

Volker Peckhaus

Logik, Mathesis universalis und allgemeine Wissenschaft. Leibniz und die Wiederentdeckung der formalen Logik im 19. Jahrhundert

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REVIEW

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The aim of Peckhaus's book is to investigate the rôle the logical ideas of Leibniz have played in the development of symbolic logic. As the title of the book suggests, the influence of Leibniz on the rise of modern logic is connected with the rediscovery of formal logic in the 19th century. But what this rediscovery means and what the influence of Leibniz and the Leibniz program on it consist in is a controversial topic among historians of logic. For Peckhaus, there has not been a significant adoption of a concrete logical idea of Leibniz by the founders of symbolic logic in the 19th century. On the contrary, "the history of modern logic is a history of unconscious rediscoveries" (p. 2). Only after finding out that the logical ideas and laws of their newly invented theories were already enunciated by Leibniz, did the logicians accept his priority. Nevertheless, the Leibnizian project of a universal characteristic and a *scientia generalis* has been playing an outstanding rôle in the formation of modern logic (p. 9): not as a source for new inventions and discoveries in logic, but as a vision (pp. 5 ff., p. 58), a utopia (pp. 125 ff.), a dream (p. 27) and even an ideology (p. 30, p. 77) of the omnipotence of the calculus. This vision the founders of modern logic have had in common with Leibniz, so Leibniz became a figure of integration and legitimacy for them (p. 5).

Peckhaus argues from the viewpoint of reception history. His focus on the history of logic is not primarily, as in many recent works, the relevance of history for the problems of our time, but the use of contextual method of historical research. With the formation of modern logic, the concept of logic itself has been changed radically. That means the analysis of this change must not only consider the actual concept of logic,

but also has to discover and describe those forms of logic which really existed in the past and the historical context in which they existed. In the change from traditional to modern logic in the 19th century, one such form was formal logic, and its considerable main contextual framework consists of philosophy and mathematics.

The situation at the middle of the 19th century, when modern logic was born, Peckhaus describes as follows: in the time after the death of Leibniz and until the middle of the 19th century we can observe “two waves of reception of the writings and unpublished works” by Leibniz (p. 181). Both were connected with edition-projects of Leibniz: the first wave with the editions by Rudolf Erich Raspe (1765) and Louis Dutens (1768), the second seventy years later mainly with the edition by Johann Eduard Erdmann (1839/40). The Erdmann-Edition of logical fragments by Leibniz met a “favorable climate” for reception (p. 182). In Germany, philosophers were discussing the so-called “logical question”: the problem of reforming logic after the domination of Hegelian logic and philosophy in the first third of the 19th century. The debate concerned two topics—firstly the the foundation of scientific knowledge and the function of logic and psychology in it, secondly the application of logic as a method of the sciences. Both directions of reforming logic have had “destructive effects” (p. 136) on the traditional form of logic and philosophy. The first direction led to the separation of psychology from philosophy at the beginning of the 20th century. As a result of the reforms of the second direction, the theory of science became a field of research separated from logic. In the discussion of the “logical question”, philosophers excluded formal logic from their reform efforts because, as the kernel of traditional logic, it was thought by them not to undergo further reforms. The reception of the Erdmann-Edition by philosophers is an indicator, as Peckhaus shows, of their attitude toward logic. Leibniz’s project of a *scientia generalis* was accepted by them, but the Leibnizian idea of the calculus was refused as being not realistic (p. 183).

Synchronically with the philosophical debates on the “logical question” and seventy years after the last publications in logic (by Johann Heinrich Lambert, Gottfried Ploucquet and Georg Jonathan Holland), symbolic logic was newly created by Sir William Hamilton, George Boole and Augustus De Morgan in Great Britain, and by Moritz Wilhelm Drobisch in Germany (pp. 103 ff.). After that, philosophers and logicians in Germany began to connect the “logical question” with the use of mathematical methods in logic (Drobisch, Rudolf Hermann Lotze, Friedrich Überweg). But philosophers didn’t and couldn’t, as

Peckhaus argues, answer the challenge that came from mathematics itself, namely the need in a logical foundation of the changes in mathematical ontology. For that reason, in the second half of the 19th century, mathematicians tried to resolve a problem that had been ignored by philosophers, the reform of formal logic. Though the main objective of the mathematicians was the changing of the foundation of mathematics, not reforming logic (p. 297), their reform efforts had started a third process of separation: of logic from philosophy, *i.e.*, the shift of parts of formal logic from philosophy into mathematics (p. 184). Acting in a domain of philosophy, the “logisticating mathematicians” needed and used the reference to Leibniz for legitimacy (p. 222). Peckhaus investigates the reception history of Leibniz’s logical ideas and analyses the rôle these ideas played in the formation of symbolic logic in the cultural contexts of Germany and of Great Britain. There are, between the two countries, of course, differences in the development of the new logic, but also similarities. Peckhaus’s book shows both, but the main accent is on the similarities. In both countries, the rise of modern logic was connected with the interests of mathematicians in the logical foundation of their science. They took and developed logic as an instrument for mathematical aims (p. 13). The common interests of using logic in mathematics united the logicians on the continent with those on the island, and modern logic had been, from its beginning, an “international enterprise” (p. 222). Another similarity is that mathematical reflections on logic both in Germany and Great Britain led to the construction of abstract-algebraic systems. Peckhaus demonstrates this in the case of England with the analyses of Boole’s logic and the development of his system by William Stanley Jevons (chapter 5), and in the case of Germany for Ernst Schröder and his project of an “absolute algebra” (chapter 6). The chapter on Schröder contains an investigation of the Schröder-Frege controversy concerning the question of whose system of logic comes nearer to the project of Leibniz.

The answer to the question of the rôle of Leibnizian ideas in the formation of modern logic can be given in summary, I think, as follows: both in England and in Germany, algebraic-logical systems developed in the second half of the 19th century without direct reception of Leibnizian ideas. The connection of modern logic with the Leibniz-program became conscious only later. Then, in England, logicians concentrated their main interest on the Leibnizian project of *calculus ratiocinator*, in Germany, they focused on his *lingua characteristica*. In the logics of Ernst Schröder and Gottlob Frege, both aspects have been united in “programs of universal science, similar to Leibnizian *scientia generalis*,

but at least in the case of Schröder without knowing the writings of Leibniz” (p. 302).

Peckhaus’s book utilizes a large base of historical research. The bibliography (about 80 pages) includes the relevant original sources on the subject. A special feature of the book is Appendix 2, a list of logical symbols. As Peckhaus reconstructs the logical systems in their original notation, the reader is confronted with the fact that a logical symbol in different systems can have different rules of use. Appendix 2 gives for each symbol a short overview of its use in the quoted systems. The reader can take it as a lexicon for logical symbolization.

The book is dedicated to Christian Thiel, the teacher in philosophy and logic of the author, in his 60th birthday.

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