

The book can be read without great difficulty. It offers interesting elements to those who are looking for language-oriented methods. This work is based on earlier work by Lorenzen, Wedekind and the author himself, and as such it documents well the state of the art. As already mentioned however, the book shows as well that at this time a final conclusion on how far the language-based approach will reach cannot yet be made. If, and to what degree, the proposed method is suited as a „methodenneutraler Fachentwurf“ remains open for discussion.

Anybody who is responsible for software development and looking for a new tool to ease the task will be disappointed. Software developers are clearly not the best audience for this book which addresses rather very scientific goals.

Hans Czap

Prof. Dr. Hans Czap, Universitaet Trier, Lehrstuhl fuer B W L/Wirtschaftsinformatik, 54286 Trier, Germany, e-mail: cz@wiinfo.uni-trier.de

PREDIGER, Susanne. **Kontextuelle Urteilslogik mit Begriffsgraphen. : Ein Beitrag zur Restrukturierung der mathematischen Logik** [Contextual Judgment Logic with Concept Graphs : A Contribution to a Restructuring of Mathematical Logic]. Aachen, Germany : Shaker Verlag, 1998. 106 p. ISBN 3-8265-3969-9.

This dissertation contributes convincingly to the foundations of "Contextual Logic" by developing a syntax and semantics of a contextual judgment logic. It is exceptional how comprehensively the theme of the dissertation is treated: from a broad discussion of the philosophical and historical background to a profound elaboration of the mathematical foundations including basic completeness theorems.

The recent development of "Contextual Logic" at Darmstadt University of Technology was brought about by problems which have occurred in using methods and procedures based on predicate logic in computer-aided knowledge processing. A main reason for those problems lies in Frege's conception of logic. G. Frege abandoned the traditional understanding of logic which, by Kant's lectures on logic, is based on the three main functions of human thinking: concepts, judgments, and conclusions. Frege concentrated on the question about the truth of propositions for gaining a certain foundation of mathematics by a mechanistically designed calculus of logic. Although this research program failed in its central aim, Frege's conception of logic still dominates. The traditional understanding of logic as the doctrine of the forms

of thinking, oriented to questions concerning knowledge and reason, has only survived in some parts of philosophy.

"Contextual Logic" is based on a language- and reality-oriented approach of mathematizing the traditional philosophical logic. As a source for the mathematization, Formal Concept Analysis is used for formalizing the doctrine of concepts, and Sowa's Theory of Conceptual Graphs for formalizing the doctrine of judgment and conclusion. The foundation on formal contexts, for which the connection of the extensional and the intensional view is constitutive, is the basis for "Contextual Logic".

In Chapter 1 (Part I) of the dissertation, the conception of "Restructuring" mathematical logic is explained as it has been developed in the department of mathematics of Darmstadt University of Technology since 1978. Starting from H. von Hentig's claim to restructure humanities and sciences so that they become better learnable, accessible, and criticizable in public, the role of mathematics in our society is discussed in the scope of basic ideas of pragmatic philosophy. Based on this, purposes and effects of mathematical logic are described for clarifying how far the developments of mathematical logic depend on the aims which they are supposed to fulfil. It is made clear that the aim of supporting human argumentation and, in particular, knowledge processing suggests a mathematization of the traditional philosophical logic. This yields the argument for a restructuring of mathematical logic by mathematizing the philosophical doctrines of concepts, judgements, and conclusions.

Chapter 2 discusses why it happened that the paradigm of logic changed from the understanding of a doctrine concerning the forms of thinking to that of a mechanistic calculus for proving truthness. Surprisingly, this question has only insufficiently been treated up to now by researchers of the history of mathematics and logic. Thus, it is a special achievement of the dissertation to make the process of change understandable by a substantial presentation of the relevant historical developments of mathematical logic. The decisive move was indeed Frege's change to a new aim of logic, namely the goal of establishing a logical foundation for mathematics (which led to the narrow semantics of truthness). In this way, logic became more and more separated from the common language which is one of the main reasons why procedures of predicate logic are of quite limited use in knowledge processing. In making this clear also historically, the turn back to the traditional philosophical logic becomes even more convincing if this leads to a better support of knowledge processing.

