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REVIEWS

The Association for Symbolic Logic publishes analytical reviews of selected books and articles in the field of symbolic logic. The reviews were published in ***The Journal of Symbolic Logic*** from the founding of the JOURNAL in 1936 until the end of 1999. The Association moved the reviews to this BULLETIN, beginning in 2000.

The Reviews Section is edited by Steve Awodey (Managing Editor), John Burgess, Mark Colyvan, Anuj Dawar, Marcelo Fiore, Noam Greenberg, Rahim Moosa, Ernest Schimmerling, Carsten Schürmann, Kai Wehmeier, and Matthias Wille. Authors and publishers are requested to send, for review, copies of books to *ASL, Box 742, Vassar College, 124 Raymond Avenue, Poughkeepsie, NY 12604, USA.*

In a review, a reference "JSL XLIII 148," for example, refers either to the publication reviewed on page 148 of volume 43 of the JOURNAL, or to the review itself (which contains full bibliographical information for the reviewed publication). Analogously, a reference "BSL VII 376" refers to the review beginning on page 376 in volume 7 of this BULLETIN, or to the publication there reviewed. "JSL LV 347" refers to one of the reviews or one of the publications reviewed or listed on page 347 of volume 55 of the JOURNAL, with reliance on the context to show which one is meant. The reference "JSL LIII 318(3)" is to the third item on page 318 of volume 53 of the JOURNAL, that is, to van Heijenoort's *Frege and vagueness*, and "JSL LX 684(8)" refers to the eighth item on page 684 of volume 60 of the JOURNAL, that is, to Tarski's *Truth and proof*.

References such as 49***5*** or 280***1*** are to entries so numbered in *A bibliography of symbolic logic* (the JOURNAL, vol. 1, pp. 121–218).

STEPHEN COOK and PHUONG NGUYEN. ***Logical foundations of proof complexity.*** Perspectives in Logic. Cambridge University Press, New York, 2010, 15 + 479 pp.

It is no secret that computational complexity theory has its origins deeply rooted in mathematical logic. By this we mean not only that the original definitions and early results were inspired by concepts from classical computability theory, but also that some of the most influential results in the area have a deep logical meaning. For example, one of the important early results in the area, the Cook–Levin Theorem, states that the satisfiability problem for propositional logic is **NP**-complete or, dually, that the problem of detecting propositional tautologies is **co-NP**-complete. One immediate consequence of this is that, unless $\mathbf{NP} = \mathbf{co\text{-}NP}$, the standard textbook proof systems for propositional logic are not *polynomially bounded*: although they are complete in the sense that all tautologies have proofs, they are not efficiently so in the sense that not all tautologies have short (i.e., polynomial-size) proofs. Perhaps surprisingly, this straight consequence of the hypothesis that $\mathbf{NP} \neq \mathbf{co\text{-}NP}$ is not known to hold unconditionally except for some weak proof systems. This takes us to an active field of research called propositional proof complexity, one of whose aims is to classify the relative strength of the existing propositional proof systems, with the goal of understanding and exploiting this sort of incompleteness phenomenon at the level of propositional logic.

The subject of ***Logical foundations of proof complexity*** revolves precisely around the theme of propositional proof complexity. It does so by developing a general framework by which

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