

BOOK REVIEW

John P. Burgess, *Philosophical Logic*, Princeton University Press, 2009, 168 pp., ISBN 978-0-691-13789-6.

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This book appears in the series *Princeton Foundations of Contemporary Philosophy* and is partially based on the author's seminar 'Heresies in Logic', at Princeton. The aim of this book is to provide a foundation to non-classical logics, i.e. extensions of or alternatives to classical logics, 'sufficient to equip the reader to follow basic applications in analytic philosophy, and to tackle if desired more advanced works' (p. vii). The ideas will be presented systematically and not historically.

Philosophical logic, as the author understands this term, is 'the part of logic dealing with proposed extensions of or alternatives to classical logic' (p. vi) and more precisely it is 'the part of logic dealing with what classical logic leaves out, or allegedly gets wrong' (p. 1). The book starts with a preface, then continues with six chapters – the first dedicated to classical logic and the others to a non-classical logic (temporal, modal, conditional, relevantistic, intuitionistic) - and ends with some selected references and a useful index of terms.

After distinguishing philosophical logic (a technical branch of logic) from philosophy of logic (a philosophical reflection on logic), chapter one provides the basic insights into the two big parts of classical logic: sentential logic and predicate logic. For each of them the author presents the language, the semantics and the issue of (un)decidability, and ends by recommending –as for all the other chapters- further readings.

The first philosophical logic presented is the temporal one. The reason is that the analysis of the notions of past and future will guide 'the treatment

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of the more obscure notions of possibility and necessity' (p.1). The author presents the language, the semantics (2.2) and the calculus of this logic (axioms 2.3, rules 2.4 and theorems 2.5). Also discussed are the axioms and the theorems of the temporal logic which may model the time of classical physics, and the possibility of the reduction among tenses (2.8). The chapter ends with a metalogical discussion regarding the soundness, completeness and decidability of quantified temporal logic (2.9).

Chapter three is dedicated to modal logic and is the most extended. While temporal logic deals with the distinctions among *was/is/will be*, the central distinction of modal logic is that between *may be* (possible) and *must be* (necessary). Section 3.2 discusses the standard semantics of the modal language –possible worlds semantics; Burgess prefers 'states' instead of 'worlds' – presenting Kripke models in relation with those for temporal logic. As section 3.3 indicates there is not a unique taxonomy of modalities. However, we can distinguish among logical, dynamic (metaphysical, physical, historical), epistemic (doxastic), and deontic modalities. Before discussing the relations among modalities (3.5) in section 3.4 are presented the basic modal systems (K, S1, S2, S3, S4, S5). Next section (3.6) offers a useful discussion about the metalogical properties of completeness and decidability with a complete proof for the completeness of K. In answer to the philosophical question 'which modal logic is the right one?' Burgess considers S4 and S5, and defends the latter as being the correct answer. The chapter ends the discussion about the problem of quantification with the conclusion that there is much to be done in this direction.

Chapter four deals with the logic of indicative (factual) and counterfactual (subjunctive) conditionals. The counterfactual conditionals were also neglected by classical logic because –as the author emphasizes– they do not play an essential role in mathematics. An extended part of the chapter is dedicated to the indicative conditionals –which are treated in classical logic as material conditionals (p.72). The author presents Grice's critique to this treatment, the probabilistic theory of conditionals according to which the assertability of a conditional is defined in terms of the probability of the consequent given the antecedent, the remoteness theory on indicative conditionals, conditional calculus and Adams test for conditionals. The discussion on the right logic of the indicative conditionals defends a materialist account which identifies the truth conditions of the indicative to those of the material conditional. The chapter ends with a short discussion on counterfactual conditionals and weak conditionals.

Relevantistic logic is presented in chapter five. This logic rejects the classical principle *ex falso quodlibet*, i.e. the principle according to which any statement follows from a contradiction. Giving it up implies also rejecting disjunction introduction, disjunctive syllogism, and the transitivity of entailment. The chapter presents different kinds of relevantistic logic (r-logic): topic logic, perfectionist logic, 'first degree' of r-logic, dialethism, 'purely

implicational' fragment of r-logic, and ends with a discussion on the possibility of combining the 'first-degree' and 'purely implicational' fragments of r-logic.

Chapter six presents the sentential and predicate intuitionistic logic together with their Heyting's axiomatization, their semantics (Kripke models), and sketches the completeness results (in the technical sense for the sentential logic and in the intuitive sense for the predicate logic). The reader is also informed about the recent philosophical dispute on the meaning of logical constants, defined in truth-conditions terms in classical logic and in proof-conditions terms in intuitionistic logic.

As the book illustrates, philosophical logic is rather a technical subject and requires a lot of practice in order to be properly understood. Philosophical logic comprises 'what logicians are doing when they are at work' and not 'questions about what logicians are doing when they are at work', what philosophy of logic deals with (p. 2). The subject is presented from the more general concepts to the particular instances and some theorems are rigorously proved. I highly recommend the book to everyone interested *in logic and its philosophy*.