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POLISH LOGICIANS IN THE YEARS 1900-1948 ON SOCIAL FUNCTIONS OF LOGIC

Abstract

The Polish School of Logic flourished in the period 1920-1939. Philosophically, it was influenced by Kazimierz Twardowski, professor at the University of Lwow (now Lviv in Ukraine), who established the Lwow-Warsaw School, to which the mentioned logical group belonged. Twardowski claimed that logic is very important in every kind of human activity, professional as well as private. Hence, every argument should be clearly formulated and proceed by correct inferential rules. These postulates involved semiotics, formal logic, and methodology of science — that is, *logica sensu largo*. This position was accepted by Twardowski's most distinguished students, such as Jan Łukasiewicz, Stanisław Leśniewski, Kazimierz Ajdukiewicz, and Tadeusz Kotarbiński, who graduated before 1914, as well as the next generation of logicians and philosophers, particularly by Alfred Tarski. Although all these people considered logic, philosophy, and science as completely neutral with respect to politics and ideology, they treated logical skills as indispensable in political activities. In philosophical specialized terminology, Polish logicians regarded logic as a weapon against irrationalism. This position was also represented by Polish logicians who did not belong to the group of Twardowski's students.

Keywords: education, rationality, science, philosophy, thinking

1. THE SITUATION OF POLISH CULTURE AT THE END OF THE 19TH CENTURY

Poland had no particularly important tradition in logic until the 20th century. The country lost its independence at the end of the 18th century — it was partitioned among Russia, Prussia, and Austria. The political deterioration

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caused a crisis in science and education, due to the closing of universities (Warsaw, Wilno) or introducing German as the language of teaching (Cracow, Lwow).

The situation improved after 1860, particularly in the Austro-Hungarian part of Poland (Galicia) and, to some extent, in the Russian sector. Polish culture, however, was extremely restricted in the German (Prussian until 1871) zone. Tsarist (Russian) authorities allowed to open the Main School in Warsaw. This institution, acting as a kind of university, became the center of positivistic philosophy (the Warsaw or Polish positivism). The popularization of scientific ideas and achievements was considered one of the means of organic work. It also concerned logic and the foundations of mathematics. In particular, works of Alexander Bain, John S. Mill, William S. Jevons, Louis Liard, Bernhard Riemann, Felix Klein, Hermann von Helmholtz, Henri Poincaré, Richard Dedekind, and Federigo Enriques were translated and published in Polish in the second half of the 19th century and the beginning of the 20th century.

The Austro-Hungarian Empire became a fairly liberal country after 1870. As for the academic life in Galicia, the universities in Cracow and Lwow became Polish — the latter had some teaching also in Ukrainian. In fact, young Poles from all three Polish territories could obtain academic education in the national language. The Academy of Arts and Sciences, established in Cracow in 1872 (the adjective "Polish" was added to its name in 1918), very soon became an important center of Polish academic life.

2. THE ROLE OF TWARDOWSKI IN INITIATING LOGICAL RESEARCH IN POLAND

The further course of political events caused the interest of Polish scholars in organizing and developing national science and education. As far as this issue concerns the topic of the present paper, a special role must be attributed to Kazimierz Twardowski (a professor of philosophy in Lwow since 1895), who became one of the most important university teachers in the entire history of Poland. In his views, he followed several ideas of his teacher Franz Brentano — in particular, the idea of doing philosophy in a clear and methodologically responsible way. As Twardowski programmatically proclaimed, "who speaks obscurely, thinks obscurely as well" (Twardowski 1919). This meta-philosophical attitude created a very favorable environment for logical investigations, because, for Twardowski, logic is an instrument of clarity. His

attitude to the "new" (mathematical) logic was more positive than Brentano's. In particular, Twardowski gave the first academic course on the novelties in logic, in which he lectured on the algebra of logic (the text of his lectures has not been published yet).

