Calculemus! The Problem of the
Application of Logic and Mathematics

Leibniz's Two Legacies.
Their Implications for Knowledge Engineering

Mind, Symbolism, Formalism:
Is Leibniz a Precursor of Artificial Intelligence?

Elementary Principles for Representing Knowledge

Gottfried Wilhelm Leibniz. Pedigree and Ancestors

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Contents page

Vol.23(1996)No.2

Scheibe, E.: **The problem of the application of logic and mathematics.**
Knowl.Org. 23(1996)No.2, p.67-76, 38 refs.
Starting out from Descartes' and Leibniz' idea of a mathesis universalis the achievements of modern mathematics are divided into three major parts: The creation of algorithms, the invention of proofs, and the application of mathematics to the description of nature. This applicability has repeatedly been viewed as being just a miracle. One major idea to diminsh the miraculous impression was to view mathematics as exploring the vast area of all kinds of abstract structures, thus establishing a huge store of humanly possible thinking from which the physicist has only to choose the structure appropriate for the case before him. There remains, however, the problem of mathematical overdetermination of physics: the structures suitable for application usually contain mathematical elements that remain without physical interpretation. The true miracle then seems to be that it is often very difficult, if not impossible, to eliminate those uninterpreted elements from physical theory.

(Author)

Marciszewski, W.: **Leibniz' two legacies and their implications regarding knowledge engineering.**
Knowl.Org. 23(1996)No.2, p.77-83, 37 refs.
Knowledge engineering anticipated by Leibniz in such projects as ideal language for science reasoning automata, library organization, etc. owes to him philosophical presuppositions as to the scope of possible automation. The paper deals with an ambiguity in his position. His attitude as an engineer implies hard AI (as represented by A. Turing) while his metaphysical insights involve an insuperable physical difference between organisms and artificial machines, which is highly relevant to efficiency of information processing (this physicalism claiming the import of hardware, accords with J. von Neumann's insights). The paper's sections: 1. Leibniz vs. Descartes in views on knowledge. 2. On physicalism and antiphysicalism in logic. 3. Turing's claim as to the insignificance of hardware. 4. Von Neumann's claim as to the significance of hardware. 5. Why Leibniz would *not* have accepted logical physicalism. 6. Why Leibniz would have accepted logical physicalism. (Author)

Krämer, S.: **Mind, symbolism, formalism: Is Leibniz a precursor of Artificial Intelligence?**
Knowl.Org. 23(1996)No.2, p.84-87, 31 refs.
The assumption that Gottfried Wilhelm Leibniz is a precursor of the idea of Artificial Intelligence is misleading. The argument is to distinguish between episteme and mind, recognition and cognition. Leibniz interpreted formal symbolic operations as a mere epistemological instrument, but not as a description of what actually happens within the mind: Leibniz denied that a machine can be used as an explanative model of cognition.

(Author)

Jaenecke, P.: **Elementary principles for Representing Knowledge**
Knowl.Org. 23(1996)No.2, p.88-102, 30 refs.
The vast majority of publications in language theory and philosophy start with the language as the given and ask about their structures, about the meaning of their words and about the correct interpretation of texts. This paper approaches the language problem from just the opposite side: the given is here a certain content; what is sought for, is an appropriate artificial language to represent this content. To this end, seven elementary representation principles are proposed. To illustrate the way they work, syntactic pattern recognition is introduced as a simple, but non-trivial example for representing knowledge in formal language. Another central thema of the paper is LEIBNIZ's characteristica universalis and the so-called LEIBNIZ project. LEIBNIZ's investigations in this field are reviewed against the background of the tasks required in syntactic pattern recognition. It is demonstrated that LEIBNIZ had, in fact, already worked with six of the seven representation principles proposed, further, that his characteristica universalis is an early form of a formal language, and lastly, that - contrary to the prevailing view - the LEIBNIZ project is not a matter of logic but rather one of knowledge representation, a field largely unexploited in today's logic-oriented epistemology and philosophy of science. It is precisely this one-sided orientation of these disciplines, which is responsible for the distorted picture of LEIBNIZ's work found in the literature; some typical misunderstandings are finally discussed. (Author)

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Examples: Brandhorst, J.P.J.: Quantifiability in iconography. Knowl.Org. 20(1993)No.1, p.12-19, 11 refs.
Hunter, E.J.: Classification made simple. Aldershot, GB: Gower 1988. 115p.
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