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Article

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WOMEN PHILOSOPHERS OF SCIENCE IN CENTRAL EUROPE: A COMPARISON BETWEEN POLAND AND CZECHOSLOVAKIA IN THE FIRST HALF OF THE TWENTIETH CENTURY[1]

SUMMARY: This paper concerns the contribution of female philosophers of science from Poland and Czechoslovakia in the first half of the twentieth century. They belonged to the first generations of women who were allowed to study at universities in those countries. The paper gives a brief introduction to the historical and sociological background to their study and further academic work. The main part, however, focuses on their contributions to philosophy. It lists the differences in their focus but also provides details of the similarities that can be found in their work, namely, the focus on the teaching of logic, the methodology of science, metaphysics in science, the laws of empirical sciences, determinism and the unity of science. Since there was no contact between these female philosophers in the interwar period, the similarities might stem from the fact that the philosophers in Czechoslovakia and Poland came from the same scientific tradition.

KEYWORDS: female philosophers of science, female logicians, Lvov–Warsaw School, Albína Dratvová, Janina Hosiasson-Lindenbaum, Izydora Dąmbska.

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1. Introduction

A law made by the Ministry of Education of the Habsburg monarchy in 1897 radically changed the accessibility of academic education for women throughout the empire. Until then, women could only be extraordinary students, which, however, did not guarantee any acknowledgement of their study (Chudoba, Smywińska-Pohl, 2017, pp. 14–15). They could also study abroad, for instance in Switzerland. Nonetheless, if they intended to utilise their study in their homeland afterwards, they had to asked for the nostrification of their diploma, which was not automatically given (see Jastrzembská et al., 2020, pp. 69–72). In my paper, I will focus on the change that the law brought to two countries which were then a part of the Habsburg monarchy – Czechia, at that time Bohemia, Moravia and Silesia, which later became Czechoslovakia, and Poland, whose southern part, Galicia, was also part of the monarchy and was incorporated into Poland in the interwar period.[2]

With respect to universities, this paper concerns Charles-Ferdinand University in Prague, the Jagiellonian University in Cracow and the University of Lviv. After the Great War, the list of the universities in this region was enlarged to include Masaryk University in Brno and Comenius University in Bratislava, on the Czechoslovakian side and, on the Polish side, the University of Warsaw, Stephen Báthory University in Vilnius, the University of Poznań and the Catholic University in Lublin (see Bahenská et al., 2023, p. 53; Woleński, 1989, p. 9). Nonetheless, as my paper is focused on female philosophers of science and logicians, only Charles-Ferdinand University in Prague and the universities of Lviv and Warsaw are of interest in this paper, since these philosophers were linked with these institutions.

In Czechia, the situation was intentionally favourable for female students, especially in Prague, where the first women's gymnasium, Minerva, was opened in 1890. This institution prepared its students for the final exam, the so-called *matura*, which was essential for attendance at university.[3] The first graduates from this institution were also allowed to study further as extraordinary students at the Czech Philosophical Faculty.[4] After 1897, they obtained an acknowledgement of

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[2] After World War Two, the borders of Poland were considerably changed.

[3] The *matura* was the final exam at a 'gymnasium' grammar school, and was meant for those who were preparing for further study at university. The absence of such a school for women in Cracow, and consequently the limited number of female students who had passed this exam, meant that there were no ordinary female students at the Jagiellonian University in 1897 (see Chudoba & Smywińska-Pohl, 2017, p. 17).

[4] Charles-Ferdinand University was at that time divided into the Czech Charles-Ferdinand University and the German Charles-Ferdinand University. After the Great War and the establishment of Czechoslovakia, the German Charles-Ferdinand University formed the German University in Prague and was separated from the Czech Charles University (see Bahenská et al., 2023, p. 53). 'Philosophical faculties' at that time offered various fields of study – basically humanities, but also social sciences and empirical

their previous studies, so the first of them could finish their studies as early as 1900 (see Jastrzembská et al., 2020, pp. 72–74).

Nonetheless, among the female students who obtained their doctorates from the Faculty of Philosophy in the interwar period, there is just one philosopher who continued in an academic career, namely Albína Dratvová.[5] This might be because philosophy was an acknowledged field of study with a long tradition. Bahenská et al. (2023, pp. 62, 87, 94–95) point out that this sort of field of study tended to have a rigid career structure occupied by men and to be less open to women than newly-established fields of study. For Dratvová, the situation was further complicated by her philosophical position, which did not agree with that of the leading philosophers of that period who held important posts at the Faculty of Philosophy and in the top Czech philosophical journal *Česká Mysl* [*Czech Mind*] (see Dratvová, 2008, pp. 122, 154–155, 167).

In Poland, the professors at the University of Lviv were in favour of women studying, and several women finished their doctorates there (see Kleszcz, 2016, pp. 21–23). At the Jagiellonian University, the professors were rather hostile to female students, especially those who had Jewish origins. However, there were exceptions, such as the philosopher Tadeusz Garbowski and the psychologist Władysław Heinrich (Chudoba, Smywińska-Pohl, 2017, pp. 26, 56). During the Great War, women philosophy students could also study at the University of Warsaw, where some of Twardowski's students obtained professorships (see e.g. Kleszcz, 2016, pp. 20, 29–30).