Although Twardowski cannot be considered a professional formal logician, his role in the further development of logic in Poland is difficult to overestimate. This is documented by the following words of Alfred Tarski (1992: 20; the letter was written in 1936):

> Almost all researchers who pursue the philosophy of exact sciences in Poland are indirectly or directly the disciples of Twardowski, although his own works could hardly be counted within this domain.

Logicians such as Jan Łukasiewicz, Stanisław Leśniewski, Kazimierz Ajdukiewicz, Tadeusz Czeżowski, and Tadeusz Kotarbiński (to mention a few names only) were students of Twardowski, all graduating before 1914.

3. NEW PERSPECTIVES

I deliberately mention the date 1914. The outbreak and the further course of World War I vitalized (or rather — re-vitalized) Polish hopes for restoring Poland as an independent country and, in particular, inspired a discussion on the future organization of science and education. Russians left Warsaw in 1915, and the city was occupied by Germans. New authorities, in order to gain the sympathy of Poles, agreed to re-open the University of Warsaw in 1916.

In the same year, the Committee of the Józef Mianowski Fund, a special institution supporting Polish science established in the second half of the 19th century, invited several scholars from various fields to formulate remarks and more extensive projects concerning the most effective activities aiming at improving the organization of research and the way of educating students. The organizers collected more than forty papers, published in the first volume of *Nauka Polska* (Polish Science), a newly established journal devoted to various aspects of scientific research in Poland. Twardowski was one of their contributors. However, the paper by Zygmunt Janiszewski "On the Needs of Mathematics in Poland" was of special importance.

Here is the end of this seminal essay:

> If we do not wish to always "lag behind," we must apply radical means and go to the fundamentals of what is wrong. We must create a [mathematical] "workshop" at home! However, we may achieve this by concentrating the work of the majority of our mathematicians on one selected branch of mathematics. In fact, this takes place automatically

> nowadays, but we have to help this process. Doubtless, establishing in Poland a special journal devoted to a unique selected branch of mathematics will attract many to the research in this field. . . . Yet there is also another advantage of such a journal for building the mentioned "workshop" at home: we would become a technical center for publications in the related field. Others would send manuscripts of new works and have relations with us. . . . If we want to capture the proper position in the world of science, let us come up with our own initiative. (Janiszewski 1918: 18)

This new initiative consisted in concentrating mathematical investigations on set theory, topology, their applications in classical mathematics, mathematical logic, and the foundations of mathematics. This was finally declared in 1920, when the international journal *Fundamenta Mathematicae* was established. Two mathematicians, Stefan Mazurkiewicz and Wacław Sierpiński, and two logicians, Leśniewski and Łukasiewicz, constituted the editorial board (Janiszewski died in 1920, before the first volume of *Fundamenta* appeared in print).

The Mianowski Fund initiative was strongly motivated by the surrounding political situation — namely, the above-mentioned hopes for independence. In this sense, it followed the ideas of Polish romanticism and Warsaw positivism. Although the latter specifically criticized romantic irrationalism, the respect for national tasks was shared by both movements. Twardowski in his program was partially guided by the same principle. Moreover, Twardowski had a similar program as Janiszewski — namely, both wanted to make their fields, philosophy and mathematics, respectively, closer to what was happening in science in the world. The political issue in question was manifested not only by participation in academic discussions. Many Polish scholars actively took part in more concrete deeds supporting independence. Both Janiszewski and Leon Chwistek (another important logician, educated at the Jagiellonian University in Cracow and later professor of logic at the Jan Kazimierz University in Lwow) were soldiers in the Piłsudski Legions, Leśniewski was a member of the group decoding the ciphers of the Bolshevik army in the war in 1919-1920, Twardowski patrolled the streets of Lwow in the war against Ukrainians in 1918-1919, Tarski (still as Tajtelbaum — his original family name) and Józef M. Bocheński (yet another person important for the history of logic in Poland) served as volunteers in Polish troops during World War I and later until 1920 (Bocheński). A common patriotic enthusiasm in acting for the independent country seems to be a very important motif in scientific enterprises of both old and young Poles, students as well as teachers. According to this attitude, science and education should serve the nation and country, particularly in a very stormy historical time.

