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Review: The Dialogical Roots of Deduction: Historical, Cognitive, and Philosophical Perspectives on Reasoning

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THE DIALOGICAL ROOTS OF DEDUCTION: HISTORICAL,
COGNITIVE, AND PHILOSOPHICAL PERSPECTIVES ON
REASONING, CATARINA DUTILH NOVAES (CAMBRIDGE
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Reviewed by Brian N. Larson*

Many legal scholars argue that deduction is at the center of legal reasoning.¹ It also holds pride of place in legal-writing and legal-theory texts.² Some, on the other hand, have argued that deduction is not central—or at least not necessary—to the process of legal reasoning.³ Others have gone further, arguing that deduction and the IRAC or CREAC organizational paradigm⁴ are hallmarks of an oppressively racist and misogynistic legal system.⁵ This review is no

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¹ See, e.g., LARRY ALEXANDER & EMILY SHERWIN, DEMYSTIFYING LEGAL REASONING 64 (2008) (identifying deduction as one of three forms of reasoning applicable to law, along with “empirical reasoning” and “moral reasoning through the method of reflective equilibrium”); RICHARD A. POSNER, THE PROBLEMS OF JURISPRUDENCE 42 (1990) (“[M]ost legal questions are resolved syllogistically.”) On the difference between *sylogism* and *deduction*, see *infra* text accompanying notes 21–26.

² See, e.g., LINDA H. EDWARDS, LEGAL WRITING: PROCESS, ANALYSIS, AND ORGANIZATION 78–79 (7th ed. 2018); DAVID S. ROMANTZ & KATHLEEN ELLIOTT VINSON, LEGAL ANALYSIS: THE FUNDAMENTAL SKILL 65–66 (2d ed. 2009).

³ Aristotle, *Nicomachean Ethics* 1.3, in 19 ARISTOTLE IN 23 VOLUMES (Harris Rackham trans., 1934), <http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0054%3Abekker%20page%3D1094> [<https://perma.cc/67P3-2PUQ>] (“It is equally unreasonable to accept merely probable conclusions from a mathematician and to demand strict demonstration from an orator.”); Brian N. Larson, *Law’s Enterprise: Argumentation Schemes and Legal Analogy*, 87 U. CIN. L. REV. 663, 683 (2019); LLOYD WEINREB, LEGAL REASON: THE USE OF ANALOGY IN LEGAL ARGUMENT 86 (2d ed. 2016).

⁴ ROMANTZ & VINSON, *supra* note 2, at 120 (characterizing IRAC and CREAC as “organizational paradigms”).

⁵ Elizabeth Berenguer, Lucy Jewel & Teri A. McMurtry-Chubb, *Gut Renovations: Using Critical and Comparative Rhetoric to Remodel How the Law Addresses Privilege and Power*, 23 HARV. LATINX L. REV. 205, 205–06 (2020) (criticizing “traditional legal rhetoric,” which “uses deductive reasoning in the form of a syllogism, illustrated by the well-known law school acronym IRAC”); Catherine E. Hundleby, *Feminist Perspectives on Argumentation* § 3.1, THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed. spring 2021 ed.), <https://plato.stanford.edu/archives/spr2021/entries/feminism-argumentation> [<https://perma.cc/CYB9-PHJS>]

place to rehearse or extend those arguments, but Catarina Dutilh Novaes' book *The Dialogical Roots of Deduction: Historical, Cognitive, and Philosophical Perspectives on Reasoning*⁶ is essential for understanding them, for understanding what deduction is, has been, and perhaps should be. Of course, as Dutilh Novaes says, "it is not surprising that philosophers, mathematicians, and scientists would be impressed by the deductive method, with its allure of certainty and its promise of unshakable foundations."⁷ This review does not take special pains to evaluate Dutilh Novaes' principal claims.⁸ Instead, my evaluation is that this book succeeds broadly in achieving her hopes that the reader leaves "with a richer, more nuanced conception of deduction,"⁹ including "obtain[ing] a better appreciation of how much of a cognitive oddity deduction really is."¹⁰ So if you talk about what lawyers, judges, and your students do as "deduction," "deductive," "syllogisms" or "syllogistic," you should read this book just to be sure you know what you're talking about.

