louis

1886 – *Logika* [Logic], Warszawa.

20th Century

Adamiak, Natalia (1922–2011)

1979 – *Logika* [Logic], Instytut Filozofii WNS UW, Warszawa.

Ajdukiewicz, Kazimierz (1890–1963)

1928 – *Główne zasady metodologii nauk i logiki formalnej* [The Main Principles of the Methodology of Science and Formal Logic], the lectures of K. Ajdukiewicz edited by M. Presburger, Komisja Wydawnicza Koła Matematyczno-Fizycznego Słuchaczy Uniwersytetu Warszawskiego, Warszawa.

1953 – *Zarys logiki* [Outline of Logic], PZWS, Warszawa. Subsequent editions: 1955, 1956, 1957, 1958, 1959, 1960 (hereafter abbreviated as 1955–1960). German translation: *Abriss der Logik*, Aufbau-Verlag, Berlin 1958.

1965 – *Logika pragmatyczna*, PWN, Warszawa. English translation: *Pragmatic Logic*, Reidel, PWN, Dordrecht, Warszawa 1974.

Baley, Stefan (1885–1952)

1923 – *Нарис логіки* [Outline of Logic], Наукове Товариство ім. Шевченка, Lwów.

Batóg, Tadeusz (1934–)

1977 – *Zasady logiki* [Principles of Logic], Wydawnictwo Naukowe UAM, Poznań.

1986 – *Podstawy logiki* [Basics of Logic], Wydawnictwo Naukowe UAM, Poznań. Subsequent editions: 1994, 1999, 2003.

Bautro, Eugeniusz (1891–1982)

1934 – *De jurisprudentia symbolica*. Część I. *Prolegomena do logistyki prawniczej* [De Jurisprudentia Symbolica. Part I: Prolegomena to Legal Logistics], Lwów, published by the author.

The first Polish textbook on legal logic.

Biegański, Władysław (1857–1917)

1903 – *Zasady logiki ogólnej* [Principles of General Logic], Wydawnictwo Kasy im. Mianowskiego, Warszawa.

1907 – *Podręcznik logiki i metodologii ogólnej dla szkół średnich i dla samouków* [Textbook of Logic and General Methodology for High Schools and Self-Taught Students], E. Wende, Warszawa. Subsequent edition: 1916.

1912 – *Teoria logiki* [Theory of Logic], E. Wende i S-ka, Warszawa.

1916 – *Podręcznik logiki ogólnej* [Textbook of General Logic], Warszawa, Lwów.

Bocheński, Józef Maria (1902–1995)

1942 – *Logika* [Logic], Edinburgh, script. Subsequent edition: Salwator, Kraków 2016.

Borkowski, Ludwik (1914–1993)

1970 – *Logika formalna* [Formal Logic], PWN, Warszawa. Subsequent edition: 1977.

1972 – *Elementy logiki formalnej* [Elements of Formal Logic], PWN, Warszawa. Subsequent editions: 1974, 1976, 1977, 1980.

1991 – *Wprowadzenie do logiki i teorii mnogości* [Introduction to Logic and Set Theory], Towarzystwo Naukowe KUL, Lublin.

Brzozowski, Stanisław (1878–1911)

1905 – *Logika* [Logic], M. Arct, Warszawa.

Chwistek, Leon (1893–1944)

1935 – *Granice nauki. Zarys logiki i metodologii nauk ścisłych*, Książnica-Atlas, Lwów. English translation: *The Limits of Science: Outline of Logic and of the Methodology of the Exact Sciences*, Kegan Paul, London.

Czeżowski, Tadeusz (1889–1981)

1949 – *Logika. Podręcznik dla studiujących nauki filozoficzne* [Logic: Textbook for Students of Philosophical Sciences], PZWS, Warszawa. Subsequent edition: 1968.

1952 – *Logika* [Logic], PWN, Łódź. Subsequent editions: Wydawnictwo UMK, Toruń 1957, 1958.

Gabryl, Franciszek (1866–1914)

1912 – *Logika ogólna* [General Logic], Kraków, published by the author.