4. LOGIC IN POLAND: RESEARCH AND TEACHING

Assume that a questionnaire about the future of logic in the world would be distributed about 1918. Certainly, Germany (because of Schröder, Frege, Hilbert, and others), Italy (because of the Peano school), the UK (because of Boole, Russell, Whitehead, and others), the USA (because of Peirce and the so-called American postulationists) or perhaps even France (because of Couturat, and ignoring Poincaré's hostility toward logic) would be pointed out as leading countries in logical investigations, but certainly, nobody would think of Poland as a "logical" country.

Just thirteen years later Heinrich Scholz (see Scholz 1931: 73) called Warsaw one of the capitals of mathematical logic, and forty years later, we can read:

> There is probably no country which has contributed, relative to the size of its population, so much to mathematical logic and the foundations of mathematics as Poland. (Fraenkel, Bar-Hillel 1958: 185)

Omitting the historical details (see Woleński 1995 or Murawski 2014 for more extensive presentations), it is clear that logic achieved great prestige during the interwar period in Poland (1920-1939). Let me mention some facts that support this claim.

Firstly, The Warsaw School of Logic established by Łukasiewicz and Leśniewski, and with Tarski as the third leader, very soon became internationally famous.

Secondly, this school can be considered as a "child" of mathematics and philosophy. Consider Tarski and other logicians of his generation — for instance, Adolf Lindenbaum — who were trained by philosophers as well as mathematicians; remember also Tarski's earlier quoted words on the role of Twardowski. Logic was considered a science, independent of its parents. Even if this position about the status of logic might be regarded as somewhat exaggerated from the contemporary point of view, this opinion of logic essentially contributed to the very high assessment of the field in the 1920s and later.

Thirdly, Poland had five (in sum, but at least three in particular "subtimes" of the interwar period) professor positions in mathematical logic (two in Warsaw, one in Cracow, one in Lwow, one in Poznań). If you are interested in how many were outside Poland, the answer is surprising: only one in Münster (in other places logicians worked in philosophical or mathematical departments).

Fourthly, logic was very intensively taught in high-schools and universities. The following story illustrates the level of this teaching. Tarski published a small textbook *On Mathematical Logic and Deductive Method* in 1935 (see

Tarski 1936), later published in English as (Tarski 1941). It was addressed to high-school students, especially interested in mathematics. When I told that to one of my American colleagues, he answered, "My goodness, it is too difficult for most of our university students."

This scope and level of teaching of logic in Poland were certainly related to the prestige of the field in the country. But not only this factor should be noted. In addition, this conviction about the social role of logic has been considered by Polish scholars and educators as justifying the considerable amount of logical teaching. Of course, I do not intend to suggest that mastering logical skills was neglected outside of Poland, but it seems that this aspect of education became particularly important in our country, *inter alia* due to a very close co-operation of mathematicians and philosophers.

In other countries, even in Germany or England, mathematicians specializing in logic were considered marginal or losing their scientific abilities (according to some gossip, when Hilbert concentrated his work on the foundational problems, some commentators said that he was finished as a creative mathematician).

In Poland, such an opinion would be a piece of absurdity. Sociologically speaking, if a prestigious special field, such as mathematics, not only tolerates logic but considers it as important for itself, logic has better chances of being seen as important also in the common education. Moreover, to repeat, according to Warsaw positivism, education of society, for instance, in the principles of correct thinking (the traditional task of logic) plays a very important role in improving underdeveloped society. The Polish nation was considered as such, due to historical circumstances.[1]

5. LOGIC AS ART OF ARTS AND SCIENCE OF SCIENCES

Logic, as conceived in Poland, comprised three parts: semantics (or semiotics), formal logic, and methodology of science. The contrast between logic *sensu stricto* (purely formal, deductive) and logic *sensu largo* (all three subdomains) was observed but without making this contrast too sharp.