Dr. Catarina Dutilh Novaes is a professor of philosophy in the Faculty of Humanities, Reasoning, and Argumentation at Vrije

(discussing work of Andrea Nye considering "certain historical points when deductive logic's operation as the default interpretive mechanism for arguments may have had an oppressive influence").

⁶ CATARINA DUTILH NOVAES, *THE DIALOGICAL ROOTS OF DEDUCTION: HISTORICAL, COGNITIVE, AND PHILOSOPHICAL PERSPECTIVES ON REASONING* (2021).

⁷ *Id.* at 4. She could certainly have included lawyers and judges in this list.

⁸ Though I feel comfortable saying that her reasoning supports the conclusions she draws from the premises with which she starts, I am not really qualified to evaluate the quality of those premises or the alternative premises and explanatory hypotheses that other theorists of logic might put forward in response to Dutilh Novaes. *But see generally* Bruno Ramos Mendonça, *The Dialogical Roots of Deduction: Historical, Cognitive, and Philosophical Perspectives on Reasoning*, 44 *MANUSCRITO: REVISTA INTERNACIONAL DE FILOSOFIA* 157 (2021) (book review), <https://doi.org/10.1590/0100-6045.2021.V44N2.BM> [<https://perma.cc/49K7-P6GB>] (reviewing the substance of DUTILH NOVAES, *supra* note 6, favorably).

⁹ *Id.* at 237.

¹⁰ *Id.* at 236.

Universiteit Amsterdam.¹¹ Dutilh Novaes was born and received her early university training in Brazil before moving to the Netherlands for her graduate training.¹² One focus of her research is the philosophy and history of logic.¹³ She is also a contemporary theorist on argumentation and critical theory, among whose works are attempts to bring the work of Rudolph Carnap (a leading figure in the logical positivist movement) into conversation with Michel Foucault (one of the twentieth century's leading critical theorists);¹⁴ and to position contemporary critical philosopher Sally Haslanger's "ameliorative analysis" against the work of Carnap.¹⁵ Dutilh Novaes is well situated to write a book with the scope she takes on here.

Dutilh Novaes' principal claim is that "deduction has dialogical roots, and . . . these dialogical roots are still largely present both in theories and in practices where deduction features prominently."¹⁶ For Dutilh Novaes, deduction is a "cognitive technology,"¹⁷ not to "be viewed as genetically encoded, but rather as a product of cultural processes."¹⁸ On my view, she asserts that the dialogical contexts in which deduction appears drive the motivation to use it, its participants, and the arguments that they produce. Discussing

¹¹ Prof. Dr. Catarina Dutilh Novaes, VRIJE UNIVERSITEIT AMSTERDAM, <https://research.vu.nl/en/persons/catarina-dutilh-novaes> [<https://perma.cc/PTK3-Q7VL>] (last visited Dec. 10, 2021).

¹² About, Catarina Dutilh Novaes (Mar. 19, 2019), <https://www.cdutilhnovaes.com/about> [<https://perma.cc/Z8GF-YZZ6>].

¹³ E.g., THE CAMBRIDGE COMPANION TO MEDIEVAL LOGIC (Catarina Dutilh Novaes & Stephen Read eds., 2016); Catarina Dutilh Novaes, *A Dialogical Conception of Explanation in Mathematical Proofs*, in THE PHILOSOPHY OF MATHEMATICS EDUCATION TODAY 81 (Paul Ernest ed., 2018); Matthew Duncombe & Catarina Dutilh Novaes, *Dialectic and Logic in Aristotle and his Tradition*, 37 HIST. & PHIL. OF LOGIC 1 (2016).

¹⁴ Catarina Dutilh Novaes, *Carnap Meets Foucault: Conceptual Engineering and Genealogical Investigations*, INQUIRY (Dec. 17, 2020), <https://www.tandfonline.com/doi/full/10.1080/0020174X.2020.1860122> [<https://perma.cc/2K25-VYH5>].