In Chapter 3 (Part II), a syntax and semantics for "simple judgments" are developed based on Formal Concept Analysis as a mathematical theory of concepts. Thereby, the simple conceptual graphs (which J. Sowa

introduced as language-oriented structures of a logic designed for knowledge representation and processing) are mathematized where the concepts of conceptual graphs (formal judgments) are made precise as formal concepts of formal contexts. In this way, concept graphs are obtained as mathematical entities based on formal contexts with additional relations on their object sets. The theory presented defines first a syntax which allows the introduction of concept graphs as syntactical constructs of a formal language formed by object names, concept names, and relation names. Semantically, these constructs are interpreted in formal contexts by assigning the object names to objects, the concepts names to formal concepts and the relation names to relations of the formal chosen context. In this way, it is possible to define when a concept graph (formal judgment) is valid in a contextual model.

The semantic entailment, which is not sufficiently developed in Sowa's Theory of Conceptual Graphs, can now be described satisfactorily: a concept graph entails another concept graph if the second graph is valid in any contextual model whenever the first graph is valid in this model. For the entailment between concept graphs, the following theorem is basic: a concept graph entails another concept graph if and only if the second graph is valid in the standard model of the first concept graph (the standard model is introduced for each concept graph). Such reasoning with standard models is the main aid for proving the completeness theorem for simple concept graphs with respect to a calculus of syntactical deduction which is taken from the Theory of Conceptual Graphs in an improved form. Soundness and completeness are also demonstrated for existential and nested concept graphs; this covers to a large extent Chapters 4 and 5 of Part II.

Besides many further theorems, which enrich and consolidate the theory of concept graphs as a useful mathematization of the doctrine of judgments, the dissertation achieves sound and theoretically fruitful formalizations suitable for a stimulating foundation of a theory of formal judgments. For instance, existential quantifiers are appropriately introduced as equivalence classes of generic markers following the ideas of J. Sowa, who adapted for his approach the theory of existential graphs of Ch. S. Peirce. The dissertation also yields a convincing solution to the difficult problem of mathematizing (positive) nested conceptual graphs, which even leads to a completeness theorem. For the solution, ideas of situation semantics of J. Barwise and K. Devlin are activated.

In the concluding Part III, the developed theory of concept graphs is discussed and assessed with respect to the aim of supporting knowledge processing by the presented formalization of the doctrine of judgments. The critical summary is very helpful for an integrated understanding of the created theory in its connections to the

aims and the pragmatic-philosophical background. The discussion of the theory of concept graphs as a basis for knowledge processing (with an outlook to further research) makes it especially clear that the ambitious goal of the dissertation to restructure mathematical logic, by developing a contextual judgment logic based on concept graphs for supporting knowledge processing, has been impressively fulfilled.

Rudolph Wille

Prof. Dr. Rudolph Wille, Fachbereich Mathematik, Arbeitsgruppe 1, Schlobgartenstrabe 7, 64289 Darmstadt, Germany, e-mail: wille@mathematik.tu-darmstadt.de

Subject headings for children : a list of subject headings used by the Library of Congress, with abridged Dewey numbers added. Edited by Lois Winkel. 2nd ed. Albany, N.Y. : Forest Press/OCLC, 1998. 2 v. (xiii, 179p., VIII. 416 p; contents: v.1 List of headings - v.2 Keyword index. ISBN 0 - 910608-58-X set (Pbk).

Subject cataloguing of children's material is an interesting and dynamically growing and changing area, and this is mostly due to the work of the Library of Congress (LC). A special list of subject headings for children's literature was developed by LC. In 1965, LC initiated the Annotated Card (AC) Programme for children's materials with the purpose of providing more appropriate and extensive subject headings for juvenile books through modifications of the scope and wording of existing headings. Of course, more headings were added. This separate list entitled *Subject Headings for Children Literature* was first published in 1969. On the suggestion of the Cataloguing of Children's Materials Committee of the ALA, many of the headings from *Subject Headings for Children's Literature* (Library of Congress) have been incorporated into the *Sears List of Subject headings* since its 13th edition (1986). The *Sears List* is thus now suitable both for juvenile literature as well as for small libraries.

The work under review is another worthwhile effort. Its second edition speaks of its usefulness as well as of the growing nature of the field. Lois Winkel's work provides an augmented and separate list based on literary warrant. The list was prepared by searching the OCLC union catalogue *WorldCat* for subject headings used in the LC Annotated Card Programme (AC) and *Subject Headings for Children's Literature* (MARC field 6xx, Second indicator set to one). The list thus obtained was rigorously reviewed and reduced by deleting many headings falling out of the chosen criteria of currency and literary warrant. More headings were also added. In this edition, the