The female scientific philosophers who belonged to the Lvov–Warsaw School (i.e., were students of Kazimierz Twardowski in Lviv or students of his students in Lviv or Warsaw) achieved many significant results in their field of study. Therefore, my paper will focus primarily on them. They were, inter alia, Daniela Gromska, Seweryna Łuszczewska-Romahnowa, Izydora Dąmbska, and Maria Kokoszyńska in Lviv and Maria Ossowska (born Niedźwiecka), Janina Hosiasson-Lindenbaum, and Dina Sztejnbarg (later Janina Kotarbińska) in Warsaw.

My aim is to describe the contribution of these women philosophers to contemporary scientific philosophy. In the first half of the twentieth century, psychology, logic and philosophy of science were the main fields of investigation for philosophers (both women and men) who intended to make progress in philosophy in a scientific way or to place philosophy within science. Therefore, my paper discusses the contributions of female philosophers in these fields of study. However, to limit my paper to a reasonable length I will not address psychology.

This paper focuses on the period from 1897, when women were first allowed to enter faculties of philosophy in the Habsburg monarchy, to the rise of com-

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sciences. They were therefore counterparts of faculties of arts, faculties of social science and faculties of science.

[5] She was Czech. There was no such figure in the German University in Prague or in other universities in Czechoslovakia.

munism in Poland and Czechoslovakia after World War Two. As the second limit is not as sharp, I have chosen the date 1950 for it. The first limit is obvious, as it was the first moment at which women could officially attend universities, and many chose this path. The second limit might be less clear but is motivated by the change of sociological situation at that time.

On the one hand, the work of women was appreciated after the World War Two, and women were encouraged to work in fields that had been closed to them in previous decades. This might have been a result of the lack of men after the War but was also the leading ideology of that time (see Jastrzembská et al., 2020, pp. 112–113). It is an acknowledged phenomenon that the academic career of many women from the Lvov–Warsaw School accelerated after the War (see Brożek, 2022a, pp. 153–154). However, in Czechoslovakia too the first female professor in philosophy did not appear until the end of the War. This was Jiřina Popelová, who habilitated in 1946 at Masaryk University in Brno. Two years later, she also obtained a professorship at Charles University in Prague. In the same year, she became the rector at Palacký University in Olomouc (see Jastrzembská et al., 2020, p. 123).

On the other hand, those who did not comply with the prevailing ideology were removed from public life after the rise of communism. This was the fate of Albína Dratvová in Czechoslovakia and, to some extent, also that of Maria Ossowska and Izydora Dąmbska in Poland (see Jastrzembská et al., 2020, p. 114; Brożek, 2024, p. 40, pp. 56–58; Woleński, 1989, pp. 21–22). Consequently, the situation changed dramatically after the War and another study would be needed to describe these changes in detail. I have therefore not covered those years in my paper.

This paper relies primarily on published materials, both academic papers and books and also memoirs and letters. This methodological choice was motivated by the fact that, as a historian of logic and philosophy, my strength lies in understanding this field of study. Therefore, I put an emphasis on this part of my study. As the work of the female philosophers introduced in this paper is still rather unknown and has not been discussed, its brief presentation could be valuable, even though it will not contain further historical background from archival materials. However, I am also aware of the fact that this decision might cause some misinterpretation of the sociological and historical situation presented in the introductory part of the paper.

In my paper, I will first mention several historical remarks that are essential for a better understanding of the contribution of the female philosophers mentioned above. I will then briefly present some topics in logic and the philosophy of science that were touched on either exclusively by the female members of the Lvov–Warsaw School or exclusively by Dratvová. Finally, I compare several topics that were discussed by the Czech as well as the Polish philosophers, such as the teaching of logic, the methodology of science, the issue of metaphysics in science, the laws of nature, determinism and the unity of science.

2. Historical Remarks

There is no doubt that the support of male professors was essential for the careers of female philosophers. In this respect, women were lucky in the Czech as well as the Polish universities of the Habsburg monarchy. As has already been mentioned, female students were allowed to study as extraordinary students at the Czech Philosophical Faculty of Charles-Ferdinand University in 1895, when the first students of Minerva obtained their *matura* (see Jastrzembská et al., 2020, pp. 72–74). At the Jagiellonian University, Professors Heinrich and Garbowski also accepted and led several female students (see Chudoba, Smywińska-Pohl, 2017, pp. 56, 74, 102). The situation was even better in Lviv, where Kazimierz Twardowski openly supported the education of women. He was a patron of the Juliusz Słowacki Gymnasium for women and the Women's Circle at the Lviv University and supported his female students in obtaining doctorates and making further progress in their academic careers (see Kleszcz, 2016, p. 21).[6] Several of these women also became his assistants (Chudoba, Smywińska-Pohl, 2017, p. 16).

Although the situation in the case of the Lvov–Warsaw School is described in detail, there are also known to have been limits to Twardowski's approach. Chudoba (2016, pp. 120–121) points out that he treated female and male students differently, and that he never required the same services from men as he required from women. His female students were his assistants and helped him in his organisational and publication activities. In addition, none of Twardowski's female students obtained habilitation before World War Two (see Chudoba, Smywińska-Pohl, 2017, p. 16). In contrast, Ossowska and Sztejnbarg (Kotarbińska)[7] were habilitated at the University of Warsaw in, respectively, 1932 and 1934 (see Brożek, 2022b, p. 131 Brożek, 2024, p. 54).

