

Keywords: Leibniz, *characteristica universalis*, knowledge representation and reasoning

Scholarship on Leibniz's contributions to logic have come across various obstacles. At the heart of Leibniz's programme was the lifelong dream of creating a universal philosophical language, built on the twin concepts of the *characteristica universalis* and the *calculus ratiocinator*. Interpretations of his work have been heavily influenced by late 19th and 20th century logic, promoting aspects of his project close to mathematical logic, while overshadowing others. My aim is to shed light on how the Leibnizian project is broader than the parts developed by contemporary logic and argue that hitherto underappreciated elements are now gaining new relevance with the development of the field of "knowledge representation and reasoning" within computer science.

The reception of Leibniz's logical work has faced different challenges. Some difficulties are material: Leibniz did not publish a magnum opus in logic; instead, his writings are scattered across notes, letters, and various essays. During the first editing and publication process of Leibniz's work in the 19th century, the mathematical and philosophical writings were divided into separate volumes. As a result, Leibniz's contributions in logic were obscured, making it difficult to get a coherent view. Furthermore, developing a universal language was a lifelong project which took on different forms at different stages of his career. Organising these disparate elements into a coherent whole presents some challenges of its own.

Other difficulties are interpretative: logicians during the 19th and 20th century, such as Boole, Frege, Schröder and Russell referred extensively to Leibniz's logical work, but their priority was for the most part advancing their own logical research, rather than doing a historical reconstruction of Leibniz's own theories. Several of these logicians declared themselves to be Leibniz's intellectual successor, but it can be unclear to what extent their interpretation of Leibniz's work corresponds to Leibniz's own ideas or instead rather mirrors their own theories. The understanding of Leibniz's logical contributions has therefore been significantly influenced by the lens of contemporary logic, cementing Leibniz's position as a renowned logician, but paradoxically also obscuring his work.

Scholars must thus avoid a somewhat natural pull towards one of two positions. The first is to provide a purely historical reconstruction of Leibniz's logical ideas, focussing on his social and political context, without bringing out the relevance of Leibniz's logical work to contemporary logic. The second is to study Leibniz solely through the lens of 19th and 20th century logic. Although this was quite fruitful for the early development of logic, there is a risk of anachronistic mistakes emerging by neglecting Leibniz's own historical context.

I will argue that Leibniz had broader ambitions for his twin concepts of the *characteristica universalis* and the *calculus ratiocinator* than those developed by his 19th and 20th century interpreters. Whereas contemporary logic focussed on what can be expressed in formal and mathematical languages, Leibniz had a more wide-ranging vision. He wished to develop a general method for improving reasoning: first by precisely and systematically representing and organising all the concepts and ideas of human knowledge, and then by deducing new truths computationally. This is quite closely related to the relatively recent field of "knowledge representation and reasoning" within computer science. By thus providing a more historically accurate interpretation of Leibniz's twin concepts, a new bridge towards contemporary issues emerges. This also shows how historical reconstructions can sometimes unexpectedly provide insights into new issues.