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# KNOWLEDGE ORGANIZATION

INTERNATIONAL JOURNAL  
Devoted to Concept Theory,  
Classification, Indexing,  
and Knowledge Representation

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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# Ranganathan

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## Contents page

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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 diminish 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)

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 explanatory 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 theme 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)

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)

# KNOWLEDGE ORGANIZATION



## Scope

The more scientific data are generated in the impetuous present times, the more ordering energy needs to be expended to control these data in a retrievable fashion. With the abundance of knowledge now available the questions of new solutions to the ordering problem and thus of improved classification systems, methods and procedures have acquired unforeseen significance. For many years now they have been in the focus of interest of information scientists the world over. Until recently, the special literature relevant to classification was published in piecemeal fashion, scattered over the numerous technical journals serving the experts of the various fields, such as

philosophy and science of science  
science policy and science organization  
mathematics, statistics, and computer science  
library and information science  
archivistics and museology  
journalism and communication science  
industrial products and commodity science  
terminology, lexicography and linguistics

Beginning 1974, KNOWLEDGE ORGANIZATION (formerly INTERNATIONAL CLASSIFICATION) has been serving as a common platform for the discussion of both theoretical background questions and practical application problems in many areas of concern. In each issue experts from many countries comment on questions of an adequate structuring and construction of ordering systems and on the problems of their use in opening the information contents of new literature, of data collections and survey, of tabular works and of other objects of scientific interest. Their contributions have been concerned with

- (1) clarifying the theoretical foundations (general ordering theory, science theoretical bases of classification, data analysis and reduction)
- (2) describing practical operations connected with numerical taxonomy/ classification, as well as applications of classification systems and thesauri, manual and machine indexing
- (3) tracing the history of classification knowledge and methodology
- (4) discussing questions of education and training in classification
- (5) concerning themselves with the problems of terminology in general and with respect to special fields.

## Instructions for Authors

*Manuscripts* may be submitted in either English, German or French to the editor-in-chief in two sets (the original and one copy) typed in double space, comprising between 1500 to 3000 words. They should be accompanied by an English indicative abstract of 100-200 words. The contributions are refereed.

*Criteria for acceptance* will be appropriateness to the field of the journal (see Scope and Aims) taking into account the merit of the content and its presentation. Papers are accepted with the understanding that they have not been published, submitted or accepted for publication elsewhere and that, if the work received official sponsorship, it has been duly released for publication. Authors will usually be notified within 6 to 10 weeks. Unless specifically requested, manuscripts or illustrations will not be returned.

*The text of the contributions* should be structured by subheadings; it should contain (a) an introduction, stating the purpose, (b) a description of materials and methods in sufficient detail, (c) information on results or systems developed, and (d) a conclusion on and/or summarization.

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*Additional notes* should be indicated in the text by lifted single numbers behind a word and equally collected with their texts at the end of the paper under the heading *Notes*.

*Journal References* should contain the names and initials of all authors, full titles of the publication, abbreviation of the journal according to the ISO Standard 4, volume number, year of

## Aims

Thus, KNOWLEDGE ORGANIZATION is meant to be a programme for the improvement of classification methods and processes, a forum for discussion for all those interested in the organization of knowledge on a universal or a subject-field scale, using concept analytical and/or concept-synthetic approaches as well as numerical procedures and comprising also the intellectual and automatic compilation and use of classification systems and thesauri in all fields of knowledge, with special attention being given to the problems of terminology.

KNOWLEDGE ORGANIZATION publishes original articles, reports on conferences and similar communications, the Newsletters of the International Society for Knowledge Organization (ISKO News) and the Committee on Classification Research of the International Federation for Information and Documentation (FID/CR News) as well as book reviews, letters to the editor, and an extensive annotated bibliography of recent classification and indexing literature, covering now some 500 items in each issue.

KNOWLEDGE ORGANIZATION should therefore be available at every university and research library of every country, at every information center, at colleges and schools of library and information science, in the hands of everybody interested in the fields mentioned above and thus also at every office for updating information on any topic related to the problems of order in our information-flooded times.

KNOWLEDGE ORGANIZATION was founded in 1973 by an international group of scholars with a consulting board of editors representing the world's regions, the special classification fields, and the subject areas involved. From 1974-1980 IC was published by K.G.Saur Verlag, München. Back issues of 1978-1992 are available from INDEKS Verlag, too. (The 14 volumes of 1978-1992 are offered now at the highly reduced price of DM 200.-).

As of 1989, KNOWLEDGE ORGANIZATION has become the official organ of the INTERNATIONAL SOCIETY FOR KNOWLEDGE ORGANIZATION (ISKO) and is included for every ISKO-member, personal or institutional in the membership fee (DM 60.-/DM 120.-).

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