In Prague, Dratvová also faced an issue with her habilitation. When she finished her doctorate, her supervisor Karel Vorovka did not support her. He was afraid that there would be strong opposition to female habilitation. Ten years later, after Vorovka's death, she again attempted to obtain habilitation and was successful. She was habilitated in 1932 (see Dratvová, 2008, pp. 74–75, 178–181, 224).

Twardowski's role was crucial not only because he supported women in higher education but also because he was a leading philosopher not just in Po-

[6] The first student who obtained a doctorate under Twardowski, Irena Pannenkowa, pointed out that Twardowski was initially sceptical about women studying. When he found out that women were able to meet with his high standards, he changed his mind and became an eager supporter of their studies (see Brożek, 2024, p. 19).

[7] During World War Two, Dina Sztejnbarg changed her name to Janina Kamińska to conceal her Jewish origin. After the war, she married Tadeusz Kotarbiński and published her papers under the name Janina Kotarbińska (see Krajewski, 2001, p. 103). However, as the majority of her work mentioned here originally appeared under her maiden name, Sztejnbarg, I call her Dina Sztejnbarg in my paper.

land, but in the whole region. He was able to attract a group of talented students around him. Thus, belonging to his School and enduring his demanding formation, either directly as was the case for his students in Lviv, or indirectly for those who were students of his students in Warsaw, contributed to later scientific success (see Skolimowski, 1967, pp. 26–27). Female philosophers at other universities did not have the same luck. Their professors were not renowned personalities.

The importance of contact with leading personalities in their field of study can be demonstrated, for instance, in the case of Albína Dratvová. She (2008, p. 266) recalled in her *Scientific Diary* a meeting and discussion with Rudolf Carnap. He encouraged her to publish in *Erkenntnis* and to present her research at international conferences. After this discussion, she was eager to progress her career in this way. However, later on, as a result of the terminal illness of her mother, she had to resign from the VIIIth International conference that took place in Prague in 1934 (Dratvová, 2008, pp. 266–267). She never published a paper in *Erkenntnis* or in any other distinguished international journal (see Popelová, 1970, pp. 701–703).

With respect to publications and attendance at international conferences, there is an interesting difference in the ways Dratvová and certain female representatives of the Lvov–Warsaw School developed their academic careers. To progress in her academic career, Dratvová relied on scientific publications, which she saw as the greatest merit of a scholar (see Dratvová, 2008, pp. 283–284, 291, 294–295, 325). However, her books and papers were mainly in Czech, even though they were published by distinguished Czech philosophical journals and publishing houses. She had no publication in an acknowledged international journal and never received a scholarship for study abroad (see Popelová, 1970). In addition, Dratvová (2008, p. 236) was rather sceptical about the merits of such scholarships.

In the Lvov–Warsaw School, publications were also valued. In particular, female philosophers who had obtained or wished to obtain habilitation had considerable lists of publication (see e.g. Smoła, 1983; Kuliniak et al., 2024). However, several female members of the Lvov–Warsaw School also published in foreign languages, attended international conferences and received scholarships for visiting renowned philosophical centres. The most active in this respect were Janina Hosiasson-Lindenbaum and Maria Kokoszyńska (see Brożek, 2017, pp. 19–20; Sznajder, 2024, pp. 1349–1350). Hosiasson-Lindenbaum's contributions are especially remarkable as she did not obtain any academic position (see Sznajder, 2024, p. 1350).

Finally, there is a difference in the ways Dratvová and other female representatives saw their positions in academic life as the first female members of academia. For Dratvová, this was a source of various remarks in her *Scientific Diary*. She reported only briefly on the difficulties based on her gender (the greatest one was caused by the already mentioned initial refusal of her habilitation). However, elsewhere she recalled that she was described as a female with a

male way of thinking and that she felt that way (Dratvová, 2008, pp. 79–80). Dratvová also complained that her 'female destiny' complicated her career (see Dratvová, 2008, pp. 182, 217). She compared herself just to men as she did not know any female philosophers (see Dratvová, 2008, p. 220).[8]

In contrast, gender was sporadically seen as something special in the publications of the female philosophers from the Lvov–Warsaw School. For instance, when Dąmbska (1948, p. 18) described 40 years of philosophy in Lviv, she listed several female members of the group.[9] There is, however, no note about their distinct position. A similar approach can be found in Tatarkiewicz's (1948, p. 13) description of the first two habilitated women at the University of Warsaw. They are just mentioned without further ado.[10]

There is one note in a letter from Maria Ossowska (then Niedźwiecka) to her future husband Stanislaw Ossowski in which she said that she did not feel like a woman but more like a man (see Ossowska, 2002, p. 199). However, Ossowska did not link this feeling directly to the fact that she was in a career in a field predominantly occupied by men.

This difference might be caused by the different natures of the sources used. While Dratvová's *Scientific Diary* is to some extent a personal memoir (despite being meant for publication), the published papers were written for a wider audience. The fact that the topic is not discussed extensively in the personal letters of Ossowska does not entirely exclude the possibility that unpublished personal materials of other members of the Lvov–Warsaw School might contain remarks similar to Dratvová's. Nevertheless, the lack of discussion in published materials of the fact that several members of the School were women is striking, especially when women were only allowed to begin to attend university just few decades earlier.

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[8] This situation changed during the World War Two at the latest, however. In her 1939 book, Dratvová (1939, p. 19) quoted a book by L. Susan Stebbing. Later, she even familiarised herself with the work of certain female representatives of the Lvov–Warsaw School, namely Janina Hosiasson-Lindenbaum and Maria Kokoszyńska, whose work she mentioned in her paper on Polish logic (see Dratvová, 1957, pp. 769, 772).

