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Does Logic Have a History at All?

Jens Lemanski[1,2]

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Abstract
To believe that logic has no history might at first seem peculiar today. But since the early 20th century, this position has been repeatedly conflated with logical monism of Kantian provenance. This logical monism asserts that only one logic is authoritative, thereby rendering all other research in the field marginal and negating the possibility of acknowledging a history of logic. In this paper, I will show how this and many related issues have developed, and that they are founded on only one prominent statement by Kant. I will argue, however, that this statement takes on a very different meaning in a broader context of the history and philosophy of science, and that Kant and his supporters never advocated the logical monism that they are still said to hold today.

Keywords History of logic · Kantian logic · Philosophy of science · Methodology · Logical pluralism

1 Introduction

Ever since the monumental works of Bocheński or the Kneales, it should be clear to every scholar that logic has a history, both a very extensive and a very complicated one. It is voluminous and complex for the simple reasons that in the course of its more than two-thousand-year history, logic has permeated all schools and disciplines of philosophy, has often been applied to other fields and has also become an integral component of mathematics, linguistics, computer science and many other sciences.

The importance of the history of logic is emphasised by almost all the major schools of the 20th century. In the Münster School, for example, it is said that the age of modern mathematical logic would have occurred much sooner had certain positions in the history of logic not been forgotten (Scholz 1961). From the Erlangen School one learns that certain researchers would not have made certain mistakes if they had known the history of logic better (Thiel 1972). And it has also been pointed out that one's preoccupation with history

✉ Jens Lemanski
jenslemanski@uni-muenster.de

[1] Philosophisches Seminar, Westfälische Wilhelms-Universität Münster, Domplatz 23, 48143 Münster, Germany

[2] Fakultät für Kultur- und Sozialwissenschaften, FernUniversität in Hagen, Universitätsstraße 33, 58097 Hagen, Germany

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and one's attitude towards the history of logic has an influence on the question of whether one advocates logical monism or pluralism (Grattan-Guinness 2011). Logical monism means that only one kind of logic is even a logic at all; there is and can be no plurality of kinds of logic.

Nevertheless, in 2004, a good half century after the publication of the aforementioned monumental works, Irving H. Anellis raised the question at the end of his paper "Does logic have a history or not?" (Anellis 2004, p. 18). The mere fact that this question is a subject of debate highlights the existence of a prominent philosopher, whose influence endures to this day, who held a dissenting view denying the historical development of logic. This standpoint has exerted a substantial impact on the fields of modern mathematics and logic. From Anellis' paper, but also from many other writings, it is clear who held this position, namely Immanuel Kant and his successors. Anellis writes elsewhere: "Kant's view is that logic has no history" (Anellis 1991, p. 71).

Not only does Kant's position seem to have been incredibly powerful in terms of historical influence, but there are many other themes surrounding Kant's so-called 'historical-logical monism'. As we will see, many authors claim that Kant and the Kantians were responsible for the fact that modern logic did not begin in the 18th century. Many 20th-century logicians claim that the re-reading of the history of logic demanded by them was jeopardised by Kant and his followers. The suppression even goes so far as to say that Kantians only studied the history of logic in order to prove that the plurality in history is ultimately false and that only one logic is correct. This would be an extreme form of logical monism.

To this day, many modern scholars draw several consequences from the position attributed to Kant: First, Kantian logic must be quasi a priori worthless, since Kant and the Kantians cannot make any contribution to logic at all if they already deny that there could be any progress in logic after Aristotle. However, since the Aristotelian-Kantian type of logical monism has been widely rejected since the 20th century, many scholars on Kantian logic today only refer to the fact that they would render 'philosophy of logic', but not 'formal logic' (Lu-Adler 2018). Moreover, a not insignificant number of logicians argued that the Kantian position should either be ignored or strongly criticised, since Kant was an impediment to logical progress. Instead of Kant, one should rather take Leibniz seriously, who on the one hand was familiar with the history of logic and on the other hand made an important contribution to progress (but was ignored or even sabotaged by Kant and the Kantians).

In this paper, I will argue that Kant never advocated this anti-historical form of logical monism, according to which logic has not progressed since Aristotle and never can. Thus we shall conclude that the alleged Kantian position invoked by 20th-century logicians is either a misunderstanding or a straw man argument.

In Sect. 2, I would like to sketch a historical trajectory that will show how the anti-historical position that has been attributed to Kant arose in the modern logic of the 20th century. In doing so, we shall see that this Kant interpretation developed until the 1930s, reached its peak in the 1950s and is an interplay of many different themes that are based only on one passage in Kant's writings. In this famous text passage, Kant appears to say that logic has or perhaps even can have no history.

In Sect. 3, I will summarise and classify the theses that were presented historically in Sect. 2 in a more analytical way. Readers who are not interested in the history can omit Sect. 2 by jumping directly to Sect. 3 and considering Sect. 2 only as historical evidence for the classification.

Section 4 deals with arguments that the 20th-century anti-Kantian position has resulted from several cumulative misinterpretations. I will present evidence that the text passage in

question was already an 18th-century insight growing out of the so-called 'Leibniz programme', that Kant adopted it, and that this adopted quotation makes very different sense in the context of Kant's history of science.

Finally, Sect. 5 will be concerned with dismantling the 20th-century prejudices and demonstrating that there has never been a prominent position that has seriously held that logic has no history. To this end, I will also point out that there was at least one mathematician in the early 20th century who did not share any of the Kant interpretations of his colleagues and therefore does not impute history aversion to Kant.

2 Kant in the Formal Logic of the 20th Century

The historiography of logic in the 20th century is characterised by the dispute over the emergence and precursors of the so-called 'new logic'—a term that also slowly gained acceptance from 1900 onwards. Kant and Leibniz are the main points of reference, the first negatively, the other positively. This is an inversion of the 19th century, where Leibniz was often dismissed as a metaphysical exaggerator and Kant was portrayed as a serious and down-to-earth scholar. Involved in this reversal of the historical evaluation of Kant and Leibniz in the first half in the 20th century are the French and English Leibnizians, American Peirceans, the Göttingen School, the Vienna Circle, the Lvov-Warsaw School, the Group of Münster and the Cracow Circle. The wealth of material that could be drawn on from these 50 years or so could fill an extensive, albeit very tedious, compendium. Therefore, in what follows, only individuals will be spotlighted, which can be easily supplemented with further examples.

In evaluating Kantian logic, a quotation from the second preface of the *Critique of Pure Reason* (1787) is particularly at issue, in which the progress and regress of logic are discussed and Aristotle emerges as a point of reference. The slightly shortened quotation, which will be referred to below as the 'Aristotle passage', reads as follows

> That from the earliest times logic has travelled this secure course can be seen from the fact that since the time of Aristotle it has not had to go a single step backwards, unless we count the abolition of a few dispensable subtleties or the more distinct determination of its presentation, which improvements belong more to the elegance than to the security of that science. What is further remarkable about logic is that until now it has also been unable to take a single step forward, and therefore seems to all appearance to be finished and complete. (Kant 1998, B XVIII)

Looking at how the image of Kant and Leibniz evolved up to about 1930, one first begins to notice mild to moderate statements about the quoted text. Harsh to pejorative judgements are only rarely made in the early 20th century. As a rule, the judgements about Kant are not based on an intensive examination of Kantian philosophy or the context of the Aristotle passage. Nevertheless, it quickly becomes clear that the Aristotle passage revolves around certain opposites such as 'Kant vs. Leibniz', 'old logic vs. new logic', 'philosopher vs. mathematician' and many others. The mood changes more and more as a result.

In 1900, in *A Critical Exposition*, Russell cites much about Kant, but says nothing about his logic (Russell 1900). A rivalry between Kant and Leibniz is not recognisable at any point in the text. In later works, such as *The Principles of Mathematics* (1903), Russell clearly emphasises his opposition to Kant, but to our knowledge never attacks Kant's views

on logic. Regarding the Aristotle passage, Russell even states that Kant was right in his time. There was simply no progress in those days (Korhonen 2013, pp. 38, 62).

