

Essential Logic
Ronald C. Pine

PREFACE

To the instructor

Why should you consider yet another logic book?

I have taught a freshman logic course for almost 25 years at both a major university and a community college. I have watched as most students who started this course severely intimidated, gradually became confident as their natural critical thinking and formal reasoning abilities emerged. Over the years, several students have indicated that this course was a turning point in their lives; they said that they were able to build on the skills and attitudes learned in basic logic to tackle any course or problem that seemed at first too difficult. These students learned the essence of critical analysis: how not to be intimidated by a complex whole, how to break things into simpler pieces, how to remain disciplined and follow a reasoning trail, and how to stay focused so that the brain can do its natural pattern-recognition work.

In the past 40 years, thousands of new community colleges have drawn legions of nontraditional students, while universities have become increasingly multicultural. In general, I have found this nontraditional student pool, with its endless diversity, a joy. What they sometimes lack in academic preparation of the traditional sort, they make up for with rich experiential backgrounds and a seriousness of purpose. We teachers sometimes forget that students today are facing quite different challenges and opportunities than we faced as students. This of course, is no reason for lack of rigor or a lowering of standards. But it should call us to rethink our approaches.

Here are the unique features this book provides.

- 1. A readable, dialogue-like, but challenging style more suitable for today's student.**
- 2. Essential introductory skills, concepts, and attitudes: deductive and inductive, informal and formal logic placed within a philosophical perspective.**
- 3. A humble, but upbeat interpretation of the power of science and inductive reasoning, one that counters the polar evils of technological overconfidence and epistemological laziness. An integration of traditional introductory concepts with modern technological issues and the world view of modern science.**

4. A unique structuring methodology and organization of informal fallacies that force students to interpret and argue, not just label. An exercise approach that forces students to write and argue by connecting criticism to key concepts.
5. Rigor and relevance in the symbolic logic chapters combined with a more student-centered sequencing of the learning steps, especially in Chapters 9 and 10.
6. Controversy. I deliberately take stands on some issues but encourage students to use the tools they have learned to critique these stands. I have also included a chapter on Fuzzy Logic and framed the presentation in terms of a debate between Western and Eastern philosophy.

Concerning (1), I try to talk directly to students in a narrative style. I explain some key terms at greater length than is customary (for instance, the treatment of validity in Chapter 1) , attempt to add more texture to sequencing (the fallacy and propositional logic chapters), and then turn up the intellectual heat in places with either controversial digressions or advanced philosophical topics (value clarification, the nature of value disagreements, the nature of truth and issues in the philosophy of science, the role of reason in life, artificial intelligence, and the frontiers of logic.)

Concerning (2) and (5), I have tried to make this textbook interesting and intriguing by having a theme. Some instructors may be surprised by the digressions where I adopt controversial philosophical perspectives. But so-called more objective texts are not value- or position-neutral anyway, and I don't think I have hidden the controversial nature of my positions from student readers behind a cloak of authoritarianism. Furthermore, I have given students the format (exercises) to critique my positions. Those instructors who desire student exercises involving extended arguments should find this approach valuable.

Concerning (3), many logic books present fallacies as if their identification is purely a process of labeling and description; as if fallacies are simply anti-commandments rolled down from above, as absolute prohibitions in which no argument is needed. I assume that the interpretation and charge of fallacy require argumentation, and students need to learn how to make a case that arguments are weak. Thus, this book introduces a formalization strategy for fallacies that not only forces students to understand exactly how to critique each fallacy and connect the nuances of the critique to broader foundational concepts, but also serves as a transition to formal logic.

With the formalization schema introduced in Chapters 4 and 5, students are able to see the relevance of formalizing our thinking, of abstracting the essence of a

thinking process so we only have to think about it once, so to speak, regardless of novel content. From here a smooth transition can be made to symbolic logic and mathematics. Students are also encouraged to see the positive nature of criticism: proper categorization and localization of the bad reasoning enables us to know what will make an argument better by identifying the type of evidence or support that will make a conclusion more reliable.

Concerning (4) , in my experience with sympathetic teaching and sequencing, the average student with no more prerequisite than an ability to read at a college level can work on the more difficult problems presented in the text, such as those in Chapter 10. They may not solve each problem but they should be able to create significant, valid symbolic trails. And in the process they will gain a deep appreciation for an important aspect of our technological culture.

Hence, Chapters 9 and 10 present propositional logic without indirect or conditional proof. Because there is only so much that can be covered in a semester or quarter, and because there is a natural affinity between syllogistic and quantification logic, Chapter 11 provides students with an introduction to the first stages of quantification via a very brief exposure to Venn diagrams and syllogisms. This is a difficult chapter, but by this stage in the semester students should be able to master the basic concepts.

Given the amount of time in a semester or quarter, I have decided that although propositional logic should be covered thoroughly, just enough classical logic should be introduced to understand the debate in Chapter 12: As we enter the 21st century, Western bivalent logic has significant competition. Students should know that the crisp lines of a Venn diagram and the pleasing symmetry of a truth table represent a major philosophical assumption, and that different assumptions may literally be worth billions of dollars in new product development. Thus, I conclude the book with a balanced presentation of Fuzzy Logic consistent with my theme that these debates are not just irrelevant ivory' tower discussions but can literally be "cashed in" to new technology.

A few final notes. I have kept the exercise sets shorter than is customary. It keeps the cost of the book down and acts as a confidence building measure for students. I have sought to provide quality in terms of conceptual understanding rather than mechanical mastery via quantity. For instance, I see no reason for students to construct a large number of truth tables, and especially any with more than four variables. In the propositional logic chapters I have used Copi's 19 rules, both for ease of student learning (it still is the best system I have tried) and for instructor convenience. There are only a few modifications. What Copi has called the rule of Tautology, I call Repetition, and I have replaced Copi's version of Implication, $(p \supset q) \equiv (\sim p \vee q)$, with $(\sim p \supset q) \equiv (p \vee q)$. The latter is easier for students to understand given English equivalents.

I would be happy to discuss any matter relevant to the material presented here via electronic mail. You can reach me via Internet at either pine@hawaii.edu. Please feel free to have your students also correspond via e-mail.

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