[9] Chudoba and Smywińska-Pohl (2017, pp. 211–212) point out an interesting detail concerning this presentation. Namely, Izydora Dąmbska did not like to be addressed as a female philosopher ('*filozofka*' in Polish), as she argued that the profession of philosopher has no gender. In addition, she tended to dress 'like a man'. She wore shirts and ties. In contrast, the majority of Twardowski's students chose not to follow a similar practice, as can be seen from pictures of Twardowski and his students (see Woleński, 2023).

[10] In the same issue, Janusz Sawaskiewicz (1948, pp. 44, 47) described 50 years of philosophy in Poznań. He mentioned an ethician called Ludwika Dobrzyńska-Rybicka, who was the first habilitated female philosopher in Poland and obtained professorship in 1931. However, he did also point to this fact as something remarkable.

3. Differences in Focus Between Dratvová and the Female Members of the Lvov-Warsaw School

Mathematical logic is the area in which most of the differences between Dratvová and the female members of the Lvov–Warsaw School can be found. This field played an important role in the School since it made the School internationally renowned. The greatest contributions, Tarski's semantic theory of truth and Łukasiewicz's many-valued systems of logic, belong to this field of study (see Woleński, 1989, pp. 81–83). In contrast, Dratvová, despite being the author of famous high school textbooks of logic in Czechoslovakia, was initially sceptical of the merits of mathematical logic, especially its excessive use by the members of the Vienna Circle (see e.g. Dratvová 1938-1939, p. 20). She (2008, p. 296) also became familiar with the area quite late.[11] One of the results of this distance is that in her textbook Dratvová (1936b, p. 137) listed anti-psychologism in logic just as an optional approach to logic. For members of the Lvov–Warsaw School, it was obvious that psychologism in logic was wrong and that no approach other than anti-psychologism was acceptable (see Gromska, 1920, pp. 158–160; Hosiasson-Lindenbaum, 1932a, p. 497).

Unlike Dratvová, the philosophers from the Lvov–Warsaw School were interested in the use of language, both natural as well as formal language in science. Kokoszyńska (1936b) argued against the view that was widespread in the Vienna Circle that syntax is sufficient in the language of science. Following Tarski, she pointed out that semantics is an essential part of the language too. Dąmbska (2016) focused on the question of whether our assertions can have similar mental content, as the issue is an important condition for the intersubjectivity of science. She (1938) also dealt with conditional propositions, which play an important role in scientific arguments. Ossowska (1983) focused on the relationship between logic and grammar. Finally, Łuszczewska-Romahnowa (1979) addressed ambiguity in the language of science.

There were also topics that were exclusive to Dratvová and were not developed by female members of the Lvov–Warsaw School in the interwar period. Specifically, in her book Dratvová (1936a) discussed the applicability of mathematics in science. She (1936a, pp. 21, 24, 49) focused on the question of whether mathematical constructions, which are developed from experience, mirror the experience truthfully.

[11] She recalled the need to master mathematical logic at the end of the year 1936 in her *Scientific Diary*. Afterwards, her view on mathematical logic was more favourable (see Dratvová, 1944, pp. 7–8). However, she was not a proponent of mathematical logic even in this period.

4. Teaching Logic

Teaching was an important issue for most of the female philosophers introduced here. The majority of them were high school teachers for certain periods of their lives (see Kleszcz, 2016, pp. 32, 34–35; Jastrzembská et al., 2020, pp. 100–101; Szubka, 2018, p. 132). Therefore, it is not surprising that the topic was discussed by members of the Lvov–Warsaw School as well as Dratvová.

In her textbooks of logic, Dratvová (1930) primarily introduced traditional syllogistic methods based on Aristotle's syllogistic and later traditions.[12] The textbooks are written for a broader understanding of logic. Therefore, they contain sections on the methodology of science, epistemology and also the philosophy of science and the history of philosophy. She (1944) was also an author of a popularizing book on logic, *Logika a lidé* [*Logic and People*], which stands on the borderline between logic and psychology.

In a series of two papers, Gromska (1920; 1921) criticised a textbook of logic authored by the renowned Polish medical doctor and theoretician of logic Władysław Biegański. She pointed out several issues with the textbook including inconsistencies in terminology and contradictory claims. Thus, she concluded that the book was not appropriate for high school students. Dąmbska (1930) discussed a problem in high schools in Poland, namely that the number of hours of logic classes per week was not sufficient. As logic was, according to her, an essential skill, she saw this as unfortunate. Therefore, she suggested that logic should also be included in different subjects, such as Polish language classes.

Dratvová (1933) also contributed to a book on philosophical education in Czechoslovakia. In her chapter 'Reforma vyučování filosofické propedeutice' [Reform of the teaching of philosophical propaedeutics], she opposed views on reducing logic in favour of the history of philosophy or aesthetics. Dratvová (1933, pp. 41–45) argued that philosophy classes in high schools should be based primarily on debates about philosophical issues with students. In such debates, logic (as well as psychology) is the critical skill and should not be sacrificed for the sake of other philosophical disciplines.