¹⁵ Catarina Dutilh Novaes, *Carnapian Explication and Ameliorative Analysis: A Systematic Comparison*, 197 SYNTHÈSE 1011, 1011 (2020).

¹⁶ DUTILH NOVAES, *supra* note 6, at ix; *see id.* at 29.

¹⁷ *Id.* at 26, 28 ("[M]ore specifically, it is a technical/theoretical concept (a term of art), restricted to circles of specialists (philosophers, logicians, mathematicians).").

¹⁸ *Id.* at xii.

deduction this way sets it in opposition to Kant and modern thinkers who follow him, for whom “logic pertains above all to the structure of thought as such and the operations of the mind.”¹⁹ Dutilh Novaes attempts to show that conceptualizing deduction as dialogic sheds light on its philosophy, history, and cognitive nature.²⁰

The balance of this review addresses matters in the book that should be of particular interest to readers in the legal rhetoric and communication community. First, it addresses some concepts central to Dutilh Novaes’ effort. Second, it surveys the book’s organization, identifying some key observations and conclusions that she supports with careful evidence and argumentation. Third, it addresses Dutilh Novaes’ attention to non-European and non-Western research and logical traditions. Finally, it considers some difficult and technical passages, noting those readers should work through because the payoff is worth it and others I believe readers in our field might skip.

A. Concepts Central to Dutilh Novaes’ Effort

Because Dutilh Novaes’ book is about deduction, and because (as noted above) terms like “deduction” and “syllogism” are bandied about in the law, it would help to have some clear sense of what each of these terms means, both within and outside of Dutilh Novaes’ treatment. She first defines a deductive argument as “(i) a stepwise process, (ii) where each step ‘follows logically’ (iii) from assumed or previously established statements.”²¹ This is much like the proof or

¹⁹ *Id.* at 146; *see id.* at 19 (“[T]he idea that deductive logic provides the canons for human agents . . . to manage their cognitive lives arguably only became fully articulated in the work of Immanuel Kant . . .”).

²⁰ *Id.* at 29–33; *id.* at 32 (“The three key properties of a deductive argument described in Chapter 1 can then all be given a natural dialogical explanation . . .”); *id.* at 33 (“[D]eductive reasoning should be conceptualized as dialogic also at the cognitive level, and this conceptualization would lead to better learning outcomes.”); *id.* at 34 (“[S]ocial dynamics of proof in mathematics communities roughly follow the dialectic of proofs and refutations described by Lakatos . . . and are thus essentially dialogical.”) (citing IMRE LAKATOS, PROOFS AND REFUTATIONS: THE LOGIC OF MATHEMATICAL DISCOVERY (1976)).

²¹ *Id.* at 5.

“apodeixis” of classical logic, where each step is a deduction, but the discourse consists of many such steps.²²

Aristotle is credited with being the first in the world to formalize a system of deductive reasoning, which he referred to as “*sullogismos*.”²³ How to translate that term from his Greek is a matter of difficulty, as Dutilh Novaes explains:

‘Deduction’ may be too broad, as Aristotle’s definition of a syllogism excludes some arguments that we would be prepared to describe as deductions (e.g. single-premise arguments). But ‘syllogism’ is too narrow in that it is strongly associated with the restricted class of arguments for which Aristotle develops a formal theory in the *Prior Analytics*, restricted to categorical sentences of the A, E, I, and O forms.²⁴

The A, E, I, and O forms to which Dutilh Novaes refers here are the four types of categorical sentences that Aristotle worked with in the *Prior Analytics*:

- A: All A is B.
- E: No A is B.
- I: Some A is B.
- O: Some A is not B.

So, an example of a valid *sullogismos* from Aristotle’s perspective is this: All B are A; some B are C; therefore, some C are A.²⁵ Note that

²² See Robin Smith, *Aristotle’s Logic*, in STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed., Fall 2020), <https://plato.stanford.edu/archives/fall2020/entries/aristotle-logic/> [<https://perma.cc/N6LC-HF7F>]; Christoph Rapp, *Aristotle’s Rhetoric*, STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Edward N. Zalta ed., Spring 2010), <https://plato.stanford.edu/archives/spr2010/entries/aristotle-rhetoric/> [<https://perma.cc/548E-S6HS>].