In 1901, the philosopher Evander Bradley McGilvary, who is close to pragmatism, takes up the Aristotle passage in *Progress of the Century* and declares that this "remark would be absurdly false if made to-day" (McGilvary 1901, p. 988). His critique, however, has nothing much to do with formal logic and absolutely nothing to do with logical monism. For him there has simply been a whole series of developments in logic between Hegel and Peirce. Thus, although a clear criticism of the 'Aristotle passage' is made around 1900, the criticism of Kant here does not concern the question of whether there was, is or will be a history of logic at all.

Couturat is one of the first to criticise Kant from the point of view of the algebra of logic (Schwartz 2017). In 1903, in *La logique de Leibniz*, he notes that Kant's logic "is almost purely scholastic" and is a retrograde step back to before Leibniz and his school of algorithmic logic (Couturat 1901, p. 440). In 1905, Couturat's opinion about Kant in *Les principes des mathématiques* is somewhat harsher, although one has to give Couturat credit for having dealt intensively with Kant. Couturat now says that modern logic and mathematics have "taken all the power away from Kant's doctrine and have proved Leibniz right" (Couturat 1905, p. 303). The modern logicians, Couturat now says, have decisively refuted Kant's opinion that formal logic has not taken a step forward since Aristotle (Couturat 1905, p. 303), (Couturat 2021, p. 91). Regarding his view on progress in logic, Kant has shown himself to be "ultra-conservative" and "reactionary" (Couturat 1905, p. 304). With these statements, Couturat proves to be one of the fiercest critics of the Aristotle passage. Poincaré, however, rejected this opinion and a lengthy discussion broke out between the two, which among other things also took aim at the Aristotle passage. This discussion was continued in English up to the last issue of *The Monist* in 1912.

As relevant as Couturat's work on Leibniz may have been, his critique of Kant was not initially adopted. I shall give just a few examples. In his writings on the 'new logic' in the early 1910s, Hans Kleinpeter, an Austrian high school professor and follower of Ernst Mach, tried to defend traditional logic, even though he acknowledged the progress of the new logic. Morris Raphael Cohen, who forms a bridge between Peirce and Russell, took up the Aristotle passage again in 1917 and tried a mediating reading. Namely, the old, Aristotelian-Kantian logic was good for classificatory sciences such as zoology, but for mathematics one had to use the new logic (Cohen 1923, p. xxii). In C. I. Lewis' *A Survey of Symbolic Logic*, Leibniz, Lambert and Ploucquet are discussed positively (Lewis 1918, pp. 4, 18ff.), but after them there is a large gap in Lewis' history until logicians like Peirce are finally mentioned (Lewis 1918, p. 78). However, Kleinpeter, Cohen, and Lewis did not discuss Kant.

In the 1920s, discussion of Kant's Aristotle passage increasingly spread in the German-speaking world, but initially here too without (significant) criticism or rejection. In 1922, for example, the Hilbert student Heinrich Behmann writes unexcitedly in his *Beiträge zur Algebra der Logik* that without sign language (Zeichensprache) or algebraic notations logic, as Kant writes, would not have taken a step forward (Behmann 1922, p. 164). This is a thoroughly moderate reading, for a judgement on Kant and his logic cannot be even implicitly found in it. Rather, Behmann accepts that there were no great upheavals in logic up to Kant's time and it is only now that progress has actually taken place.

In September 1927, the *Second Congress of Polish Philosophers* met in Warsaw with numerous foreign guests and prominent logicians such as Tarski and Leśniewski. In his opening speech, Jan Łukasiewicz rejected both a "back to Leibniz" and a "back to Kant" point of view. Aristotelian logic, however, had its justification, though it had to be

complemented by Stoic logic in particular (Mirtschuk 1928, p. 347). Łukasiewicz held this moderate to neutral position in his later publications, for example in his *Geschichte der Aussagenlogik* of 1935. The history of logic should indeed be rewritten, namely by a historian who also mastered logistics (Łukasiewicz 1935, p. 112), but there is not a word of contempt or ridicule of Kant, or even of the appropriation of Leibniz, in that paper. Łukasiewicz, however, argues overall in that paper for the primacy of propositional logic and thus also for a stronger interest in Stoic logic and Frege (Łukasiewicz 1930, p. 63).

With the publication of Hilbert and Ackermann's *Grundzüge der theoretischen Logik* in 1928, however, the narrative changes: mathematics had revolutionised logic. "[T]he idea of a mathematical logic was first conceived in clear form by Leibniz" (Hilbert and Ackermann 1950, p. 1). Then De Morgan, Boole, and others continued the Leibniz programme. At the beginning of the chapter on the predicate calculus (Hilbert and Ackermann 1950, p. 55), Hilbert and Ackermann cite the Aristotle passage. They say that Kant shares the opinion of earlier logicians that logic has made no progress and is complete. But, they continue, "Aristotelian formalism" is "inadequate". They do not mention who these earlier logicians are. (We shall return to this question.) Again, the Aristotle passage serves more to draw attention to the contrast between logic before and after 1900, more than to anything else; and in this respect it is a rather moderate reading of Kant himself, but a thoroughly harsh critique of philosophy and Aristotelian logic compared to the logic of today.

In the same year, Carnap revisits the topic at the beginning of his *Abriss der Logistik*: the "old logic, wasting away with anaemia, received its death blow when it became apparent that contradictions appeared in it" (Carnap 1929, p. 1). Kant is not mentioned negatively, but the polemic against the 'old logic' seems surprisingly aggressive in Carnap's review of the logics of the early 20th century, and thus also shapes the argumentation against the old logic in many writings of the next years.

In contrast, the so-called *Manifesto of the Vienna Circle* of 1929 comes across as somewhat more moderate. Here, Brentano's decision in favour of Leibniz and against Kant is emphasised (Mach 1929, p. 11), and the history of logic is reduced to the sequence Leibniz, Peano, Boole, Venn, Frege, etc. (Mach 1929, pp. 13, 21). In 1930/31, Carnap's treatment of the same topic in *Die Alte und die Neue Logik* seems gentler as well, and sounds similar to Hilbert and Ackermann: the old logic was indeed inadequate, but one does not reproach it (Carnap 1959, p. 134). It is only true that logic has been revolutionised by mathematicians in the last 50 years (Carnap 1959, p. 134).

A caesura in the debate pro Leibniz and versus Kant is the slowly forming Münster School or 'Group of Münster' (Strobach 2020). Between the 1930s and the 1950s, a new interpretation breaks in, which for the first time connects the Aristotle passage to the question of whether there is a history of logic at all. Here, several of the common modern criticisms of the old logic are now gathered together and directed primarily against Kant. Heinrich Scholz's most important contribution to logic consist, as it is still said today (Peckhaus 2022, Sect. 3.3), in his *Abriß der Geschichte der Logik* first published in German in 1931 and translated into English in 1961. Scholz reports that there has only been one major monograph on the history of logic and that this is Prantl's *Geschichte der Logik im Abendlande* (Scholz 1961, Pref.). Scholz thinks there has been no comparable project for modern logic so far, which is why he is making a first attempt here. (But as we will discover in Sect. 5, this is not correct, and it is surprising that Scholz overlooked or ignored the histories of modern logic that were already published at the time he was writing.)

Scholz declares his intimate connection with Couturat's research on Leibniz directly in the preface. He notes that Lambert (Scholz 1961, p. 14ff.), Ploucquet and, in the broadest sense, Euler also took up Leibniz's ideas. Scholz's criticism of Kant is radical.