Logical education was linked to clear and proper thinking. This point was acknowledged by members of the Lvov–Warsaw School as well as Dratvová. The importance of a clear philosophical style, which was cherished in the Lvov–Warsaw School, is well known. See, for example, the following quotation:

> A general education in logic is an essential prerequisite for both sound scientific work and sound activity in life. An education in logic develops in a critical person, caution in formulating statements, love of accuracy in reasoning, care for clarity and precision of expression, and these qualities, on which the so-called logical

[12] However, Hosiasson-Lindenbaum (1931b, p. 838) also admitted, in her paper popularising mathematical logic, that the Polish textbook for high school also just covered traditional logic.

> culture is based, are indispensable both in research work and in practical life. (Dąmbska, 1930, p. 279)[13]

It is more surprising, however, that similar requirements can also be found in Dratvová's works, such as the statements:

> We must not assume that we can think logically if we have learned the rules of logic. If we **do not try hard to think logically at all times**, neither our work in logic nor our whole education will be worthwhile. True education does not consist in the accumulation of knowledge, but in the clarity of our knowledge, in its firm logical order. True education necessarily includes the ability to **think clearly**. (Dratvová, 1930, pp. 13–14)[14]

As Dratvová was not in touch with the members of the Lvov–Warsaw School at that time, the requirement for clarity and precision might have been widespread in Central European scientific philosophy at that time.

5. Methodology of Science

All the female philosophers introduced in this paper prized science and disapproved of irrationalism.[15] For instance, Dratvová (1932, p. 323) argued:

> The philosopher must take from the empirical sciences the stimulus for thinking, learn from them sobriety of view, their clarity and precision, which does not let them go far from the range of reality, and must also learn from them method.[16]

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13 Ogólne wykształcenie logiczne jest niezbędnym warunkiem zarówno rzetelnej naukowej pracy jak i rzetelnej działalności życiowej. Wykształcenie logiczne wyrabia w człowieku krytycyzm, ostrożność w formulowaniu twierdzeń, zamiłowanie do ścisłości w rozumowaniu, dbałość o jasność i precyzyjność wyrażania się a cechy te, na których polega tzw. kultura logiczna niezbędne są zarówno w pracy badawczej jak i w życiu praktycznym.

14 Nesmíme se domnívat, že snad umíme logicky mysliti, jestliže jsme se naučili logickým pravidlům. Nebudeme-li se **usilovně snažiti mysliti vždy logicky**, nebude míti ceny ani naše práce v logice, ani naše celé vzdělání. Pravé vzdělání nezáleží v nahromadění vědomostí, nýbrž v tom, jak jsou naše vědomosti jasné, pevně logicky spořádané. K pravému vzdělání patří nutně schopnost **jasně mysliti.**

15 Disapproval of irrationalism was one of the features of the Lvov–Warsaw School (see Simons 2017, pp. 8–12).

16 Filosof musí od přírodních věd bráti podněty k přemýšlení, učiti se od nich střízlivosti v nazírání, názornosti, jejich jasnosti a přesnosti, která je nepustí daleko z okruhu skutečnosti, a také se musí od nich učiti metodě.

She (1932, p. 323) also saw empirical sciences as the only unexhausted spring for philosophical issues.

One of the most important topics in the philosophy of science at the beginning of the twentieth century was the methodology of the empirical sciences. There were renowned contributions to this issue from the members of the Vienna Circle and Karl Raimund Popper (see Leitgeb, Carus, 2024; Thornton, 2023). Similarly, philosophers from Poland and Czechoslovakia, including female members of the groups, took part in this discussion.

In her book *Heuristické předpoklady fyzikálního bádání* [Heuristic Prerequisites of Physical Research], Dratvová (1934, p. 3) argued that the methodology of science is the most important part of logic (in the broader sense of the word) and that changes in contemporary empirical sciences had also prompted changes in methodology. Dratvová (1939, p. 68) identified induction, deduction, statistical method, analogy and classification as the scientific methods. She (1934, p. 17) argued that most of the changes had been seen in induction, which had been enriched by the theory of probability. Unlike many other philosophers of science, Dratvová (1939, p. 99) refused to give any of these methods' priority, and claimed that any method could become inappropriate if its value was overestimated.

In the Lvov–Warsaw School, induction was discussed primarily by Janina Hosiasson-Lindenbaum. In her dissertation, of which parts were later published in a series of two papers, Hosiasson-Lindenbaum (1928) differentiated between two types of inductive reasoning: generalising, and hypothetical. She (1928, p. 363) also addressed analogy as a generalising of subinduction.[17] In addition, Hosiasson-Lindenbaum (1928, pp. 365–366) opposed the view that induction is just a specific type of abduction (which, in the Lvov–Warsaw School, was known as 'reduction'.) In the second paper, Hosiasson-Lindenbaum (1934) focused mainly on hypothetical induction and its use and importance for science. She (1934, pp. 16–17) was aware that, unlike deduction, induction is always just probable.

In order to measure the amount of conviction, which, like Ramsey, she called 'degrees of belief', Hosiasson-Lindenbaum (1934, pp. 18–22) introduced a system of inductive logic. The most renowned version of this system appeared in her paper 'On Confirmation', where she (1940, pp. 136–141) used it, inter alia, for the solution of Hempel's Raven Paradox. She (1931a, 1948) also wrote two papers on the advancement of knowledge and confirmation of hypotheses, and criticised frequentists' approach to probability (see Hosiasson-Lindenbaum 1932b, pp. 196, 203–208).