Logical teaching included elements of semantics (or semiotics), formal logic, and methodology of science, albeit in different proportions. The logical program for high schools functioned as part of propaedeutics of philosophy and was rather elementary (see, however, the remark on Tarski's textbook

[1] This point was stressed independently of the rise and development of formal logic in Poland, see Bobrzyński 1912. Bobrzyński taught philosophy in a college in Cracow.

from 1936) and touched all parts of logic *sensu largo*. As for the universities, logic *sensu stricto* was very intensively taught in mathematical studies. For instance, in Warsaw, students had obligatory lectures and seminars during the first three years, and the first volume of *Principia Mathematica* by Whitehead and Russell was recommended as a textbook (Leśniewski even planned to translate this entire book into Polish). Philosophers had advanced courses balancing all three parts, and other curricula stressed mainly semantics and methodology.

Nevertheless, as documented by the textbooks for mathematicians (see Ajdukiewicz 1928, Łukasiewicz 1929), sophisticated lectures in mathematical logic had a section on semantics and/or methodology (unfortunately, the English translation of Łukasiewicz 1929 — i.e., Łukasiewicz 1963, omits this section). Although, as far as I know, no Polish logician quoted Petrus Hispanus' slogan *dialectica est ars artium, scientia scientiarum, ad omnium aliarum scientiarum methodorum principia viam habens* ("dialectics [logic] is art of arts and science of sciences, establishing methodological principles for all other sciences"),[2] all scholars in Poland, and not only specialists in logic, fully agreed with its content. In other words, at least elementary knowledge of logic as the very foundation of thinking was indispensable for doing any science. It also concerns teachers of all levels of schools, including elementary schools, colleges, as well as more specialized teaching institutions — for example, pedagogical institutes.

6. INDISPENSABILITY OF LOGIC

Since universities taught future scholars and teachers, the amount of logical teaching in interwar Poland appears to have been dictated by certain general assumptions concerning the character of education. Clearly, Janiszewski's idea of how mathematics should be done and Twardowski's conception of philosophy, in requiring that the successful work in these fields must obey logical principles, also contributed to the character of education, because these domains were considered models for all scientific investigation. The very deductive character of mathematics almost automatically generates the appropriate logical skills needed for mathematical investigations.

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[2] In the standard critical edition, reconstructing the original layer of the text, this definition is shorter (Petrus Hispanus 1972: 1): "Dialetica est ars ad omnium methodorum principia viam habens." See also the critical apparatus and the editor's introduction on pp. LXXII-LXXIII and LXXXVI.

The situation of philosophy appears radically different, due to various metaphilosophical projects. The Lwow-Warsaw School, established by Twardowski at the end of the 19th century (see Skolimowski 1967, Woleński 1989), to which most Polish logicians belonged in the interwar period, shared, together with the Vienna Circle (I skip considerable differences between these two movements), the view that philosophy should be analytic in the sense of being logically correct, by virtue of employing satisfactory methods of reasoning and justification.

Even more, Twardowski and his students firmly believed that logic provides tools for essentially improving philosophy and transforming it into an actual science. For example, Łukasiewicz hoped to axiomatize philosophical theories. Perhaps the case of the Cracow Circle provides a good case. This was a group of Catholic philosophers including Bocheński, Jan Drewnowski, Jan Salamucha, and Bolesław Sobociński. All these people were quite familiar with modern logic and intended to reform neo-scholasticism via logical methods. The problem was that many, perhaps even most Catholic philosophers in Poland as well as those abroad, were hostile or at least skeptical towards modern mathematical logic. Bocheński and his colleagues argued that theological arguments — for instance, proofs of God's existence — should be logically correct, because they must be rejected in other case. Twardowski's conception of philosophy claimed that scientific philosophy has to be neutral with respect to worldviews, religious or ideological. The Cracow Circle followed this pattern and demanded rational theology based on logic. In general, logic was considered by most Polish scholars as a weapon against irrationalism, a socially dangerous attitude.