Right on the first page, he asserts that Kant is responsible for the fact that the 'history of logic' as a discipline does not yet exist. For, Scholz says, Kant claims in his Aristotle passage that logic has no history at all, since there is only one true logic, namely the Aristotelian one (Scholz 1961, p. 1f.). Thus in contrast to all the logicians mentioned above, Scholz introduces a new and stronger interpretation: The Aristotle passage is no longer used merely as a bon mot to refer to the contrast between the old and new logic, but is castigated as an expression of logical monism and is thus related for the first time to the question of the very existence and even possibility of any history of logic.

Scholz follows the Lvov-Warsaw School and presupposes propositional logic as elementary. This was already anticipated by the Stoics, whereas Aristotelian logic was only a weak form of predicate or term logic (Scholz 1961, p. 33f.). Since Kant propagates only one true logic, which is the Aristotelian one, he has already missed the revolution of Stoic logic. Scholz thinks that since Kant puts Aristotelian logic on a pedestal over and above everything else in logic (Scholz 1961, p. 15), Kant (very naturally) would have found that all the innovative logicians of the 19th century and beyond have no real value. Scholz thinks that if Leibniz had been followed instead of Kant, the new logic would superseded the old one much earlier (Scholz 1961, p. 57). Thus for the first time, the Aristotle passage becomes the standard for pejoratively dismissing Kant's view of logic as unchanging, as well as Kant's own logic.

The radical nature of Scholz's interpretation also becomes obvious in contrast to other interpretations of the time. In the same year, there is another allusion to Kant's Aristotle passage in Reichenbach's *Ziele und Wege der heutigen Naturphilosophie*, which seems like a connection between the two writings mentioned by Carnap, but does not yet include Scholz's new interpretation. On the one hand, Reichenbach explains that Kant is right that logic really did not make any progress in the 18th century, but on the other hand, the progress is now so serious that "Aristotelian logic appears only as a primitive initial stage" (Reichenbach 1931, p. 42f.). Reichenbach's modest reading agrees with Kant from a historical perspective, since the old logic had undergone only marginal changes. Scholz, however, accuses Kant of being responsible for a decadence and even regression in logic, and for sabotaging the discipline of the history of logic.

In 1933, Menger takes up Kant's Aristotle passage several times both implicitly and explicitly, and continues the aggressive tone of these years. Kant's "famous dictum" was proof that Leibniz had not been perceived in later years (Menger 1937, p. 301). From today's perspective, Kant's statement appears "not only strange but incomprehensible" (Menger 1937, p. 300). Logic had been practised conservatively for 2000 years, but even in the dark Middle Ages logic had been more progressive than in the bright Enlightenment (Menger 1937, p. 301). Fortunately, however, mathematicians now helped the philosophers and set the new logic on its way (Menger 1937, pp. 301f., 309). Menger thus combines many of the theses mentioned above, but does not address all of Scholz's arguments.

The narrative of Kant's counter-productivity was cemented at the latest with the *First International Congress for Unity of Science* at the Sorbonne in 1935. In his lecture on *Klassische deutsche Philosophie und die neue Logik*, Scholz once again reinforced his theses from the *Abriss der Geschichte der Logik*. Right at the beginning he cites the antagonism between Kant and Leibniz as the reason for the disregard of the new logic (Scholz 1936, p. 2f.). Kant was an opponent of Leibniz, and Kant's school dominated until recently. Frege, however, was a Leibnizian; thus Scholz holds Kant responsible for the long ignorance of Frege's logic (Scholz 1936, p. 2f.). Several participants of this congress who wrote about logic in later years came back to Kant's Aristotle passage.

For the year 1936, only Neurath (1981, p. 686) and Walter (1936, p. 91) shall be mentioned here. Neither, however, relates the Aristotle passage to the rejection of a historiography of logic, but only to the fact that Kant could have had no idea of modern logic. Scholz, in contrast, emphasised his rejection of Kant in later years and, as Quine also confirms, set Kant and Aristotle against Stoic logic and Frege (Quine 1936a, 1936b).

Until the middle of the 20th century, this position against Kant and in favor of Leibniz became entrenched in logic. It would be tedious to present the many references to Kant, and especially to the Aristotle passage as discussed by various schools of logical thought, any further. For most formal logicians between the mid-1930s and the 1950s repeat the narratives put forward so far, or else remain silent about Kant and most Kantians. In the context of the entrenchment of the Scholzian position, these quotations can then also be quickly classified and certain gaps of some sort identified. However, Bocheński, who shaped the image of Kantian logic from the 1950s onwards for several generations thereafter, and who continues to have an impact today, still deserves to be mentioned.

Bocheński's engagement with the Aristotle passage of Kant can be traced back to the 1930s, although it only became known in the 1950s. In 1936, Bocheński wrote a paper on the history of logic entitled *Notiones Historiae Logicae Formalis*. This work affirmed the positive thesis: Formal Logic has a history! ("Logica formalis historiam habet." (Bocheński 1936, p. 109)) Kant had believed that Aristotle had immediately invented everything in formal logic. But this widespread belief, Bocheński says, is wrong. In fact logic, like all sciences, has a long and complicated history. However, Bocheński takes a moderate view. Kant was right that Aristotle had made a very good major start; but one must also mention the Stoics, among others, as important contributors. Bocheński names Scholz, Łukasiewicz and also Prantl – "falsam omnino habet conceptionem logicae" – as precursors of his project of correctly expounding the history of logic (Bocheński 1936, p. 110). For further details we refer to Tkaczyk (2022) which illustrates how Bocheński's still quite moderate reading of the Aristotle passage turns into a very pejorative one over the years.

In the 1940s, Scholz was in an intensive exchange with Bocheński (Besler 2022). In his *Ancient Formal Logic* of 1951, Bocheński interprets the Aristotle passage as saying that there is "no history of logic at all" (Bocheński 1951, p. 5). Bocheński's support of a positive thesis has now turned into a rejection of a negative thesis. For Bocheński, since Kant referred back to Aristotle, Kant and the entire 19th century did not even know the Stoics. For Bocheński, the Stoics were "the greatest thinkers in logic", but "Kant is not a logician at all" (Bocheński 1951, p. 5). Moreover, Kant is responsible for the fact that the history of logic is in such a difficult position. For "the worst mischief" was caused by Carl Prantl, who had written a voluminous history of logic, but on the one hand had no idea of formal logic, and on the other hand believed in Kant (Bocheński 1951, p. 5). Bocheński further strengthens these theses in later writings, as we shall see.

With Bocheński, a change of direction thus took place in 20th century Polish logic, away from the neutral attitude of Łukasiewicz, towards a pejorative portrayal of Kant. This is also apparent in Bocheński's famous *Formale Logik* in 1956, which became known as the *History of Formal Logic* in the English translation of 1961. At first, Bocheński adopts the modest reading here, claiming that Kant was right because the logic of his time had made no progress (Bocheński 1961, p. 6). But then comes the reversal into the opposite, because this is only due to the fact that Kant was an ignoramus and was not interested in formal logic (Bocheński 1961, p. 258). The same is true of many of his contemporaries, all of whom could not even distinguish the precursors of propositional and predicate logic, i.e. Aristotelian from Stoic logic. The only exception was Leibniz who was "one of the greatest logicians of all time" (Bocheński 1961, p. 6, 258). Some followers of Leibniz's programme

such as Lambert, Ploucquet and furthermore Euler are sometimes still mentioned even now (Bocheński 1961, p. 267). Leibniz had introduced the mathematical and the diagrammatic calculus. Leibniz could also have revolutionised logic as a whole, but Kant and his contemporaries did not listen to him.

If we compare Bocheński's theses with the previous opinions, we can see that in later years Bocheński has clearly moved away from the neutrality of Łukasiewicz and the early Lvov-Warsaw School. Instead, Bocheński tends to increasingly reinforce the reading of Scholz and the Münster School. Although Bocheński agrees with both Łukasiewicz and Scholz that propositional logic is primary, Bocheński clearly breaks with Łukasiewicz's neutrality regarding the evaluation of Kant and Leibniz. Indeed, Bocheński argues unequivocally in favour of Leibniz and polemicises ever more strongly against Kant in the course of the book. This violation of Łukasiewicz's historical neutrality may also be one reason why there were several Polish schools of logic in the early 20th century. While Łukasiewicz is nowadays considered the founder of the Warsaw School, Bocheński belongs to the 'Cracow Circle' (Murawski 2015; Porwolik 2020.