In her review of Popper's *Logik der Forschung* Dina Sztejnbarg (1935, pp. 269, 272–275) discussed the opposite approach to the methodology of science,

[17] Hosiasson-Lindenbaum (1941) later developed her views on analogical reasoning in a paper that was published in *Mind* and in an unpublished manuscript that was recently presented by Marta Sznajder (2024, pp. 1362–1364).

namely falsification. She characterised Popper as an opponent of the inductive method and a proponent of the deductive method. Popper claimed that the inductive method either requires the involvement of a priori methods or leads to the *regressus ad infinitum*. He also denied that the inductive method has any justificatory value, as inductive reasoning leads only to probability but not to truth. He stressed that the laws of logic cannot be justified, but they can be denied using deductive methods, that is, falsification. The easier it is to falsify a law, the more valuable the law is, according to Popper. Sztejnbarg (1935, pp. 273–278), however, pointed out that Popper's criticism of the inductive method is not justified. Namely, if there are directives of inductive reasoning (like, for instance, Mill canons) neither of these unwelcome consequences (apriorism or *regressus ad infinitum*) appear. With respect to the greater value of laws that it is easier to falsify, Sztejnbarg argued that this is also not always the case. Thus, despite appreciating Popper's great logical culture, Sztejnbarg was not a proponent of Popper's falsificationism.

6. Metaphysics and Empirical Sciences

Sztejnbarg (1990b, p. 107) pointed out that the members of the Vienna Circle had declared war on metaphysics, which they saw as fruitless, useless and even harmful for science. This radical stand was significant for the early period of the Circle.[18] Another common thread between Dratvová and female members of the Lvov–Warsaw School was a criticism of this view on metaphysics. Namely, as will be introduced in this section, they argued for a certain (albeit quite limited) place for metaphysics in the empirical sciences.[19] This manifested itself most in their views on hypotheses and causality. However, at the beginning of this section, I will mention Kokoszyńska's discussion on the nature of metaphysical propositions, which concerns the bare possibility of discussing metaphysics scientifically. In addition, the issue of determinism could be added to metaphysical questions. As this issue is also closely connected with the laws of science, it will be discussed in another section.

In her paper on metaphysics in science, Kokoszyńska (1938, pp. 10–11) differentiated between three pairs of propositions – determined and indetermined, analytic and synthetic, and confirmable and unconfirmable. Combining these three pairs of characteristics, there are eight types of proposition. However, just four of these can be identified in language: determined analytic confirmable, determined synthetic confirmable, indetermined synthetic confirmable and indetermined synthetic unconfirmable propositions (see Brożek, 2017, pp. 25–26). Kokoszyńska (1938, pp. 16–22) argued that the view of the members of the Vienna Circle that metaphysical propositions are indetermined synthetic uncon-

[18] Dratvová (1938-1939, p. 23) shared similar views.

[19] Szubka (2024, pp. 16–17) pointed out that already Twardoewski held similar view on metaphysics.

firmable propositions (and therefore meaningless 'pseudo-propositions') is not the only acceptable view, and nor is it the best defended position.[20] In her paper she presented the positions of philosophers who sorted metaphysical propositions into different groups, such as indetermined synthetic confirmable, and as such they could be a part of science.

An example of an indetermined synthetic confirmable proposition could be a hypothesis. Unlike, for instance Ernst Mach, who argued for the limited use of hypotheses in science, several female members of the Lvov–Warsaw School, as well as Dratvová, vindicated their usefulness in science (see e.g. Sztejnbarg, 1932b, pp. 263–268; Dratvová, 1939, pp. 179–180). Dratvová (1939, pp. 179–180) understood hypotheses and theories as basic explanatory principles of phenomena. Hypotheses, according to her, belong to metaphysics. Once they are verified by experience, they cease to be hypotheses and become facts. If, on the contrary, they are falsified, they have to be changed or excluded from science. She thought that science without hypotheses was useless as it lacks a unification principle for observed facts. Furthermore, she claimed (1939, pp. 187–188) that building hypotheses is one of the most important parts of science, as theories are constructed from hypotheses. In this way, hypotheses contribute to the development of science.

Hosiasson-Lindenbaum (1940, pp. 151–152) claimed that metaphysical theories, if they are not meaningless, could imply observable facts. She argued that there could be metaphysical assumptions such as, for instance, the fact that 'every time A appears, B appears too'. Hosiasson-Lindenbaum admitted that a hypothesis could also contain facts that had not yet been observed but might be observable in the future and in this way could confirm or falsify the hypothesis. In this way, hypotheses that were once metaphysical could become scientific. She also aimed to model the strength of such a hypothesis via her inductive system of logic.

Additionally, Sztejnbarg (1932b, pp. 263–268) described metaphysical hypotheses as unobservable causes of observable facts. She was against the exclusion of such hypotheses from science just on the basis that they are metaphysical (and therefore meaningless in the view of certain philosophers), which was the argument that was widespread mainly among members of the Vienna Circle. According to Sztejnbarg (1932b, pp. 268–269), metaphysical hypotheses are not useless, but could play the role of methodological guidelines, and their value could be in their usefulness for science.