Polish logicians conceived of the education of future scientists as equipping them with suitable logical knowledge, as something socially very important. Clearly, this view was also caused by the fact that, due to the abovementioned historical circumstances, the Polish scientific community was not very large when Poland recovered its independence. It is understandable in the case of young or restored countries that their social tasks require scientists educated in the "national" spirit.

The Polish project assumed that logic should belong to the essence of the scientific curriculum, and this supposition increased the social importance of education in logic. However, preparing school teachers to perform intellectually responsible (that is, using logical devices) teaching of youth in the system of common education at all its levels was considered equal to or even more significant than logical training at universities.

This was clearly expressed by the following words of Twardowski (see also Twardowski 1901 and 2016 for his views about logic and its general importance; the second book is based on Twardowski's lectures in Vienna in 1894-1895):

> The lack of logical education not only theoretically decreases intellectual quality but also brings ignorance and the lack of precision also in practical application of our thoughts. Our entire life constitutes this application. (Twardowski 1920: 71)

According to Łukasiewicz:

> . . . if judges and officials do not respect principles of logical thinking, it can result in the arbitrary interpretation and application of legal rules, which would strike the rule of law and authority of the state. Lawyers competent in the correct thinking and reasoning are needed for a state, and logic should be included in the program of legal studies as an obligatory subject. (Łukasiewicz 1939/1998: 436)

These two passages show how Polish logicians understood the significance of logic for social life. To sum up, knowledge of logic and preserving its principles increases the quality of human practical actions, because — to paraphrase one of Twardowski's sayings — the obscurity of thoughts and their expressions in language obscures their application in various daily situations. Consequently, the role of logic exceeds purely theoretical knowledge and is also relevant for practical matters.

Politics can be understood more or less widely. Under its extended meaning, the qualification "political" can be applied to every sector of public life. Accordingly, we have various policies (or politics in plural, if one prefers this way of speaking) — for instance, the legal, economic, scientific, cultural, educational, administrative, monetary, or financial. Clearly, the quoted views of Twardowski and Łukasiewicz (other Polish logicians had similar opinions) concern the role of logic in doing politics in the wide sense. Roughly speaking, practical decisions are rational, if they are logical (of course, it is a necessary but not sufficient condition, unless one claims that rationality and logicality are equivalent).

What about the relation between logic and politics when the latter is understood narrowly — that is, as the way of governing countries?

In general, Twardowski (1933) claimed that universities should be entirely independent of political matters — in particular, tendencies represented by official authorities, political parties, etc. Eventually, the standpoint of Polish logicians would be something like that: "Well, politics in the narrow meaning is a special instance of policy in the wide sense. Hence, politicians are obliged to be logical in the usual sense."

7. POLISH LOGICIANS AND POLITICS BEFORE WORLD WAR II

However, the matter is not so simple. First of all, Polish logicians radically contrasted politics (in the narrow sense) with logic (and science in general).

In particular, according to their view, political preferences cannot be rationally justified. Yet they had political views. Twardowski represented a kind of liberalism, early Leśniewski was a socialist, but later he became a rightist, Łukasiewicz always represented Catholic conservatism, Tarski (at least before the war) was leftist, Chwistek declared "almost" communism, and Lindenbaum — full communism (even quite orthodox), but they abstained from expressing their ideological options in scientific writings. Anyway, these scholars, even members of the Cracow Circle, tried to very sharply distinguish logic from ideology and, at least as far as I know, never illustrated general problems of being logical by appealing to "grand" political problems and their proposed solutions. In particular, nobody tried to propose a logical analysis of political ideologies in the sense of Bocheński's post-war writings about communism (see, for instance, Bocheński 1964). This does not mean that Bocheński changed his earlier view on the difference between ideology and science, but only that a new situation arose that suggested enlarging the scope of conceptual analysis.