²³ See ARISTOTLE, *PRIOR ANALYTICS* 229–235 app. I (Robin Smith trans., Hackett Publ’g Co., 1989); see DUTILH NOVAES, *supra* note 6, at 109 (“This theory is rightly described as the first regimentation of deductive reasoning in the history of logic, and thus as the first logical theory as such.”).

²⁴ DUTILH NOVAES, *supra* note 6, at 110 n.1.

²⁵ ARISTOTLE, *supra* note 23, at 5 (“For let A belong to every B and B to some C . . . [then] it is necessary for A to belong to some C.”) This example

each sentence attributes a predicate to some or all of its subject; the predicate is not conditional. These sentences may be useful for reasoning to certain kinds of scientific conclusions, Aristotle's central concern at this point. But they are not the kind of deductions that we need in law to adjudicate a particular case. For those, we need conditional propositions in a form something like this:

Major Premise: [Any person] who operates a vehicle in the municipal park [is] guilty of a gross misdemeanor.

Minor Premise: Mr. Biker operated a vehicle in a municipal park.

Conclusion: Mr. Biker is guilty of a gross misdemeanor.²⁶

Here, unlike in Aristotle's syllogism, the major premise is conditional, with the presence of some antecedent (a person operating a vehicle) determining some consequent (misdemeanor guilt); and the minor premise refers to a specific individual. This is the *modus ponens* form of argument.²⁷

Dutilh Novaes' definition of *deductive argument* encompasses all these forms of argument. She characterizes deductive arguments as having three key characteristics: necessary truth-preservation, stepwise or perspicuous structure, and belief bracketing.²⁸ Necessary truth-preservation means that if the premises of a deductive argument are true, the conclusion must be true.²⁹ These arguments are thus "monotonic," meaning that the addition of any premise(s) will not change the truth condition of the conclusion.³⁰ In this sense,

illustrates one characteristic of Aristotle's categorical sentences that is not consistent with all conceptions of deduction: There is at least one instance of every predicate. For Aristotle, "All B are A" is true only if there is at least one B. See STEPHEN F. BARKER, *THE ELEMENTS OF LOGIC* 44 (6th ed. 2003). A legal rule does not require this instantiation: "If anyone operates a vehicle in the park, they are guilty of a misdemeanor" could be true even if no one ever has or ever does operate a vehicle in the park.

²⁶ Larson, *supra* note 3, at 676.

²⁷ PATRICK J. HURLEY & LORI WATSON, *A CONCISE INTRODUCTION TO LOGIC* 382–83 (13th ed. 2018); Larson, *supra* note 3, at 676. This represents a propositional logic. HURLEY & WATSON, *supra*, at 381–83. There are other logics, of course. *Id.* at 327.

²⁸ DUTILH NOVAES, *supra* note 6, at 5–8.

²⁹ *Id.* at 5.

³⁰ *Id.*

then, deductive arguments are *indefeasible*: if the premises are true, nothing can defeat the argument.³¹ Dutilh Novaes argues throughout the book that this “necessary truth-preservation is in fact a cognitive oddity.”³²

Perspicuity refers to the connections between the steps in a deductive argument. It is “very naturally understood in dialogical terms; dialogue itself is a stepwise, dynamic process, where parties typically take turns in making contributions to the conversation as reactions to what has been said previously.”³³ Even in mathematical proofs, however, not every step need be included, depending on context.³⁴ There are “varying *levels of granularity* of a proof presentation,” where some steps may be omitted depending on the context.³⁵

Deduction requires bracketing belief, because its “focus is exclusively on the *connection* between premises and conclusions, not

³¹ The alternative, a defeasible argument, is still rational:

