

REVIEW: Warren Goldfarb's *Deductive Logic*

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Warren Goldfarb, *Deductive Logic*, Hackett Publishing Company, 2003.

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Deductive Logic is an introductory textbook in formal logic. The book is divided into four parts covering (i) truth-functional logic, (ii) monadic quantification, (iii) polyadic quantification and (iv) names and identity, and there are exercises for all these topics at the end of the book. In the truth-functional logic part, the reader learns to produce paraphrases of English statements and arguments in logical notation (this subsection is called “analysis”), then about the semantic properties of such paraphrased statements and arguments, such as satisfiability, implication and equivalence (“logical assessment”) and finally (“reflection”) there is an axiomatic proof method and some important extras such as disjunctive normal form and expressive adequacy. Parts two and three mirror this analysis/assessment/reflection structure for monadic and polyadic quantification, though this time the proof system is a natural deduction one, and part three contains a completeness proof for that system. The fourth part of the book introduces names, the identity predicate and descriptions and examines the additional expressive power which these provide.

I do not think there should be any doubt that this is an excellent book; it presents the essential topics of a first logic course with accuracy, clarity and attention to detail, and it makes material that can be confusing the first time round—say, the translation of conditionals—transparent and easy to understand. But there are a lot of good introductory logic textbooks out there, so I will say something about how it resembles and differs from some other books, and then discuss one minor irritation with this one.

* * *

Deductive Logic distinguishes itself by unusual clarity and insistence on the topic of the use/mention distinction. Pages 53–59 discuss the difference between the connective ‘if ... then ...’ and the relational predicate ‘implies’, and the text goes on to introduce quotation mark names and syntactic variables through examples. Perhaps part of the explanation for the book’s quality in this respect is its pedigree; Goldfarb took over Quine’s introductory logic course at Harvard in 1979, and at first taught from the Quine’s seminal *Methods of Logic*. The present book arose out of Goldfarb’s attempts to make that course more pedagogically effective.

I will stress how good a thing I think this emphasis is. There are those who will tell you that a class in formal logic is no place to be worrying about the use/mention distinction. New logic students, they suggest, should be concentrating on their proofs and their truth tables, and we should leave it to “Introduction to Philosophy”, or even later, until they start studying philosophy of *language*, before we harp on about confusing, not to say pedantic, things like the use/mention distinction. I disagree. Just as students who have taken logic are more comfortable with ideas like transitivity, modus tollens, and restricted quantification when they encounter them in metaphysics or ethics, so students who have had their attention drawn to this occasionally tricky, often over-looked, but sometimes important distinction in the context of their logic class—with several good examples and a few exercises—are more likely to follow when it comes up during a discussion of modality or truth. And discussions of modality and truth are hard enough without that being the context in which one first meets syntactic variables. Moreover, the use/mention distinction is important to the study of logic in its own right. It is one thing to have one’s students attracted to relevant logic. It is another to have them attracted to relevant logic because they did not understand the difference between conditionals and entailment.

Another attractive feature of the book is its choice of proof methods—an axiomatic system for truth-functional logic, and a natural deduction system for the logic with quantifiers. In the research literature it is common to characterise logics according to their acceptance or rejection of certain axioms (e.g. the s_4 -axiom or Peirce’s Law) which makes it important for students to understand how an axiomatic proof system works. Natural deduction systems, in turn, have the value of encoding many of the informal proof methods that philosophers and others use and refer to in the course of their work: proof by contradiction, proof by cases, conditional proof etc. So—though I couldn’t care less if my students never saw a semantic tableau—I think there are good reasons to introduce then to both axiomatic and natural deduction systems and this book does this.

Another feature which distinguishes *Deductive Logic* from similar books is that it does not contain much material beyond the core topics taught in *all* introductory logic courses. In particular, there is no section introducing set theory, second-order logic, or syllogistic logic, there is no discussion of intuition-

istic or relevant propositional logics, and no sections on alternative notations (Polish, using dots instead of parentheses, etc.) Is such asceticism desirable? If you want to teach these additional topics you might not *need* them to be included in the textbook for the course. Or you might think that these topics are too advanced, or even too heretical, to be taught at all—maybe you don't want your crazy hippy students to even *see* a chapter headed "Paraconsistency." Supplementary topics can always be added using handouts, or other books. But then you might also have concerns about making your students purchase two texts, and you might appreciate the flexibility that additional topics provide; you could always leave them out. There is one kind of reader for whom the tight focus of this book is a definite plus: if you are trying to teach yourself logic—perhaps sitting in a cafe one summer before your first year in a philosophy PhD programme—then you might not have an instructor to help you distinguish the crucial parts of your book from the interesting extras. For such a reader I know of no better text than this.

One final way in which this book differs from some of the other introductory texts available: it does not come with a CD full of software for doing the exercises, and you do not get your grading done for you by computer. If you like the idea of getting your students to mess around with computerised proof-builders, truth-table constructors and model construction programs, and of course, getting the grading done by a TA who cannot suffer, then this may be a decisive consideration against the text, but the possibility of teaching, or taking, the entire course without a computer remains a good thing if you teach at an institution which does not provide access to computers for all students. Unless we are tacitly ignoring everything but first world institutions, this is a real possibility.

And so finally, a minor, but genuine, criticism of *Deductive Logic*. In one respect, formal logic is like arithmetic; there is agreement on technical results—such as that there is no highest prime and that '¬' and '∨' are adequate for expressing any truth-function—but disagreement on important foundational and philosophical issues, such as what a number, or possible world, is, and the relation between logic and good reasoning. One hazard of writing an introductory-level textbook is that some discussion of foundational or philosophical issues is required; a student in her first logic course does not simply want to know whether the set containing '¬' and '∨' is truth-functionally adequate, she also wants to know what this logic stuff is all about, and why she should be interested in validity in the first place. Goldfarb's introduction addresses these issues, and his first sentence is this: "Logic is the study of the principles of reasoning." Now, I suppose it is OK to utter this seductive falsehood during an introductory logic course—there may be occasions where it makes pedagogical sense to utter a literal falsehood—but that does not mean I want it to be the first sentence my students read in their textbook. As Harman has pointed out time and time again, logic can tell us about the consequences of the statements that we accept (maybe they imply some new statements, maybe they imply all

statements), but if these implications suggest some *revision of our beliefs*, there will normally be a number of adjustments that could be made. For example, one might start believing the content of the implied statement, or one might relinquish belief in the content of one or another of the premises. But logic is *not* the science that tells you how to do this. For that you need extra-logical principles of *inference* (that is, principles of *belief revision*,) and maybe some other extra-logical things such as plausibility assignments or knowledge of your own mental capacities (there is no sense in believing all the consequences of your beliefs, you do not have the energy.)

But perhaps I should not be surprised by irritations of this kind when an author makes the effort to say something about the controversial issue of what logic is all about, and it will not change the fact that *Deductive Logic* is a first rate introduction to the subject.

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