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Zbl 1013.03001

[Carbone, Alessandra](#); [Semmes, Stephen](#)

A graphic apology for symmetry and implicitness. (English)

[B] Oxford Mathematical Monographs. Oxford: Oxford University Press. xvii, 501 p. \sterling 69.50 (2000). [ISBN 0-19-850729-1/hbk; ISSN 0964-9174]

This outstanding monograph investigates many formal connections between important parts of modern mathematics and logic. Particular attention is given to implicitness studies of large or complex formal objects as well as families of such objects. Deep parts of modern group theory enter the inquiry from connections with symmetry theory and the theory of recursively presented groups. E.g., trivial words in recursively presented groups are strongly analogous to provable formulas in the first-order predicate calculus; then there exist recursively presented groups with recursively unsolvable word problem just as the set of provable formulas of first-order logic is recursively enumerable, but not recursive. A strong combinatorial framework for the monograph exists in the form of considerable attention given to oriented graphs (similar to important ideas in geometry and topology). The book covers a broad range of basic topics: morphisms in proof theory and complexity theory; graphs and their visibilities; geometric aspects of cut elimination; duality and NP-completeness; finite automata; strong forms of recursion; graphs and groups; and Corona decomposition of graphs. The reviewer highly recommends this novel and interesting monograph, believes the authors' implicitness approach has several useful applications to modern cosmology theory, and hopes that future editions will show formal connections between degrees of recursive unsolvability, implicitness theory and group theory.

[[Albert A. Mullin](#) (Madison)]

MSC 2000:

- *[03-02](#) Research monographs (mathematical logic)
- [05-02](#) Research monographs (combinatorics)
- [68-02](#) Research monographs (computer science)
- [03D05](#) Automata theory in connection with logical questions
- [03D15](#) Complexity of computation
- [03F05](#) Cut-elimination, etc.
- [03F07](#) Structure of proofs
- [03F20](#) Complexity of proofs
- [05Cxx](#) Graph theory
- [54E35](#) Metric spaces, metrizable
- [68Q15](#) Complexity classes of computation
- [68Q17](#) Computational difficulty of problems
- [68Q45](#) Formal languages
- [68R10](#) Graph theory in connection with computer science
- [68Q25](#) Analysis of algorithms and problem complexity

Keywords: implicit definitions; morphisms in logic; complexity theory; graph theory; visibility graph; formal languages; complex formal objects; symmetry; recursively presented groups; oriented graphs; proof theory; cut elimination; duality; NP-completeness; finite automata; recursion; graphs and groups

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