In argumentation theory, just as in property law, something that is *defeasible* stands until and unless something comes along to *defeat* it. Brian Bix thus described a defeasible concept as “subject to an analytical structure such that certain criteria justified the assertion of some legal claim (like ‘valid contract’), but that claim might subsequently be defeated by the discovery of additional facts.” Brian H. Bix, *Defeasibility and Open Texture*, in THE LOGIC OF LEGAL REQUIREMENTS: ESSAYS ON DEFEASIBILITY 193, 197 (Jordi Ferrer Beltrán & Giovanni Battista Ratti eds. 2012) (citing H.L.A. Hart, *The Ascription of Responsibility and Rights*, 49 PROC. ARISTOTELIAN SOC., 175 (1948–49)). Pollock described reasoning as defeasible if “the premises taken by themselves may justify us in accepting the conclusion, but when additional information is added, that conclusion may no longer be justified.” John L. Pollock, *Defeasible Reasoning*, 11 COGNITIVE SCI. 481, 481 (1987).

Brian N. Larson, *Endogenous and Dangerous*, 22 NEV. L.J. (forthcoming 2022) (manuscript at 4 n.9), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3814925 [<https://perma.cc/YL7J-HWBS>].

³² DUTILH NOVAES, *supra* note 6, at 62.

³³ *Id.* at 65.

³⁴ *Id.* at 7.

³⁵ *Id.* at 35.

on the nature or plausibility of the premises or conclusions.”³⁶ It’s easy to see why empirical evidence suggests that folks don’t like to bracket belief: “Try to explain to a group of uninitiated, logically naïve interlocutors (say, high-school students) that ‘All cows are blue, and all blue things are made of stone, so all cows are made of stone’” is a valid deduction.³⁷ Those students will likely get hung up on the truth (or falsity) of the premises, which speaks to the argument’s *soundness*, rather than its deductive *validity*.³⁸ Lawyers and judges frequently engage in belief bracketing when they infer conclusions from assumptions or argue in the alternative. The arguer might say, “Assuming the court were to rule in this way, [list of calamities].” Or “The rule is A, but even if the rule were B, the outcome would be the same because [list of reasons].”

We naturally understand some of the appeal of deduction, including particularly the “higher degree of certainty for a conclusion (given the truth of the premises) than reasoning methods that do not guarantee truth-preservation”³⁹ Dutilh Novaes argues, though, that “[t]hese are desirable properties for a method of reasoning in the context of scientific (including mathematical) inquiry, but are basically out of place in more mundane situations.”⁴⁰ I’ve argued elsewhere that law is such a situation, and that so-called “deductions” in the law are neither indefeasible nor monotonic.⁴¹ Given this conceptual introduction, we can consider the organization of the book.

B. Claims and Structure of Dutilh Novaes’ Argument

In Part I, Dutilh Novaes sets out the book’s principal concerns from a philosophical perspective. In Chapter 1, she identifies her main questions, particularly where deduction is found and how is it used, what is the nature of the necessity in deduction, and what is the point of deduction. Here she offers her principal claim and some subsidiary standpoints. She carefully argues for and describes her methodology in first half of Chapter 2 and summarizes the book’s arguments in its

³⁶ *Id.* at 7.

³⁷ *See id.* at 8.

³⁸ *See id.*

³⁹ *Id.* at 236.

⁴⁰ *Id.*

⁴¹ Larson, *supra* note 31, at 16.

second half. She describes her model of the “prover-skeptic dialogue” for deduction in Chapter 3, characterizing deduction as involving (in many cases) an actual dialogue and (in even more cases) an internalized skeptic, supporting a dialogical framework but with only one speaker or writer. In Chapter 4, Dutilh Novaes uses her dialogical model to explain the key features of deduction and then shows that it explains some other problems in logic.