Giedymin, Jerzy (1925–1993)

1966 (with: Jerzy Kmita (1931–2012)) – *Wykłady z logiki formalnej, teorii komunikacji i metodologii nauk* [Lectures on Formal Logic, Communication Theory and Methodology of Sciences], Wydawnictwo Naukowe UAM, Poznań.

Gregorowicz, Jan (1921–1998)

1953 – *Zarys logiki dla prawników* [Outline of Logic for Lawyers], Wydział Prawa UW, Warszawa. Subsequent editions: 1955–1958, 1962, 1975, 1977, 1980, 1995.

Greniewski, Henryk (1903–1972)

1955 – *Elementy logiki formalnej* [Elements of Formal Logic] PWN, Warszawa.

1955 – *Elementy logiki indukcji* [Elements of Logic of Induction], PWN, Warszawa.

Grzegorzczak, Andrzej (1922–2014)

1955 – *Logika popularna* [Popular Logic], PWN, Warszawa. Subsequent editions: 1960, 1961, 2010. Czech translation: *Populární logika*, SNPL, Praha 1957. Russian translation: *Популярная логика*, Наука, Moskwa 1965.

1961 – *Zarys logiki matematycznej* [Outlines of Mathematical Logic], PWN, Warszawa. Subsequent editions: 1969, 1973, 1965, 1981, 1984.

1997 – *Logic: A Human Affair*, Wydawnictwo Naukowe Scholar, Warszawa.

Gumański, Leon (1921–2014)

1967 – *Elementarny wstęp do logiki współczesnej* [Elementary Introduction to Modern Logic], Ośrodek Nauk Społecznych i Wojskowych, Bydgoszcz.

1969 – *Wstęp do logiki współczesnej* [Introduction to Modern Logic], Towarzystwo Naukowe w Toruniu, Toruń.

1983 – *Wprowadzenie w logikę współczesną* [Introduction to Modern Logic], Wydawnictwo UMK, Toruń. Subsequent edition: 1990.

Guzicki, Wojciech (1947–)

1987 (with: Paweł Zbierski (1944–2002)) – *Podstawy teorii mnogości* [Basics of Set Theory], PWN, Warszawa.

Hołówka, Teresa (1944–)

1972 – *Teoria zbiorów i relacji. Wprowadzenie do matematyki współczesnej dla humanistów* [Theory of Sets and Relations: Introduction to Modern Mathematics for Humanities], Instytut Badań Literackich PAN, Warszawa.

Ingarden, Roman (1893–1970)

1972 – *Z teorii języka i filozoficznych podstaw logiki* [On the Theory of Language and Philosophical Foundation of Logic], PWN, Warszawa.

Jaśkowski, Stanisław (1906–1965)

1947 – *Elementy logiki matematycznej i metodologii nauk ścisłych* [Elements of Mathematical Logic and Methodology of Exact Sciences], Akademicka Księgarnia Spółdzielcza Skrypt, Toruń. Subsequent edition: 2018.

Kmita, Jerzy (1931–2012)

1975 – *Wykłady z logiki i metodologii nauk* [Lectures on Logic and Methodology of Science], PWN, Warszawa.

Kotarbiński, Tadeusz (1886–1981)

1924 – *Kurs logiki* [Course of Logic], Komisja Redakcyjna Koła Filozoficznego Studentów Uniwersytetu Warszawskiego, Warszawa.

1925 – *Logika* [Logic], KRSUW, Warszawa.

1926 – *Elementy logiki formalnej, teorii poznania i metodologii [nauk]*, WKFiKP, Warszawa. Subsequent editions: 1929, 1947, 1961, 1986. English translation: *Gnosiology: The Scientific Approach to the Theory of Knowledge*, Pergamon Press, Osolineum, Oxford, Wrocław.

1947 – *Kurs logiki dla prawników* [Course of Logic for Lawyers], Koło Prawników i Ekonomistów Studentów Uniwersytetu Łódzkiego, Łódź. Subsequent editions: 1949–1951, 1953, 1955, 1960, 1961, 1963.

Kozłowski, Władysław Mieczysław (1858–1935)

1916 – *Podstawy logiki czyli zasady nauki* [Basics of Logic, or Principles of Science], Wydawnictwo M. Arcta, Warszawa.