For Bocheński, Kant's rejection of the history of logic had a negative effect on logic as a discipline of science: Prantl was the first to write a book on the *Geschichte der Logik im Abendlande*, but only to prove "that Kant was right, i.e. that formal logic has no history at all" (Bocheński 1961, p. 8). Prantl thus becomes not only a victim of his own ignorance and trust of Kant, as Bocheński still wrote in 1951, but he becomes a deliberate perpetrator who writes a history of logic that leads the history of logic into absurdity (Bocheński 1961, p. 6). From Bocheński's perspective, Prantl looks like a madman pursuing the self-contradictory project of writing a history of logic in order to show that there is no history of logic but only one true logic. In other words, Prantl used history to refute logical pluralism and to defend logical monism.

Bocheński later wrote in his autobiographical writings that he had been motivated by Łukasiewicz to rewrite the history of logic. He quickly realised why this was necessary: "The 18th and 19th centuries completely misunderstood and despised the logic of the past. It had no history at all after Kant and Prantl." (Bocheński 1975, p. 18f.) For Prantl, only a history of ruin and decadence existed since any logic according to Aristotle is a degradation or dilution of the true Aristotelian doctrine. At least that is Bochenski's reading of Prantl. In contrast, Bocheński himself now claims to be pioneering. He and his colleagues have finally changed the situation in logic: "We have discovered its history" (Bocheński 1975, p. 18f.). The Aristotle passage finally becomes evidence of contempt for the history of logic.

Bocheński's work is an important document in the historiography of logic: the content, and also the acknowledgements, illustrate how strong the influence of Scholz and the Münster school were on Bocheński and the Cracow School, but they also show how strongly Bocheński influenced later historiography (Bocheński 1961, p. Vff.). Albert Menne, founder of the 'Arbeitsgruppe Mathematische Logik an der Ruhr-Universität Bochum', proofread Bocheński's manuscript and later adopted several prejudices against Kant's logic. The Kneales also studied Bocheński's work intensively and regarded it as a supplement to their own work (Kneale and Kneale 1962, p. 765). They too take up Kant's Aristotle passage and discover in it an argument for a "purity of logic". Kant, they argue, was not aware of the history of logic, and knew of no valuable contribution to logic after Aristotle at all (Kneale and Kneale 1962, p. 355).

From Bocheński and the Kneales onwards, the picture of 'the anti- or non-logician Kant' expands further and further. Almost all schools of logic that deal with the history of logic in the second half of the 20th century take up and perpetuate one of the critical

judgements on Kant cited here. The position that there can be no history of logic at all is rarely seriously discussed until the 21st century, since the position seems absurd. But since this position is usually attributed to Kant or a Kantian, the implications of this thesis are still present in many judgements of formal logicians, as we have shown with examples in the introduction. Anellis, for example, has transferred Bocheński's formulation on Prantl to Kant: "logic has no history at all".

3 Classification of the Historical Theses

As we have learned from the spotlights on the history of 20th century logic in Sect. 2, there is a whole range of possible theses interpreting Kant's Aristotle passage on the history of formal logic. These theses can be classified in various ways.

The *modest or moderate reading* is that Kant was right in that there was no progress up to his time. This is often coupled with the assertion that it would be absurd to continue to adhere to the 'no progress' thesis after 1900.

The *harsh to pejorative reading* about Kant can be reduced to eight theses, the last of which is the focus of the present paper.

(1) For Kant, only Aristotle was authoritative.
(2) For Kant, there was only one true logic.
(3) Kant was a preventer of Leibnizian logic.
(4) Kant was a preventer of modern logic.
(5) Kant had no knowledge of logic.
(6) Kant had no knowledge of the history of logic.
(7) Kant did not even know about Stoic logic/propositional logic.
(8) Kant was a preventer of the history of logic.

These eight theses can be placed in various contexts, as we will now see. It is possible to argue that (1) and (2) are in such a close relationship that either one of them could stand as a justification of, or even substitute for, the other. The pair (3) and (4), as well as the pair (6) and (7), also stand in a close relationship of justification. For whoever prevented Leibnizian logic (3) also prevented modern logic (4). And whoever has no idea of the history of logic (6) also has no knowledge of Stoic logic (7). And certainly the Lvov-Warsaw, Cracow and Münster schools would also allow the converse inference to apply. (3), (4), (8) are 'preventer theses', meaning they say Kant hindered progress here. (3) and (4) concern logical impediments, while (8) concerns deliberate historical impediments. (5), (6) and (7) are 'knowledge theses', since Kant is accused here of not having had certain knowledge. Here, only (5) is a logical thesis, while (6) and (7) are related to history. Through the distinction between historical and logical, (6), (7), (8) and (3), (4), (5) can then also be combined and grouped. (5) is certainly the most serious accusation that can affect a logician subjectively or personally. But from an objective or scientific point of view, (4), (6) and (8) are probably the most severe accusations.

Numerous variants can be subsumed or substituted under theses (1–8). For example, the statement that for Kant there was no progress or regression can be identified with (1) or (2). The judgement that Kant was not a logician or that he is worthless for today's logic would probably correspond best with (5). The assertion that Kant could not have anticipated the development of the new logic can perhaps be best subsumed under (6) or even (7). And the

claim that there would be no history of logic is most closely related to (8) insofar as those who believe that logic has no history will probably also help prevent the development of the historical study of logic by the very statement of their belief. (8) can also be read as a rejection of logical pluralism.

Theses (1) and (2) represent the Aristotle passage quoted at the beginning of Sect. 2. Both theses stand for the position that can be called 'logical monism'. In the case of Kant and the Kantians, logical monism means that there is only one true logic (2), namely Aristotle's (1), and that therefore the many logics since Aristotle have not actually brought any progress, but are only variations on Aristotle.

All other theses, (3–8), are either used as a conclusion or consequence in the authors mentioned in Sect. 2, or they serve in support of those authors. For example, (8) is interpreted as a conclusion of (1). In Scholz and Bocheński (2) and further theses appear as arranged as support in various forms, but without a precise structure of the argumentation being recognisable. In Bocheński's work, for example, one finds all eight theses again, and even, at the point indicated in Sect. 2, the modest reading as an introductory stylistic device, in order to be able to emphasise his criticisms and polemic even more afterwards. Bocheński also explicitly transfers (1), (5), (7) and (8) from Kant to Prantl, and thus also implicitly the other theses.

Finally, based on the transfer from Kant to Prantl made by Bocheński, one can also introduce a *successor thesis*, meaning a thesis that everything in theses (1–8) that applies to Kant also applies to the Kantians. It should be pointed out, however, that every now and then individual Kantians have been acquitted of these charges by certain authors mentioned in Sect. 2. Scholz, for example, pardons Fries and Herbart (Scholz 1961, pp. 17f., 45), while Scholz's pupil Edith Matzun and especially Menne pardon Schopenhauer (Menne 2003).

4 Did Kant or the Kantians Advocate Logical Monism?

In Sect. 2, we showed the history of how, in the early 20th century, various interpretations arose of Kant's Aristotle passage and Kantian logic. And we showed that from the 1930s onwards, this history eventually led to the radical thesis that Kant and his followers denied that there was or even could be a history of logic. In Sect. 3, we listed both a modest interpretation and eight possible versions of the pejorative reading that could be gleaned from Sect. 2. The premises of logical monism, meaning theses (1) and (2), finally led to the radical thesis that for Kant and his followers, logic has and can have no history at all (8).