Perhaps Tarski's view offers a clarification of the issue concerning the relation between logic and politics. He wrote:

> I shall be very happy if this book contributes to the wider diffusion of logical knowledge. . . . It is obvious that the future of logic as well as of all theoretical sciences depends essentially upon normalizing political and social relations of mankind, and thus upon the factor which is beyond the control of professional scholars. I have no illusion that the development of logical thought, in particular, will have a very essential effect upon the process of the normalization of human relationships; but I believe that that the wider diffusion of the knowledge of logic may contribute to the acceleration of this process. For, on the one hand, by making the meaning of concepts precise and uniform in its own field and by stressing the necessity of such a precision and uniformization in any other domain, logic leads to the possibility of better understanding between those who have the will to do so. And, on the other hand, by perfecting and sharpening the tools of thought, it makes men more critical — and thus makes less likely their being misled by all the pseudo-reasonings to which they are in various parts of the world incessantly exposed today. (Tarski 1941: XV)

One might say that Tarski presents Twardowski's view in this passage. Certainly, there are reasons for such an interpretation, because Tarski's expressed a strong belief in the positive significance of "the wider diffusion of the knowledge of logic" for "the process of normalization of human relationships." However, it is interesting that in the preface to the Polish edition

there are no such words. Clearly, the situation in 1940 was completely different from 1935, and the war influenced Tarski's thinking about the social role of logic. It seems that Polish logicians were inclined to think that even if political controversies are unavoidable, the use of logic would temper their importance.

8. DURING AND AFTER WORLD WAR II

The outbreak of World War II proved these hopes to be too optimistic. Yet Tarski, to repeat, noted several virtues of logic for protecting people against being "misled by all the pseudo-reasonings to which they are in various parts of the world incessantly exposed today." Thus, a kind of anti-irrationalism clearly sounds in his words — his quoted words allude to ideologies, like Nazism or communism, considered as responsible for War World II.

The situation in Poland (similarly in the entire Soviet block) after World War II became strongly dependent on various political events. Roughly speaking, the following stages can be distinguished: 1945-1948/1949 (the period of a relative continuation of the pre-war order), 1949-1956 (the so-called Stalinist era with a very oppressive policy); 1956-1970 (the period of liberalization — gradually lesser and lesser, particularly in 1968-1970), 1971-1980 (the attempt at "westernization" of the country, ultimately unsuccessful), 1981-1989 ("Solidarity", marshal law, and the fall of communism).

The official state policy definitely favored Marxism via various administrative regulations concerning academic life, but it looked differently in particular periods or even their sub-periods. As for logic, its prestige remained still very high, although certainly not so great as in the interwar period. Founding *Studia Logica*, an international logical journal, can be taken as a sign of the role of logic in post-war Poland (incidentally, this journal replaced in a sense *Collectanea Logica*, of which two first volumes were destroyed in September 1939); it is interesting in itself that this journal was founded in the Stalinist era. Also, teaching of this subject was considerable in high schools as well as in universities. Logic occupied its place as a part of philosophy and as a part of mathematics, but, due to Marxist pressure on the former, mathematical logic gradually transformed into the foundations of mathematics. The process of separation of mathematical logic from philosophy resulted in weakening of cooperation between logicians-philosophers and logicians-mathematicians.

9. DIALECTIC(S) *VERSUS* LOGIC

Thus, very close personal and scientific relations between these two logical "parties," characteristic of the Polish interwar logical community, became not so intense. These sociological facts show a special aspect of the relation of logic to politics. However, any general conclusions derived from historical circumstances should be carefully checked. For instance, the separation of mathematics from philosophy proceeded everywhere — this means that the role of politics in this particular case could be secondary in the Soviet Bloc.