Besides hypotheses, Dratvová (1939, pp. 194–195, 211–212) argued that other metaphysical categories, namely, substance, causality and finality, are also important for science. Causality, in particular, was a commonly discussed metaphysical issue at that time. Dratvová (1931, p. 1) pointed out that causality had

[20] The fact that the propositions of metaphysics are, according to the members of the Vienna Circle, meaningless and unconfirmable was also addressed by Dąmbska (2024, pp. 43–44) in her paper originally published in 1932.

been viewed as a fact for centuries, but certain results in quantum mechanics seemed to oppose its existence. There had been a shift from a belief in the absolute validity of causality to the absolute denial of its existence. Dratvová (1931, pp. 85–86) opposed this denial. First, she stressed that it contradicts our experience. Secondly, she pointed out that causality is not affected by the fact that conditions in microphysics are so complex that we are unable to derive one fact from another. Thirdly, causality is a necessary condition for the development of physics as a science. Like Dratvová, Dąmbska (1933, pp. 17–21) argued that the new findings in quantum mechanics did not imply a denial of causality.

7. Laws of Empirical Sciences

The attack on causality introduced in the previous section prompted revisions to the conception of laws in the empirical sciences. If we are talking about laws in nature, there are two possible conceptions of them. First, we can acknowledge that there are certain observable regularities in nature, that is, that it functions according to certain laws (see Dratvová, 1939, p. 210). In the following section these laws will be called 'natural laws'. However, philosophers and physicists at the beginning of the twentieth century were aware of the fact that natural laws are not available to us. The laws that we formulate in our scientific theories are just approximations of inaccessible natural laws (see Dratvová, 1936a, p. 58). This second conception of laws in science will be called 'laws of nature' in this section. The majority of this section concerns this latter concept of laws.

Dratvová (1931, pp. 57–61) claimed that we believe that nature is ordered in a certain way, and that there are similarities in it which can be arranged into laws of nature. The term 'law' came from the legal sector, and it was assumed that the laws of nature are as certain and unexceptional as laws there. However, the laws of physics that physicists aim to formulate, mainly using mathematics, do not always possess these features. They often require some abstraction or approximation, anomalies can be found that do not fit them, and so on. Thus, she defined a law as an approximate simplified construction. It expresses not what is actually the case but what would be the case if the conditions were ideal. Dratvová (1936a, p. 58) argued that people have no access to real abstract natural laws but construct them as they appear to them. In this way, laws are dependent on cognitive abilities.

Sztejnbarg (1990b, p. 107) pointed out that the war with metaphysics declared by the members of the Vienna Circle also concerns the laws of empirical science. According to Sztejnbarg (1990b, pp. 108–110), the radical denial of metaphysics by the Vienna Circle led to a paradoxical situation. Namely, the laws of nature could be excluded as meaningless in the same way as the propositions of metaphysics, as the laws also do not fulfil the demanding condition of intersubjective verifiability given by the members of the Circle. Popper aimed to secure the situation with his theory of falsification, namely that a proposition is a

part of science if there are known conditions according to which it could be falsified. This would save the laws of nature, as they could be falsified.

Dąmbska (1933, pp. 22–23) distinguished between semantic and epistemological notions in the laws of physics. In the first type of notion, we could ask what type of expressions the laws of physics are and if they could obtain a truth value. This notion is closely linked to the second notion, the epistemological one. Dąmbska argued that the laws of physics are propositions and, consequently, they could be true or false. Their truth value is based on the empirical world. Furthermore, she claimed (1931, pp. 197–198) that the laws of physics are true (or false) absolutely. However, our knowledge might never be sufficient to allow us to know their truth value.

8. Indeterminism vs Determinism

One of the important metaphysical issues that was discussed by contemporary philosophers as well as scientists was the issue of determinism and indeterminism. As Dratvová (1934, pp. 21–22) pointed out, quantum mechanics made certain researchers believe in indeterminism. She (1931, pp. 85–87), however, also stressed that this was not a widespread conviction. For instance, Max Planck argued against this interpretation. He claimed that determinism is more valuable for science than indeterminism. According to him, determinism in quantum mechanics may differ from the classical notion of determinism, but the world is determined even there.

Sztejnbarg devoted her habilitation to the debates between determinism and indeterminism; this was published in *Przegląd Filozoficzny* as a series of three papers (see Sztejnbarg, 1932a, 1932b, 1933).[21] In empirical sciences, determinism is linked with the claim that everything that happens, happens in accordance with the laws of nature (see Sztejnbarg, 1932a, pp. 34–35). She pointed out (1932a, pp. 56, 60–61) that the laws of nature had recently been interpreted not as true undeniable laws but statistically as just probable rules, which had made certain researchers argue for indeterminism. This step had, according to Sztejnbarg, been taken too fast because this is not what this concept of the laws of nature implies. It just means that our knowledge in this field is not sufficient to settle laws that would be certain.

Like Dratvová, Sztejnbarg (1932a, p. 61) claimed that determinism was also endangered by certain results from microphysics, namely the Heisenberg uncertainty principle, which states that certain phenomena of microphysics are fundamentally undetermined. She (1932a, pp. 65–67) questioned, however, how these

[21] Sztejnbarg (1990a) also dealt with determinism when she addressed the concept of coincidence. Krajewski (2001, p. 104) pointed out that she (1990a, pp. 60–64) also discussed in this paper the views of Marxist philosophers, despite this philosophy not being popular in interwar Poland. When it began to be popular after World War Two, she never quoted them.

results that concern microphysics could also be applied to macrophysics. She pointed out that the principle just declares the limits of our knowledge, not the fact that the laws of nature are undetermined. At the same time, she admitted that there is also not sufficient evidence for determinism.