We place this judgement (8) and its premises, (1) and (2), at the centre of this paper for two reasons. First, this thesis (8) still appears occasionally in treatises in various forms. And second, to our knowledge, as an interpretation of Kant, it has never been revised. The situation is different, however, with theses (3–7). These have been challenged time and again by certain arguments and evidence, and are hardly ever seriously defended today. In this section, we will therefore concentrate on the two premises (1) and (2) and argue that they have nothing to do with Kant (or even Kantians like Prantl), and that therefore (8) or any similar thesis is also unsubstantiated. We assume that no other plausible arguments for (8), meaning plausible arguments that are not based on (1) or (2), will be forthcoming.

To this end, we will give a brief overview of those lines of research that have revised theses (3–7) (4.1). We will then argue for the moderate reading and show that there really was no progress in Kant's time (4.2). To do this, we will consider primarily the historical

situation in logic around 1787. In a further step, however, we will then also abandon the moderate reading and argue for the fact that premises (1) and (2) were never asserted by Kant (4.3). To do this, we will examine the context of the Aristotle passage (quoted at the beginning of Sect. 2) and draw on the so-called 'methodological interpretation' that has been making ever wider circles in Kant scholarship for about 20 years. With the help of this reading, we will revisit not only Kant's history of logic, but also the entire history of science from the second preface of the *Critique of Pure Reason* and conclude that the 'no-history' argument is untenable.

4.1 Discussion of Theses (3–7)

The validity or invalidity of the judgments (3–7) could be the subject of entire monographs. However, since many books and papers have already been written on them, it will suffice here simply to note that the validity of these judgements is very much in question today. We provide links to some of these research findings in Subsection 4.2.

Theses (3) and (4) are closely related, as we said in Sect. 3. In fact, the Erlangen School in particular has strongly pointed out that although Leibniz has a systematic similarity to modern logic, there is no reason to claim that modern ideas were prevented by Kant or that modern logic could have started earlier (Peckhaus 1997a). There is also no significant break, but rather a continuous development from the logic of the so-called 'Leibniz-Wolff era' to the logic of the 20th century (Peckhaus 1997b).

Thesis (5) has been rejected by a large number of studies. Nowadays, it is well known that Kant studied logic carefully and taught it for decades; his logic lectures were even collected into a book by Gottlieb Benjamin Jäsche, *Immanuel Kants Logik*, called the *Jäsche Logic* in the English-speaking world (Lu-Adler 2018; Tolley 2017). In the process, it has also become apparent that the formal logic of the 21st century can follow Kant in several respects. On the one hand, the Eulerian calculus that Kant favoured was established as sound and complete in the 1990s (Hammer and Shin 1998). As we know today, Kant himself made a decisive contribution to Eulerian logic (Lemanski 2023). On the other hand, a formal system of Kantian logic can be developed by using paraconsistent logics and incorporating the subject-predicate structure of natural logic (Kovac 2008; Achourioti and van Lambalgen 2011; Evans et al. 2019). And recently, the early Kantian writing *The False Subtlety of the Four Syllogistic Figures* has been interpreted as an anticipation of proof-theoretical semantics (de Castro Alves 2022). Thus it appears that the old 20th-century prejudice against Kantian logic has now been largely overcome.

Theses (6) and (7) must be treated in much greater detail, as they are a matter of interpretation. An important step towards the revision of (7) and (4) has been provided by inferentialism, which argues that Kant, along with Frege, Russell and much of 20th-century logic, believe in a primacy of propositions (Brandom 1994, 2.II.1). More recently, it has even been asserted that Frege may have taken many of his approaches to propositional logic or Stoic logic from Prantl (Bobzien 2021). Although all these theses are controversial. The primacy of propositions has been argued again and again in the history of logic, including by many Kantians (Lemanski 2021, chap. 2.2). Thesis (7), i.e. that Kant did not even know Stoic logic, can be quickly refuted by pointing to the exact passages in Kant's texts where he discusses or applies Stoic logic. Some Kant scholars have even argued that Kant's overall picture of logic is Stoic rather than Aristotelian (Tolley 2017) and there are also many other texts by Kantians on Stoic logic, but they were already unknown in the early 20th century (e.g. Arthur Schopenhauer, Adolph Diesterweg, Karl C. F. Krause).

Furthermore, Kant's lectures on the history of logic never suggest Kant thought that Stoic logic is superfluous. In this respect, thesis (6) is incorrect as well.

4.2 Discussion of the Moderate Reading

Having seen that many 20th-century judgements about Kantian logic have already been refuted in recent years and decades, we would now like to turn to judgements (1), (2) and (8) in more detail. The moderate reading of the Aristotle passage that seems to correspond with (1) and (2), and from which (8) seems to follow, says that Kant was right in the late 18th century, but that in the 20th century one can no longer say that Aristotelian logic is still binding. We agree with both parts of this modest reading and assume that especially the second part is accepted by everyone nowadays in some way. That is, in the 20th and 21st centuries, pure Aristotelian logic can no longer be formally regarded as the only authoritative source. We leave undecided what has been the authoritative source in the 20th century, as almost every nation votes for its own logicians: British logicians name Boole or Russell, Italians name Peano, Americans cite Peirce, Germans mention Frege, and so on. But more important is the first part of the modest reading, namely the claim that there was no progress in Kant's time. Is that true? Was there really no progress in Kant's time?

There are at least two possible answers to this question, since there are both conservative tendencies and progressive tendencies in 18th-century logic. Eberstein, an 18th-century historian of logic, wrote in 1794 that one should not believe that scholasticism had died out, because in every school of Thomists or Scotists one can still hear the echo of scholasticism (von Eberstein 1794, p. 2). A glance at the logic books of the 18th-century Thomists and Scotists quickly confirms this report in many cases. Of course there were progressive tendencies, but what was often taught in the 18th century was the scholastic mnemonic techniques with the reduction of syllogisms to the perfect modes (Barbara, Celarent etc.). But many logic traditions in Central Europe after the Thirty Years' War were united by the idea of somehow freeing itself from this scholastic mnemonic technique. To this end, the Leipzig School with Weigel, Sturm and Leibniz initially resorted to geometric calculi and the Basel School around the Bernoullis to algebraic procedures. Moreover, Kant's early writing on *The False Subtlety* can be seen as an attempt to simplify the reduction procedure in such a way that syllogisms can be tested without mnemonics.

Let us now turn to the progressive tendencies. Most logicians in the early 20th century say that Leibniz represented progress, Lambert, Ploucquet and further also Euler continued this approach. But Kant and the Kantians then interrupted the so-called 'Leibniz programme' up to Boole, Frege, Peano, etc. As pointed out in Sect. 2, this no longer agrees with today's findings in the history of logic. Leibniz's writings on the logical calculus only became known around 1840, and Kant did not prevent anything at all here either, but actively worked to make the calculi of Euler and Lambert known (Peckhaus 1997a). Importantly, Kant and his successors also developed how to transfer the Eulerian method to Stoic logic (Demey et al. 2021).

As we know today, Euler and the geometrical calculi were even actively disparaged by Leibnizians in the 19th century. As a result, some of Euler's writings on logic were never published and others were even censored by Leibnizians (Lemanski 2021, Chap. 2; Lemanski 2023). But there is another reason for the rejection of Leibniz's programme in Kant's time. Lambert and Ploucquet are responsible for this. They are actually the ones who are still portrayed by Lewis, Scholz, Bocheński, and others as bright spirits in dark

times because of their affinity for the Leibniz programme (see Sect. 2). But was logic really on the path of progress with them, and did Kant prevent the progress of logic?

To answer these questions, let us look at the debate in the 1760s between Lambert, Ploucquet and some other logicians about the invention of the first logical calculus. In Leibniz's programme, logic was considered the principle of all sciences and the logical calculus was regarded as the central idea (Peckhaus 1997a, chap. 2). Within this ongoing discourse, Ploucquet and Lambert emerged as key figures, engaging in a dispute over the original creator of the logical calculus, an idea to which Leibniz dedicated his efforts before. Initially, both contenders ardently believed they had achieved Leibniz's objective, namely, the development of a logical calculus, and each staunchly claimed authorship. Additional logicians participating in this debate did provide suggestions for refinement but largely leaned toward supporting either Ploucquet or Lambert's claims.