In Part II, she moves to the history of deduction, arguing “that deduction emerged against the background of specific dialogical practices and retains many of the original dialogical components throughout the centuries.”⁴² Dutilh Novaes first traces the uptake and development of Aristotelian deduction in medieval Europe and the Arab/Islamic world. She then describes the erasure of much of the dialogical roots of deduction in the Cartesian era and thereafter. This treatment begins with mathematics and dialectic in ancient Greece in Chapter 5. Chapter 6 is important: The first two-thirds deal with Aristotle’s “syllogistic” and are a must-read for anyone bandying the term “syllogism” about. The final third is a brief but not oversimplified survey of the historical development of logic in the Indian subcontinent (including Afghanistan and Pakistan) and in China. Chapter 7 follows the history of deduction to the nineteenth century, explaining “why and how the dialogical origins of logic and deduction were slowly . . . forgotten in Europe.”⁴³

In Part III, Dutilh Novaes “discuss[es] empirical evidence that bears on the hypothesis that deductive reasoning is best understood in dialogic terms.”⁴⁴ She presents in Chapter 8 “empirical evidence on how humans reason, individually as well as in groups, specifically with respect to deductive problems.”⁴⁵ She shows that “content in general and background beliefs in particular have a strong effect on reasoning performance, and this includes both facilitating effects . . . [and] hindering effects.”⁴⁶ In Chapter 9, she explores the development of deductive reasoning in the cognition of the individual (its “ontogeny,” as she calls it),⁴⁷ and in Chapter 10, its development

⁴² DUTILH NOVAES, *supra* note 6, at 87.

⁴³ *Id.* at 132.

⁴⁴ *Id.* at 151 (identifying “evidence . . . from different fields, especially psychology of reasoning, cognitive science, and mathematics education”).

⁴⁵ *Id.* at 151.

⁴⁶ *Id.* at 152–53.

⁴⁷ *Id.* at 169.

within populations either as an evolutionary adaptation or as a cultural tool (its “phylogeny,” as she calls it).⁴⁸ Finally, in Chapter 11, she takes a detailed look at the way deduction unfolds in the work of academic mathematics before offering some brief remarks in a concluding chapter.

In addition to supporting her main claim about the dialogical nature of deductive argument, Dutilh Novaes’ book supports two less technical claims, one about deduction’s typical role in human cognition, and the other about the appropriate contexts for deduction. Those who read the book will almost certainly concur with her conclusion that deduction is not a natural practice for humans: She notes that “[i]n much of the literature in philosophy of logic and on deductive reasoning more generally, it is often assumed that deduction is a widespread phenomenon.”⁴⁹ But “whether deductive reasoning is ubiquitous is by and large an empirical question, and the empirical data currently available suggest that it is not.”⁵⁰

As for the appropriate contexts for deduction, Dutilh Novaes concludes that deductive reasoning is for specialist users and does not model reasoning that is by nature defeasible. She claims that “deductive reasoning belongs in niches of specialists: mathematicians, scientists, and philosophers, and even in these niches it does not completely overpower other forms of reasoning.”⁵¹ Omitted from her list is the field of law, and this may be a controversial contention for those who describe (at least some) legal reasoning as deductive. Nevertheless, I concur with her claim that “[h]ow best to model defeasible reasoning formally . . . is still a matter of contention, but it is clear that monotonic, indefeasible deductive logics are utterly inadequate for this job.”⁵² In my view, *all* legal reasoning is defeasible and thus not deductive. To describe legal reasoning as “deductive” is to dress it in indefeasibility that it cannot exhibit, reenforcing a formalist view of what lawyers do to the detriment of the more nuanced view that reflects professional realities.

⁴⁸ *Id.* at 187.

⁴⁹ *Id.* at 10.

⁵⁰ *Id.* at 11; *accord id.* at 10 (“Tellingly, a survey article by one of the leading researchers in the field . . . is informally known among psychologists as the ‘death of deduction.’”).

⁵¹ *Id.* at 12.

⁵² *Id.* at 11.

C. Treatment of Non-Western Traditions

In developing her arguments, Dutilh Novaes is careful to give attention to traditions other than the Greek and European. Given that she is a scholar with experience in critical theory and a Latina trained initially in a developing country, this should be no surprise. She notes the exclusion of other traditions in the historiography of mathematics⁵³ and addresses concerns of colonialism in the “empirical” or non-European vs. “analytic” or European orientations.⁵⁴ Her discussion of data from cognitive studies includes participants from Africa and Brazil,⁵⁵ and she relies on the work of many woman scholars in the field of logic, dominated for centuries—millennia, really—by men.