According to Marxism, every kind of reality and human activity is subject to dialectics. Hence, the relation between logic and dialectics was frequently discussed in Poland and other communist countries. The problem itself appears to be very old and goes back to Hegel. He considered dialectic as the general theory of thinking and reality. Hegel's assumption about the identity of thought and being entails that dialectical principles — for instance, the rule of the unity of opposites — equally applies to both being and thought. Since dialectic governs the reality as a dynamic entity, formal logic loses its significance and is valid only with respect to static objects.

Consequently, dialectic (sometimes the word "dialectics" was employed) is superior to logic — in a sense, the former is the real logic of reality. In particular, the law of contradiction must be rejected in "dialectical logic" (I employ quotation marks in order to avoid the confusion between formal logic and dialectical logic). The issue was discussed by some Polish logicians. Łukasiewicz (1910) offered a very detailed analysis of this principle and concluded that the law of contradiction should be considered not as a basic (primary) theorem of logic. His further works on many-valued logic show that logic without the law of contradiction is possible, sound, and consistent. Stanisław Jaśkowski, also a member of the interwar Warsaw logic group, continued Łukasiewicz's studies on the law of contradiction (see Jaśkowski 1948) and constructed the system of so-called "discussive" logic (in fact, it was the first system of paraconsistent logic) in which contradictions do not imply arbitrary sentences. Although Łukasiewicz mentioned Hegel as a critic of the law of contradiction, and Jaśkowski noted Marxists' interests in the law of contradiction, studies of both Polish logicians entirely remain in the domain of formal logic; Łukasiewicz and Jaśkowski had no intention of replacing logic with dialectic. Even if someone should say that the Jaśkowski system can be treated as a kind of dialectical logic, it would be understood as a standard logical system. Particularly, if the law of contradiction is rejected on the level of the object language, the requirement of consistency remains the fundamental metalogical postulate.

Most Marxists, following Hegel, Marx, and Engels, regarded dialectic as being prior to logic and claimed that the former should be qualified as "the higher" logic (the definite article is proper in this context). Due to the understanding of Marxism as a deeply politically involved philosophy, expressing the view that communism is unconditionally superior to other social systems, the issue of how logic is related to dialectic had an ideological (political) aspect. More precisely, if a view appeared inconsistent with Marxism, it was qualified as obscure and reactionary.

Since the discussion between logicians (Ajdukiewicz, Maria Kokoszyńska — also the latter belonged to the Polish pre-war logical circle) and dialecticians (for instance, Adam Schaff, Jarosław Ładosz) is described in detail in (Jordan 1963) and (Woźniak 2022), I limit myself to very general remarks. Ajdukiewicz (1948) showed that the paradox of the arrow (one of arguments for the claim that motion is inconsistent) results from the ambiguity of the terms "moment" and "place" and thereby cannot be assessed as conclusive. Kokoszyńska (1957) argued that real dialectical contradictions — that is, occurring in being (she did not suggest that the reality is contradictory in any sense) — should not be confused with logical ones. According to logicians, preserving principles of logic (in the wide sense) is obligatory for practitioners of dialectics. Most Polish Marxists accepted this position and, in the further course of the development of philosophy in Poland, the relation of logic to dialectics was not discussed except in marginal cases.

The sociological effects of the "victory" of logic over dialectics are difficult to be exactly assessed, but one might claim that political changes in Poland in the 1980s and later were to some extent (although it should not be exaggerated) related to the success of logic in public relations. Yet the recent crisis of liberal values in Poland demonstrates that the role of logic in public life is still a delicate issue. In particular, logic has been eliminated in Poland from teaching at high schools and universities. It is very surprising that it happens in the country that, to repeat, "has contributed, relative to the size of its population, so much to mathematical logic and the foundations of mathematics."

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