Lambert, however, confessed just a few years later that an arithmetical or algebraic logic did not work and that geometric calculi had their weaknesses. Ploucquet went even further: he argued in later years that a logical calculus was impossible. It was no wonder that he had failed at it, since even Leibniz had not been able to invent such a thing during his lifetime. The impossibility of a logical calculus was therefore the prevailing opinion in the middle of the 18th century. One could say that the impossibility of a logical calculus in Leibniz's sense became as much a dogma in the mid-18th century as Gödel's incompleteness theorem became in the 20th century.

The logicians of the 1760s were in agreement: A logical calculus did not belong to the realm of mortals, but was an erroneous belief of science, like the philosopher's stone, the squaring of the circle or the perpetuum mobile (Bök 1766, Vorr.). In fact, Hilbert and Ackermann seem to be right when they claim, as stated in Sect. 2, that Kant adopts the position of his predecessors that there can be no progress in logic. This was in fact already the consensus in the German-speaking world a generation before the Aristotle passage was published.

This insight is echoed in Kant's Aristotle passage. Moreover, Kant's formulation bears a striking resemblance to a proposition put forth by August Friedrich Bök. Bök had meticulously collected and edited the texts encompassing the dispute of the 1760s, compiling them in a work titled *Collection of Writings concerning the logical calculus* (Bök 1766). This anthology experienced numerous editions and remained widely recognised during Kant's era. Notably, Kant himself explicitly referred to this anthology in his manuscripts, e.g. (Kant 1889, p. 54).

Within this collection, Bök arrived at a damning conclusion concerning the Leibniz programme, asserting that the creation of a logical calculus was an unattainable objective. The subsequent passage by Bök has been reiterated by numerous authors until the mid-19th century:

> Since the time of Aristotle, the history of logic has not travelled to a great and memorable epoch which would have opened a new and convenient path for the mind to a rapid and certain progress in the realm of truth. (Bök 1766, Vorr.)

In his Aristotle passage, Kant is taking his cue from this passage of Bök. Bök's quote is itself a summary of the prevailing opinion at the time. Any serious scholar who read the second Preface to the *Critique of Pure Reason* in 1787 or even several decades later knew that by the end of the 18th century, progress had only been made insofar as a good interpretation of Aristotle was preferred to scholasticism and its system of rote learning and memorisation. The impossibility of a logical calculus was a dogma at Kant's time. However, the knowledge about this dogma became lost and the logicians of the early 20th century, which

was just rediscovering history for itself, no longer knew the context of Kant's Aristotle passage. After all, they knew that they had overcome the Kantian period of logic—at least if one presupposes that Leibniz, Ploucquet etc. had the same expectations of a logical calculus as the logicians after Frege, Russell, etc.

4.3 Against the Pejorative Reading

So far, I have tried to justify the modest reading as a better alternative than the pejorative reading, by examining its historical context. However, we will now focus more closely on theses (1) and (2). The result will be that we reject the modest reading in turn for a better reading yet. I will argue that Kant is saying something far stronger in his Aristotle passage than what the modest reading and judgements (1) and (2) suggest. Specifically, I claim that Kant was addressing far more than the question of formalising logic or a logic calculus. Namely, the Aristotle passage is about the status of logic as a science as a whole.

In the 2000s, a new reading of the (second) Preface to the *Critique of Pure Reason* began to emerge and is still gaining ground today, e.g. Brandt (2007), Lemanski (2016), Moledo (2017), Olson (2018), Meer (2021). The starting point of this reading was the realisation that the interpretation of the Copernican turn coming from Neo-Kantianism would not make sense. In Kant scholarship, the Copernican turn refers to a passage found nine paragraphs after the Aristotle passage. This passage has long been considered the centrepiece of this entire preface.[1] The neo-Kantian interpretation of the Copernican turn identified the earth with the subject and the sun with the object and related the whole preface to the favourite theme of neo-Kantianism: the subject-object division. By the 1970s, however, it was already clear that this interpretation was nonsensical as, for example, in Kant the subject is active and the object passive, but with Copernicus the sun stands still and the stars move. Thus, efforts were made to find very free readings that identified the Copernican turn's relationship with the topic of freedom and necessity, for example. These interpretations are called 'hermeneutic interpretations' in today's Kant scholarship. It was only around 2000 that a new reading became popular and this reading belonged to a minority before that. This interpretation is called 'methodological' (Meer 2021).

The starting point for this new methodological interpretation was Kant's indication that the *Critique of Reason*, and thus also the Preface, was a "treatise on the method" (Kant 1998, B XXII) in which an "experiment" was to be conducted on metaphysics (Kant 1998, B XVIII). The goal was to subsequently check whether the assumptions made in this book could be successfully applied to "metaphysics both of nature and of morals, as confirmation of the correctness of the critique" (Kant 1998, B XLIII).

It was soon recognised that Kant's method also corresponded to Copernicus' methodology. After thousands of years of an inductive approach in astronomy, which was

[1] The Copernican (turn) passage says: "Up to now it has been assumed that all our cognition must conform to the objects; but all attempts to find out something about them *a priori* through concepts that would extend our cognition have, on this presupposition, come to nothing. Hence let us once try whether we do not get farther with the problems of metaphysics by assuming that the objects must conform to our cognition, which would agree better with the requested possibility of an *a priori* cognition of them, which is to establish something about objects before they are given to us. This would be just like the first thoughts of Copernicus, who, when he did not make good progress in the explanation of the celestial motions if he assumed that the entire celestial host revolves around the observer, tried to see if he might not have greater success if he made the observer revolve and left the stars at rest. Now in metaphysics we can try in a similar way regarding the *intuition* of objects." (Kant 1998, B xvi f.)

accomplished by collecting data in the form of star catalogues, Copernicus revolutionised the method: guided by reason, he presupposed principles and a whole theory of heliocentrism, and then tested whether or not his theory was confirmed by the existing data of the star catalogues. Consequently, the outcome demonstrated that the predictions deduced from the Copernican theory exhibited superior alignment with the data, as compared to the empirically grounded Ptolemaic theory before, which necessitated repeated extensions (e.g., for epicycles). Ptolemy and his successors raised the theory on the basis of data and had to modify and extend it again and again, whereas Copernicus first considered a new theory as a hypothesis and then saw whether the data fit it or not. Data-driven, inductive and fact-based research in astronomy was revolutionised into a hypothesis-driven, deductive, and reason-based method (Brandt 2007).

Furthermore, the 'methodological interpretation' realised that Kant, in his wording of the famous Copernican turn, was referring almost verbatim to a passage in Lambert that was very well known in the late 18th century and early 19th century, but was forgotten thereafter (Lemanski 2016; Hottner 2020). Kant borrowed above all the unusual metaphors "army of stars" (Sternenheer) and "spectator" (Zuschauer) along with the formula "the first thoughts of Copernicus," from Lambert's work, the *Cosmological Letters*. This allusion, potentially recognisable to contemporary readers as a reference to Lambert's renowned book, enabled Kant to furnish his contemporary audience with a crucial interpretive framework for the passage. Lambert's interpretation of Copernicus' accomplishments aligns methodologically with the approach employed by present-day Kant scholars in their analysis of the Copernicus passage.

