Chapter 1
The Core of Logics

Jeremy Horne
International Institute of Informatics and Systemics, USA

ABSTRACT

Like mathematics so often logic is taught to introductory students in a very mechanical way, the emphasis being on memorization and working problems. Particularly egregious is that the logic taught in philosophy departments is devoid of philosophy. Students rarely encounter the deep philosophy underpinning the structures. Logic is the theory of innate order in the universe and is the language of that order. More explicitly the foundation of that order is binary, based on the most fundamental law of all: dialectics. Something is apprehended because of what it is not. This chapter summarizes the development of thinking underpinning this idea of the innate binary structure. It is an ordered binary space starting in one dimension and progressing through three, and beyond. The philosophical basis of single, two (Table of Functional Completeness), and three (three-dimensional hypercube) dimension space provides coherency to ideas like deduction, induction, and inference, in general. The ordering in these spaces is founded on the same thinking giving rise to numbers and arithmetic. An exposition of how binary logical space develops sets the stage for discussing foundational ideas like the relationship between arithmetic (and its follow-on, mathematics) and logic, pattern recognition, and even whether we may be a simulation, a conjector made by Nick Bostrom. Research directions are proposed such as questioning the nature of axioms, exploring the insufficiency of Peano's postulates, proof theory, and ordering of operators based on intellectual complexity.

INTRODUCTION

This chapter appears as a description of how logic should be introduced. Stylistically, it is more conversational in hopes that those reading it, especially students, will feel more at ease and not be intimated by academic formalisms. Yet, it is critical that academic rigor be maintained, such as references and integrity of argumentation. There are some paragraphs that repeat the content of others, but it is normal in a course for the instructor to do the same to emphasize importance. Students are to do likewise here, and it is hoped that instructors will appreciate the pedagogy, rather than focusing on editorial style, informality, academic nitpicking, and abbreviated expression.

DOI: 10.4018/978-1-5225-2443-4.ch001

As to pedagogy, a number f readers may find sections as "obvious" or elemental. However, there are three reasons why they are written. First, this chapter is supposed to appeal to a universal audience, tricky, inasmuch as the beginners will jot be able to apprehend the complex sections, and those able to read the complexity may be annoyed at the elemental. Yet, not only do we often forget the obvious but it is worthy to see how the complex has been reached through an exposition of the elemental. Touring our grammar school exercises often can be prove to be very instructive. Indeed, university-level often review such basic knowledge, set theory courses revisiting what was learned in grade school arithmetic.

Speculative excursions dot this chapter, but students should be reminded that the philosophical treatment of logic is supposed to initiate these explorations. The conclusions reached in this chapter may or may not be ultimately correct. It is that student should be thinking about them, prompted by the logic courses that is the central focus. That is, logic is a method, a pathway, an epistemology (a way of knowing), a prompt, a motivation to explore who we are, we are here, and, in general the nature of the Universe.

By nature any logic system is bootstrapped. There is a starting point, often chosen by custom or arbitrarily, assumptions are simply built in, or there is a select epistemology (justified belief), and the content unfolds from that. It is argued in this chapter why and how for both the introductory course and its normal follow-on, symbolic logic, should include not only a survey of current topics but also attention to computer science, psychology (logic and learning theory), systems theory (modeling and simulation), linguistics (deep syntactical structures), and physics (e.g.: digital physics and quantum cosmology), among other fields. Students should realize that logic permeates areas much outside ordinary language translations, scientific methods, and mathematics. Right out of the box a student should reject the view that philosophy has no place in mathematics, science, or logic. Particularly obnoxious is: "I do not believe mathematics either has or needs 'foundations' . . . that the various systems of mathematical philosophy, without exception, need not be taken seriously" (Putnam, 2017, p. 2).

More to the truth, however, is, "... almost all of us must sometimes wonder: Why are we here? Where do we come from? Traditionally, these are questions for philosophy, but philosophy is dead. Philosophers have not kept up with modern developments in science. Particularly physics (Hawking, 2017)". As long a philosophers teaching logic ignore the thinking behind what they are teaching, they will be like the Medieval Scholastics, reduced to nothing more significant that recording and playback machines.

Inasmuch as any course should emphasize process, rather than circumscribed content, the present chapter is to have that approach. One may also use the original call for participation in this book project as an outline of sample topics. Perhaps the most important conclusions are that order may be innate in our world, that there are many logics expressing it, and there could be in the lifetime left of the human species that final completeness of that order. An introductory textbook for logic taught in the philosophy departments should cover in an interdisciplinary way how structure appears and why it may appear that way.

How might an introductory logic course be taught? First, there is a need to present not only a robust definition of the word "logic", but its context and becoming, i.e., etymology. Second, the student needs to know that the field is more vast than common definitions allow. That is, like mathematics, there are logics – plural. Third, and here is an emphasis on a special way of presenting the subject and which is in the title of this book (*Philosophical Perceptions of (on) Logic and Order*), there needs to be a focus on the "why", as well of the "what". Discussing order is what students do not see in their courses – even whether it exists. Yet, logic can be seen as a gateway into that intellectual world. Logic is a discovery, the language that innate order uses to describes itself.

Years before and leading up to entering into this project through IGI, I was working on what was to be an introductory logic text. The original version was to treat the contemporary material of Aristotelian