In biology, the issue of determinism and indeterminism was linked with the controversy between vitalism and mechanism, as vitalists argued that the laws of biology cannot be reduced to the laws of physics (see Sztejnbarg 1932b, pp. 245–246). However, Sztejnbarg (1932b, pp. 250–252) denied that there is a direct link between determinism and mechanism on the one side, and indeterminism and vitalism on the other. Specifically, she argued (1932b, pp. 257–258) that the teleological concept[22] that is contained in vitalism neither requires nor vindicates indeterminism. Thus, she (1932b, p. 272) concluded that biology does not provide arguments to resolve the dispute between determinism and indeterminism.

Finally, Sztejnbarg (1933, p. 77) stressed that the main opponents of determinism were traditionally recruited from the humanities. Researchers there could admit that determinism concerned the empirical sciences but would deny that it also affected their field of study, as this would be harmful for free will or free creativity. However, certain researchers claimed that the laws of physics also impact on the realm of humanities, and hence this view was questioned. As in biology, there was a dispute in the humanities about whether their laws could be reduced to the laws of physics. Sztejnbarg (1933, pp. 78–105) specifically discussed the laws of history and the laws of psychology. She (1933, p. 106) concluded, however, that even if the laws of the humanities differ from the laws of physics, no argument from the humanities is sufficiently convincing to prove the priority of indeterminism.

9. Unity of Science—Physicalism

The belief that science could be unified was one of the important views of the Vienna Circle, and unification was one of their aims (see Brożek, 2017, pp. 28–29). As already mentioned, female representatives from the Lvov–Warsaw School as well as Dratvová saw the Vienna Circle as a group of radicals and consequently expressed their doubts about their programme.

Concerning unity of science in the Vienna Circle, Kokoszyńska (1936a, pp. 157–161) differentiated between two notions: a negative and a positive one. While the negative notion reduces all knowledge to scientific knowledge, the positive one argues that there is just one science and just one method in it. She pointed out that one example of the positive notion could be physicalism, whose proponents were mainly Carnap and Neurath. She also stressed that not all the members of the Vienna Circle were proponents of physicalism: for example, Schlick and the group gathered around him opposed it. Thus, Kokoszyńska

[22] This concept is called ‘finality’ by Dratvová.

(1936a, p. 164) argued that the notions of physicalism and the unity of science were ambiguous in the Vienna Circle as they depended on the concepts of science and scientific propositions, about which the members of the Vienna Circle had differing views.

Sztejnbarg (1934, pp. 91–92) also claimed that the views of the members of the Vienna Circle on physicalism were linked with their understanding of the meaningfulness of propositions. Namely, a proposition could belong to a science if it could be intersubjectively verified. According to Carnap, all such propositions could be translated into the language of physics. From this position, Carnap argued that claims from psychology, especially those from introspection, are meaningless as they cannot be verified by anybody else (see Sztejnbarg 1934, pp. 93–94). However, his arguments for physicalism were not convincing, according to Sztejnbarg (1934, pp. 94–95), in a similar way to his arguments against introspection which he inferred from the former.

Like Sztejnbarg, Dratvová based her arguments against physicalism and the unity of science on examples from psychology. There might, according to her, be some arguments for physicalism. She (1939, p. 9) stressed that many disciplines could be formulated in the language of physics, that physics was the original empirical science from which other sciences evolved, and (1934, pp. 4–8) that contemporary physics was the most abstract of the empirical sciences. At the same time, she claimed that this does not mean that we can express everything in the language of physics. Specifically, she argued that the language of physics is not sufficient for expressing inner states of mind. She added that if all sciences were to express their findings in the language of physics, the language would be cumbersome. Furthermore, physics could hardly be a model to other sciences if it itself were not unified. Thus, Dratvová (1934, p. 7) concluded that physicalism was right in its requirement for a more precise language of science but that its requirement that all human knowledge be translated into the language of physics went too far.

10. Conclusion

To conclude, there are certain differences between Dratvová and the female representatives of the Lvov–Warsaw School. Dratvová's academic career was at the Faculty of Sciences, which might have led to her deeper connection to the empirical sciences (not just physics, but also chemistry, biology, and even geology and mineralogy). Despite sometimes being labelled as a mathematician, she did not often discuss the new trends in mathematics, and her works on mathematics focused primarily on its utilisation in the empirical sciences. In contrast, the members of the Lvov–Warsaw School also discussed mathematical logic, semantics, semiotics, the philosophy of science and linguistics, which were not addressed by Dratvová at all.

More importantly, there were several similarities between the female members of the Lvov–Warsaw School and Dratvová. They all valued science, the

scientific method, and clarity of language (and consequently the importance of logic in high school education), and argued against irrationalism. Although the most distinguished representatives of scientific philosophy of that time, as well as certain scientists, argued against metaphysics, the philosophers presented here argued that in certain aspects of science, metaphysics is useful and even unavoidable. The similarities might be caused by the fact that all the female philosophers belonged to a similar scientific tradition, started by August Comte and primarily John Stuart Mill and further developed by German philosophers, especially Franz Brentano.

In this respect, female philosophers did not differ from male scientific philosophers of that period. They might vary in their conclusions, but the value of science and scientific methods, as well as the insistence on clarity and precision, were widespread regardless of gender. In addition, several of their results are valuable contributions to the philosophy of science. The only difference between the male and the female philosophers was that, for various sociological reasons, the path along which female philosophers could proceed with their research, write publications, and obtain positions in academia contained more obstacles. The fact that many aimed to overcome these obstacles and that several even succeeded should not be forgotten.

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