In the course of the 2010s, it was realised that other passages in Kant's Preface also referred precisely to certain methodlogical treatises, and a structure was discovered in Kant's text that had hardly been noticed before. In the first paragraph of the Preface, Kant begins with a general doctrine of methods and asks how an unsecure and uncertain science can become a secure and certain one. Instead of the Copernicus passage, this first paragraph can rather be seen as the heart of the preface in the methological reading. The following paragraphs then attempt to substantiate and deepen this methodological doctrine by means of a history of science. Kant presents the following sciences in order: First logic, then mathematics, then physics in the form of mechanics, hydraulics, chemistry and finally metaphysics, in which he once again draws an analogy with astronomy, namely the Copernican turn. Kant's core thesis is that metaphysics has not yet been revolutionised like the other sciences because no one has yet come up with the idea of transforming it from data-driven inductive metaphysics to a theory-laden, deductive science (Brandt 2007).

However, Kant wants to show that this method has so far led to success in the history of science with certain paradigmatic researchers in logic, mathematics and physics. Of course, Kant does not name a scholar of metaphysics in his history of sciences, since he himself claims to be able to act as a revolutionary in this discipline. As Kant gave lectures on geography, mathematics, physics, logic and many other disciplines, one can quickly guess from these which paradigmatic researchers Kant could name in his history of science. But even without knowledge of Kant's complete works, the same names that one might mention as a scholar around the year 1787 in his history of science are likely to come to mind here: For example, Newton, Pascal, Lavoisier, Kepler in physics, Euclid or Descartes for mathematics and Lambert, Ploucquet or Euler for logic (not much was known about Leibniz's logic at the time).

The fact is, however, that Kant does not mention any of these contemporary researchers, but always a predecessor. And with these predecessors, as proven by some studies today, he always seems to have had a very specific text in mind, which either comes from a text

of a predecessor or from an interpretation of those that were popular in his time. Galileo, Torricelli, Stahl and Copernicus are named by Kant for physics, Thales for mathematics and Aristotle for logic. In the late 19th and early 20th centuries, the Copernicus passage enjoyed a career in neo-Kantian epistemology, although it was not meant epistemically at all. The Aristotle passage became famous in formal logic in the 20th century because Kant was accused of logical monism (Sect. 2). The other passages have long been ignored, even though only the entire context illuminates the picture of this incredibly dense preface.

Let us now go one step further and ask the question whether an inference from logical monism to mathematical, mechanical, hydraulic, ..., monism would make sense. In the (early) 20th century it was quite possible to believe that Kant knew only Aristotle, as theses (6) and (7) suggest. But is it possible that representatives of the Vienna Circle, the Münster School or the Lvov-Warsaw School would have thought it possible for Kant to have endorsed Galileo instead of Newton, Stahl instead of Lavoisier, or Thales instead of Euclid, etc.? So does Kant also advocate a mathematical, mechanical, chemical monism here? And if that was his intention, does it make sense to name scientists who have actually long since ceased to be authoritative for current research?

Kant certainly did not have a bad opinion of Galileo, but his whole metaphysics of nature is virtually a vindication of Newton. Kant did not teach according to Thales in mathematics either, and by 1787 it was clear to Kant that Stahl's phlogiston theory was nonsensical compared to Lavoisier (Hottner 2020, chap. 3). And in exactly the same way, one can probably also say that Kant knew that there were also developments in logic. So if judgement (1) were true, why has it never been applied to Thales, Stahl, etc.? Why was Kant never criticised in the 20th century for basing a 'mathematical monism' on Thales?

We thus conclude that theses (1) and (2) cannot be correct in context of the Preface. For despite Kant's better knowledge that all of the scientists mentioned are only precursors, Kant cites in the preface this initially strange history of science, which begins with Aristotle in logic and ends with Copernicus in astronomy. An explanation for this unusual history of science is provided by the methodological interpretation. This not only assumes that Kant refers to very specific passages in Aristotle, Thales, Galilei etc. – such as the quote of Bök in the Aristotle passage (see Sect. 4.2)—but also that Kant is telling a history of method here and not of content. Kant is not concerned in the Preface with the newest, most correct explanation or trend of the respective sciences, but with the question of who first turned an unsecure science into a secure one in each discipline. This is evidenced by the first paragraph of the preface, in which Kant asks how a science, after many failed attempts, finally enter "upon the secure course of a science" (Kant 1998, B XVII). And the history of science that follows then asks: Who first discovered the method that we still use today in the respective disciplines?

For Kant, the revolutionary transition from an unsecure to a secure science is the change from data-driven, inductive to hypothesis-driven, deductive research. In astronomy, it took a very long time for this to happen and only Copernicus was successful in that he did not continue to look for meaning in the data of the star catalogues, but instead considered for himself which planetary constellations could produce this data in the first place. He thus decided on a new theory and then tested whether it in accordance with the data or not. Galileo, Torricelli and Stahl also found a method by which reason "must take the lead with principles for its judgments according to constant laws and compel nature to answer its questions, rather than letting nature guide its movements by keeping reason, as it were, in leading-strings" (Kant 1998, B XIII).

But the history of logic is different. Here, Aristotle directly recognised that one must approach logic with principles and rules in order to be able to prove the validity or invalidity of inferences. And despite all the changes in logic, i.e. despite the introduction of Stoic logic, the first algorithmic logic of the medieval ages and despite these rediscoveries by Leibniz and also around 1900, logicians today still work in the same sort of theory-laden way as Aristotle did. Logic is therefore, for Kant, the proto-discipline for finding out what science is in the first place—and this is precisely why the *Critique of Pure Reason* is drenched in formal logic (in the vestment of a so-called 'transcendental logic') (Santozki 2006).

Kant does not advocate logical monism in the Aristotle passage or anywhere else in his work. To accuse him of representing only one logic (1) and that this logic is the Aristotelian logic (2) would be just as nonsensical as accusing him of representing only one chemistry, namely the phlogiston theory, or only the mathematics of Thales. With the Aristotle passage, Kant represents at most a methodological monism. There is only one successful type of scientific method and this is hypothesis-driven or deductive.

With the omission of judgements (1) and (2), at least the basis for judgement (8), which has been the focus here so far, also falls. Kant does not believe that there is no history of logic. He just does not state this history of logic in the preface, but he does not really tell a history of mathematics, physics etc. either. He only reports that before the initiating and revolutionary thinkers like Thales, Galileo etc. there were uncertain sciences in each case. Since Kant—like most scholars nowadays—also has no idea of logic before Aristotle, he cannot even describe this 'minimal history' with respect to logic. Not telling or being able to tell a history does not mean rejecting history. (Presently, there exists minimal disagreement regarding the existence of a canon of logical competences predating Aristotle in numerous cultures, e.g. Schumann (2023)).

One would now have to check carefully whether all Kantians who adopt the Aristotle passage really do reject the history of logic after all, perhaps because they have misunderstood Kant's Aristotle passage just as much as the logicians of the 20th century. Spot checks, however, show the opposite. Johann Baptist Schad, for example, understands very precisely the meaning of Kant's preface, i.e. as well as today's methodological interpretation (Schad 1800, pp. 346ff.). Schopenhauer, while reproducing the Aristotle passage in his Logic Lectures, is intensely concerned with the application of Euler's calculus to non-syllogistic inferences and also writes a history of logic (Pluder 2020). In a progressive reading, Hegel's reception of the Aristotle passage in the introduction to the *Science of Logic* can be seen as his motivation for rethinking logic.

Prantl is known for the slogan 'Back to Kant and Aristotle' (Prantl 1852, p. 16) and he also takes up the Aristotle passage in his *Geschichte der Logik im Abendlande* (Prantl 1855, p. 4). But whether he would thereby, as Bocheński claims, write this work only to defend a historical-logical monism is, to my knowledge, not demonstrable. Bocheński and his successors give no reference for this thesis, and Prantl himself writes only that he wants to examine whether there was an advance in logic or not (Prantl 1855, p. 5). He does indeed polemicise about late antiquity and the Middle Ages, but the question remains as undecided as the completion of this monumental task (Thiel 1972). In fact, it would have been a monumental task to write several thousand pages on history only to prove that there is no history. But Prantl never finished his work and drew a conclusion. So whether Prantl would have actually rejected the history of logic ultimately remains undecided. Ignoramus et ignorabimus.

