
We have here yet another elementary logic textbook; instructors of beginning courses in elementary logic would do well to ignore it. I fear, though, that many instructors involved in year-long courses will be attracted by the wide range of topics covered and by the sections entitled “Philosophical Applications and Difficulties.” The purpose of this review is to demonstrate that in spite of these, the pedagogical inadequacies and logical errors justify rejection of the book.

Chapters I and II, on propositional logic, involve the following pedagogic difficulties. First, in order to learn the system, the student must memorize 26 equivalences, 10 tautological implications, and two rules of inference (all this before “conditional proof”). Second, the bright student will be confused when he discovers that the system presented fits neither “axiomatic” nor “natural deduction” as defined (pp. 65-69). Third, there is almost no discussion of “stylistic variance” in ordinary language. How is the student to learn how to translate sentences containing, e.g., ‘only if’? Fourth, the convention of dropping outside parentheses is introduced on page 9; however, when the rules of inference are given, it is not mentioned that the rules are only operable on formulae without this convention. Students always infer something equivalent to ‘(p ⊃ (q v r))’ from ‘p ⊃ q’ by the rule of Add, when the parentheses are dropped. Finally, direct proofs must start from premises, and furthermore the premises must “essentially mention” something “mentioned” in the conclusion. Thus, for example, no theorems are provable. Yet the author claims that conditional proof is theoretically eliminable (page 61).

Chapters III and IV are entitled “Syllogistic Logic” and “Class Logic.” About the only justification one can give for inclusion of these topics is their historical interest, and even this is taken away by the attempt to introduce new types of statement: singular affirmative and singular negative. If deemed necessary, they should be
assimilated to A and E propositions ("All things identical with Socrates are F," etc.).

Chapter V is predicate logic. The pedagogic difficulties seem to me to be these: First we are given existential and universal "quasi-names" in addition to names and variables. This is not necessary, for we have to instantiate to a new "existential quasi-name" (for EI) anyway—we could just instantiate to a new variable and keep track of where they come from for UG. Incidentally, this condition (given on page 181) is continually violated—e.g., pages 191 (step 6), 392 (step 6). Second, the "disproofs" section considers no examples and only one exercise (and that one done incorrectly) from other than monadic logic—yet the author nowhere mentions that these are automatically disprovable. And he does not mention that the rest of the predicate calculus has been proven to be undecidable. Third, instantiation rules merely require that "the quantifier not be in the scope of another quantifier or a negation, and must extend to the end of the formula." So from 'Fa ⊃ (x)Gx' we are supposed to be able to infer 'Fa ⊃ Gb'. The student who has understood that the parentheses-dropping is merely a convention, and that they are still "really there," will never understand how the rules justify the inference just given. Fourth, EG is stated so that every occurrence of the name, quasi-name, or variable generalized on must be so generalized. Since there is a rule of Reductio in the system, this leads to no logical difficulties, but it does make certain proofs longer and more complicated (e.g., the simple passage from '(Fa ∨ Ga)' to '(∃ x) (Fx ∨ Ga)' would take eight steps instead of one).

The author's desire not to have "vacuous quantification" or quantifiers in the scope of another quantifier using the same variable leads to various logical problems. First, the rules (page 181) nowhere state that there need be anything generalized on. It seems permissible by the rules to pass from 'Fa' to '(∃ x)Fa'; and further, if '(x) (Fx ⊃ (x)Gy)' is provable from some premises so is '(x) (Fx ⊃ (x)Ga)', so the rules allow passage from truths to non-formulas! (The author himself does not always obey this convention—see the example at bottom of page 180. The example also contains a misprint.) Second, this convention makes him understandably shy about stating what the permissible substitutions for the "dummy predicates" of his rules and theorems are. And this in turn leads him to confuse predicates, predicate variables, and meta-linguistic variables, as is evidenced wherever rules and theorems are stated. This same difficulty attaches to the "Replacement Rule," but the author does not seem to recognize this. Two other logical difficulties worth mentioning here are: the discussion on pages 164-165 about the conditions necessary for "subalterns," "contraries," and "subcontraries" is incorrect. To incorporate all Puitill's comments, we need a universe of two (not one) individuals. (With only one, we cannot falsify both "contraries" nor make true both "subcontraries"). The last difficulty I mention with this chapter is in the disproof section. After giving the standard "small worlds" technique, Puitill gives a "shortcut" method. He acknowledges that the method is not infallible, even in monadic logic (page 190). Indeed so. Whenever there are two existential premises, at least one of which is "superfluous," and the conclusion is not itself a theorem, but "depends upon" a universally quantified premise, the "shortcut" will declare it invalid. Various remedies for this could be given, but here as in the "shortcut" for propositional disproofs, the author chooses to stay with a non-effective method.

Chapter VI is "Extended predicate logic," which starts with second-order logic, and begins to lead the student astray by incorrectly translating various English sentences. For example, '(x) (y) (z) [Fz Fy]' is said to be "Everything has some relation to everything (else)" instead of the correct "For any (two) things there is some relation between them." Further the author gives us no hint of what the proper substituends are. Can they be any formula? Or just atomic predicates? If the former, there needs to be some restriction on the variables. Identity is now introduced by definition. The rules suggested for the use of '¬' are not mentioned as being derived from the second-order logic, and furthermore are incomplete. (Also needed is something that implies '(x) (x = x)', if we are not to have recourse to the second-order system.) The author only devotes one page to the logic of identity (plus two to second-level intensional properties, one to symbolizing numbers, and one to exercises). Surely the topic should be covered in more depth. The same is true of the next section "Definite Descriptions." Four and one-half pages is simply not sufficient. Incidentally, the author insists that all definite descriptions be proper (page 218) so that "in translating English to this notation, it is essential that we only use the iota operator when we know there is a unique individual ..." The next section concerns the lambda-operator, and a long discussion is devoted to difficulties of the "impredicatable property" sort. The solution suggested, elimination of "self-reference," is susceptible to insolubles of mediaeval vintage: Plato: "What Socrates says is true"; Socrates: "What Plato says is false" (and they say nothing else).
Chapters VII and VIII discuss modal, epistemic and deontic logic. I have three objections. First, the various systems are not always kept separate. Some method of subscripting theorems would help. Second, no mention is made of systems other than $S_4$, $S_5$ and $S_6$—and various falsehoods are stated about $S_6$ being the “strongest system” and $S_4$ being the system immediately weaker than $S_6$. Third, the semantical meta-theory would be more clearly stated by Kripke-style “possible worlds” than by 4-valued “quasi truth-tables,” especially since (Dugundji, JSL V: 150-151, 1949) there is no finitely many valued logic characteristic of any of the $S_1$ - $S_6$ systems.

Chapter IX is “The logic of ordinary language,” and seems well-done, at least for the purposes of classroom discussion. Chapter X is a grab-bag of such topics as “Definition,” “Meaning,” “Probability” and “Scientific Inference.” The chapter is much too short to do justice to any of these topics. There are four appendices: “Simplifying Compound expressions,” “256 simplest forms” (of expressions with three propositional variables), “Alternate notations,” and “Many-valued logics.” Only the third was worth writing.

The even numbered exercises are solved in the back of the book, and there is an answer book for the instructor for the odd-numbered exercises. The book is marred by an extraordinary number of misprints, and at least a tenth (and perhaps as many as a fifth) of the exercises are solved incorrectly.

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