

Concepts, Numbers, and Machines — Leibniz' Contributions to Computer Science

Klaus Robering

March 29, 2016

In his booklet on the *Origins and Foundations of Computing*, the eminent computer scientist Friedrich Bauer says that his discipline started “when the first attempt was made to mechanize what we call ‘intellectual activities’”. Since such attempts have been made in different ways by several scholars, it is difficult to determine a definite moment and a single individual. However, if one nevertheless wants to point out a single person, this—according to Bauer—“would have to be Leibniz (1646–1716), who qualifies as one of the founders of informatics in a number of ways”. As a justification, Bauer refers to Leibniz' four-species adding machine, his dual system, and his “concept notation”.

Bauer's list of Leibniz' contribution to computer science can readily be extended. One has just to think of his model of the human mind as a “mental automaton” and his speculations about “machines of nature” and “divine machines” in order to recognize the importance of his ideas for such subdisciplines of computer science as Artificial Intelligence, Artificial Life, and Natural Computing. In contrast to the examples quoted by Bauer, however, these issues are of a more controversial character. But just by this, they illustrate how topical Leibniz' ideas still are for computer science.

Nevertheless, in my talk, I shall restrict myself to the three issues mentioned by Bauer. I will explain the significance of Leibniz' ideas concerning concepts, numbers, and machines in their historic contexts and will explain how these ideas are interrelated.