1918 – *Krótki zarys logiki wraz z elementami ideografii logicznej* [Brief Outline of Logic with Elements of Logical Ideography], Wydawnictwo M. Arcta, Warszawa.

Kraszewski, Zdzisław (1925–2012)

1970 – *Główne zagadnienia logiki* [Main Issues of Logic], PWN, Warszawa. Subsequent edition: 1971.

1975 – *Logika – nauka rozumowania* [Logic – the Science of Reasoning], PWN, Warszawa. Subsequent editions: 1977, 1981, 1984.

Kubiński, Tadeusz (1923–1991)

1971 – *Wstęp do logicznej teorii pytań* [Introduction to the Logical Theory of Questions], PWN, Warszawa.

1980 – *An Outline of the Logical Theory of Questions*, Akademie-Verlag, Berlin.

Kuratowski, Kazimierz (1896–1980)

1952 (with: Andrzej Mostowski (1913–1975)) – *Teoria mnogości* [Set Theory], PWN, Warszawa. Subsequent editions: 1966, 1978. English translation: North-Holland Publishing Company, Polish Scientific Publishers, Amsterdam, Warszawa, 1967, 1976.

Lutosławski, Wincenty (1863–1954)

1906 – *Logika ogólna czyli teoria poznania i logika formalna* [General Logic, or Theory of Knowledge and Formal Logic], Wszechnica Mickiewicza, Londyn.

Łubnicki, Narcyz (1904–1988)

1963 – *Nauka poprawnego myślenia* [Science of Correct Thinking], PWN, Warszawa.

1964 – *Zarys logiki. Semantyka i logika formalne* [Outline of Logic: Formal Semantics and Logic], UMCS, Lublin.

Łukasiewicz, Jan (1878–1956)

1929 – *Elementy logiki matematycznej*, WKMF, Warszawa. Subsequent edition: 1958. English translation: *Elements of Mathematical Logic*, Pergamon Press, Ox-

ford 1977. Japanese translation: *Sūri ronrigaku genron*, Bunka Shobō Hakubunsha, Tokio 1992.

1947 – *Geneza logiki. 10 lekcji* [Genesis of Logic: 10 Lessons], Biuro Handlowo-Montażowe inż. M. Bizonia, Katowice.

Łukowski, Piotr (1961–)

1990 – *Ćwiczenia z logiki* [Exercises in Logic], Oddział Regionalny Ogólnopolskiej Fundacji Edukacji Komputerowej, Białystok, Łódź.

Malewski, Andrzej (1929–1963)

1957 – *ABC porządnego myślenia* [The ABC of Proper Thinking], PZWS, Warszawa.

Marciszewski, Witold (1930–)

1969 – *Sztuka dyskutowania* [The Art of Debating], Iskry, Warszawa.

1974 – *Zarys logiki dla bibliotekoznawców. Część II. Wybrane zagadnienia metodologii nauk i logicznej teorii języka* [Outline of Logic for Library Scientist. Part II: Selected Issues in the Methodology of Sciences and the Logical Theory of Language], Wydawnictwa UW, Warszawa.

1994 – *Sztuka rozumowania w świetle logiki* [The Art of Reasoning in the Light of Logic], Aleph, Warszawa.

Marek, Wiktor (1943–)

1972 (with: Janusz Onyszkiewicz (1937–)) – *Elementy logiki i teorii mnogości w zadaniach* [Elements of Logic and Set Theory in Problems], PWN, Warszawa. Subsequent editions: 1975, 1977, 1978, 1991, 1996, 1998–2006, 2008, 2011, 2012.

Mortimer, Halina (1921–1984)

1974 – *Elementarne wiadomości z semantyki i metodologii logicznej* [Elementary Information from Semantics and Logical Methodology], Wydawnictwa UW, Warszawa.

Mostowski, Andrzej (1913–1975)

1948 – *Logika matematyczna* [Mathematical Logic], "Monografie matematyczne," Instytut Matematyczny Polskiej Akademii Nauk, Warszawa, Wrocław.

Mostowski, Andrzej Włodzimierz (1931–2021)

1974 (with: Zdzisław Pawlak (1926–2006)) – *Logika dla inżynierów* [Logic for Engineers], PWN, Warszawa.

Nowaczyk, Adam (1936–)

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