5 Conclusion

The thesis that Kant or Kantians were against a history of logic, would prevent it, were conservative or advocated logical monism is untenable. Whether there has ever been a serious position that regarded the attempt to write a history of logic as nonsensical remains questionable. Certainly there are logicians, then as now, who are not interested in the history of their discipline, but this is not Kant's fault but their own. In any case, the history of logic of the 21st century, which is just dawning, is more open to discarding old prejudices of the early 20th century. And one could equally argue today that 20th century logic has long prevented and suppressed developments. As can be identified particularly well in Menger, for example, the geometric calculi that long dominated between Euler or Kant and Venn were suppressed until the 1990s. In addition, meaningful interpretations of 19th century logic were also suppressed because they were not yet compatible with the new logic. With a view to paraconsistent, paracomplete, connexive, diagrammatic etc. logics, the situation looks different again today, even if some prejudices still persist in general.

This does not mean, however, that the historiography of early 20th century logic was pointless or completely wrong. For its time, it was quite justified, since one had the impression that progress had now been made that had not been so clearly established for a long time. At least there was no general mood of progression or revolution beforehand. Section 2, in particular, may also have shown that people never actually seriously examined or interpreted Kant and went straight for the narrative of opposites such as 'good Leibniz/bad Kant'. This was then generalised in the course of the 1920s to the formula 'good mathematician/bad philosopher'. If one took note of Kant's formal logic at all during this period from the point of view of the new logic—as with the Kneales, for example—this logic was interpreted primarily from the point of view of Kant's alleged 'logical monism'. In the past, it was commonly assumed that Kant had entirely embraced Aristotelian logic. However, contemporary perspectives find this view peculiar, if not outright absurd, even though it is undeniable that Kant had a penchant for orienting himself towards Aristotle and the *Organon*. And, of course, one has to admit that the whole (second) Preface to the *Critique of Pure Reason* is a reader-unfriendly puzzle from today's perspective because it contains many references to contemporary debates that are no longer known.

One can ask how it came about that Kant was interpreted in such a way that he was even accused of having an aversion to the history of logic. There are many possible explanations, and certainly only a combination of these explanations makes sense. One can certainly recognise the combination of concern with both formal logic and the Leibniz Renaissance in both Couturat and Russell as an important part of the interpretation of Kant as denier of the history of logic, since Couturat and Russell both re-emphasized the old rivalry between Kant and Leibniz. But one can also, as later logicians with an affinity to Kant try to detect in the 'pro-Leibniz/anti-Kant' a 'propaganda strategy', as it was defined in the philosophy of science by Thomas Kuhn and Paul Feyerabend. Volker Peckhaus is somewhat milder since in his monograph he presents the Leibniz narrative as an integral part of the 20th-century research programme (Peckhaus 1997a). In doing so, he asserts that the prevailing Leibnizian perspective of the 20th century requires the same degree of reevaluation as I have undertaken for the Kantian narrative. But these are only some of the possible explanations.

However, considering the highlights mentioned in Sect. 2, one can also try to explain the Kant polemics of the 20th century with concepts of modern communication theory such as echo tunnels, filter bubbles, spirals of silence or confirmation bias. This mean

that again and again, certain authorities took up the Aristotle passage as a non-contextualised quote for entertainment or amusement. Kant's alleged banality thus strengthened the genius of the community's own. Then, the Aristotle passage was uncritically adopted and sometimes even embellished, especially by more historically interested authors with a modern background. Although the discipline of logic of the early 20th century was extremely dynamic, alternative impulses were often ignored. This was also due to the Kantians, who rarely fought directly against the opinions of the logicians of the Vienna Circle, the Göttingen School, Münster School, Krakow School, Warsaw School, and so on. This divide further solidified the opposition between self-titled 'mathematical logicians' and 'proponents of pure philosophy' on both sides. Consequently, within these communities, a tendency emerged where already existing beliefs or viewpoints have been reinforced or confirmed through repeated repetition, leading to a selective recognition of other voices or perspectives.

A very good example, which we point out last because it shows very well how alternative voices concerning Kant's Aristotle passage were ignored in the 20th century, is the mathematician Federigo Enriques. He published *Per la storia della logica* in 1921, which appeared in German translation by Ludwig Bieberbach in 1927. (We pointed out in Sect. 2 that Scholz should really have known this book.) Enriques takes an original position that can hardly be brought together with any of the authors from Sect. 2, even though he came into conversation with them on several occasions (Lolli 2018). Enriques is indeed pro-Leibniz and anti-Kant, ironically despite the fact that he understands Kant in terms of the methodological reading. First, Enriques rejects logicism, since mathematics is not reducible to logic (Enriques 1923, p. 1f.). Moreover, logic for him includes not only theory- or rule-guided deductive reasoning, but is mainly probabilistic inductive reasoning (Enriques 1923, pp. 28, 50, 107), (Enriques 1906, p. 156). He examines logic and the history of logic insofar as it has a relationship to either mathematics or the natural sciences based on mathematics. Enriques approves of Leibniz and rejects Kant, but for different reasons than other logicians at that time. His reason is mainly that Leibniz often thinks strictly in terms of mathematics, but Kant does not reason mathematically (Enriques 1923, p. 117).

Enriques is very good at classifying and analysing the Preface to the *Critique of Pure Reason*. Like today's methodological interpreters, he notices that Kant wants to draw an analogy between the experimental procedure of Stahl, Galileo etc. and his method in metaphysics. However, Enriques already rejects this for natural science, since he does not believe that one should approach data in a theory-laden way (Enriques 1923, pp. 113ff.), (Enriques 1906, pp. 127ff.). Rather, theories spring from dealing with the data: He thus opposes Kant's theory-first or deductive approach with a data-first and inductive approach.

This makes it easy to understand why Enriques does not take much notice of the Aristotle passage, since it does not seem as spectacular to him as it did to other logicians of his time. He knows that Kant's philosophy is actually aimed at Lavoisier and Newton, and that Kant does not hang on to old theories like Stahl or Galileo. He thus rejects Kant on methodological grounds, not on logical grounds or grounds of logical monism. The fact that Kant was accused of either not wanting to deal with the history of logic or not knowing it must have seemed abstruse to Enriques.

One can encounter in Enrique an example of the methodological interpretation that is independent of most modern Kant research, just because Enrique takes the contexts of Kantian history of science into account. But one also realises how strong the 'filter bubble' of the prevailing community was, in which opinions about Kant echoed back. Enriques was only noticed by a certain circle of the authors mentioned in Sect. 2 until the above-mentioned conference at the Sorbonne in 1935. When the collaboration with the Vienna Circle

became closer for a few years in the late 1930s, other, probably more important topics were discussed than Kant exegesis. Nevertheless, the case outlined here shows how long common misconceptions about the history of logic can persist, and also shows how misconceptions can prevent approaches to logical topics that turn out to be important or productive in later generations. In this respect, one can only agree with Łukasiewicz that a one-sided pro and contra on certain positions is not helpful, and that one must regularly re-examine the history of logic in the light of new findings. For one can conclude from the results presented that logic does have a history, and it neither begins nor ends in the 20th century.

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Jens Lemanski is currently researcher at the University of Münster and Privatdozent at the University of Hagen. He is the principal investigator of the projects *History of logic diagrams in Kantianism* (Thyssen Foundation) and *Gestures and diagrams in visual-spatial communication* in the priority programme ViCom (DFG). He holds a doctorate from the University of Mainz and the Università del Salento, and a habilitation

from the University of Hagen. He is co-editor of the journal *The History and Philosophy of Logic* and the book series *Historia Logicae*. Recent publications include the monograph *World and Logic* (2021), the special issue *Logic, Spatial Algorithms and Visual Reasoning* (2022) and the volume *Language, Logic, and Mathematics in Schopenhauer* (2020).