Further, Dutilh Novaes is careful to explain the development of logical traditions within their social contexts. In Chapter 7, she devotes considerable attention to the work of medieval Arab and Muslim scholars, including Avicenna, who “famously identified *concepts* as the subject matter of logic,”⁵⁶ a move that may have influenced similar thinking by Kant. She concludes “that fully-fledged deduction does not emerge in China or India . . . , even if in both places (especially in India) debating practices were of paramount importance.”⁵⁷ But she calls on the reader “not to say that having given rise to the concept of deduction makes Ancient Greek logic automatically superior. In fact, regarding complexity and sophistication, it is fair to say that classical Indian logic, in particular, is on a par with Ancient Greek logic.”⁵⁸

D. Technical Sections to Read—or Skip

Through this wide-ranging discussion, Dutilh Novaes’ writing style is very accessible. Nevertheless, the material can sometimes become rather technical. This paragraph and the next identify certain of the more technical sections that are important for understanding

⁵³ *Id.* at 93.

⁵⁴ *Id.* at 176, 176 n.5.

⁵⁵ *Id.* at 176–77.

⁵⁶ *Id.* at 141.

⁵⁷ *Id.* at 123.

⁵⁸ *Id.*

the key points of the book and other sections readers can afford to skim if they are not central to their reading goals. Chapter 3 is rather technical, especially the first half, but readers should attempt it because it helps make sense of Section 3.3, which is itself an important framework for the rest of the book. It also deserves attention of legal-theory readers to link this work to the law, as it describes the kinds of roles that legal reasoners may take on in dialogical exchange. Near the other end of the book, Chapter 11 is quite technical but interesting to show that even mathematical proofs play a variety of social roles, depending on context, and that successful ones are constructed with their social contexts in mind. In particular, Dutilh Novaes offers three case studies that are quite technical but very useful for showing the social dimensions of these arguments.⁵⁹

A number of other discussions are probably only of interest to specialists in logic, including brief discussions of non-monotonic deductive systems,⁶⁰ logical pluralism,⁶¹ and the nature of deductive necessity⁶² and logical consequence.⁶³ There are also longer discussions that many readers may wish to skip. One example is the quite-technical discussion in Chapter 3 of dialogical models that are precursors or alternatives to her “prover-skeptic” model.⁶⁴ Other more extended discussions that are difficult and may not yield great benefit to those in our field include the normativity of logic,⁶⁵ paradoxes,⁶⁶ arguments “leading to the impossible” or *reductio ad absurdum*,⁶⁷ the kinds of philosophic entities that mathematical proofs are,⁶⁸ and finally, computational and probabilistic proofs.⁶⁹ Readers encountering the sections described in this paragraph may safely, in my view, skim them to get to more important content.

⁵⁹ *Id.* at 216–21.

⁶⁰ *Id.* at 5–6.

⁶¹ *Id.* at 82–84.

⁶² *Id.* at 12–17.

⁶³ *Id.* at 73–74.

⁶⁴ *Id.* at 39–46.

⁶⁵ *Id.* at 74–78.

⁶⁶ *Id.* at 78–82.

⁶⁷ *Id.* at 120–22.

⁶⁸ *Id.* at 206–09.

⁶⁹ *Id.* at 228–32.

E. Conclusion

It would be a gross misrepresentation to call this an easy book. In some 237 pages of text, Dutilh Novaes presents cautious and sophisticated arguments in support of her principal claim, that deduction has dialogical roots and that those roots shed light on the history, philosophy, and cognition of deduction. The reader who completes the book may or may not embrace the author's conclusion, but the effort will pay off in a much richer understanding of deduction, a concept that is central to our talk about—and according to some, our practice of—legal reasoning. This book is well worth the time of scholars of legal theory, argumentation, rhetoric, and communication who wish to engage with arguments about the appropriate role, if any, of deduction and IRAC or CREAC in legal reasoning.