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"SOCRATES IS MORTAL": FORMAL LOGIC AND THE PRE-LAW UNDERGRADUATE

*Patricia Sayre**

In this paper I want to step back from the various interesting technical issues that arise at the intersection of formal logic and the law in order to think broadly about the study of formal logic and its pedagogical value as preparation for a career in law.

It is a firmly rooted tradition that a course in logic, and preferably one that includes some formal logic, is an essential component of the pre-law curriculum. It is also a firmly rooted tradition that a significant number of pre-law students who take such a course have serious doubts about the relevance to the actual practice of law of many of the logical techniques they learn. Those of us who teach formal logic to pre-law students owe an enormous debt of gratitude to Robert E. Rodes and Howard Pospesel for their fine work in *Premises and Conclusions: Symbolic Logic for Legal Analysis*.¹ Their textbook reveals the relevance of formal logic to the law far more explicitly than does any other text to date. Despite their many carefully selected legal examples and exercises, however, I suspect that at least some of their readers may still have lingering doubts about the practical value of formal logic. My aim here is to take these doubts seriously, and to suggest that these worries reflect something more than youthful (or not!) pique at having to master new and difficult material. They are, as I read them, a symptom of deep and to some extent justified philosophical disquietudes about the whole project of formal logic.

In what follows, I argue that there is indeed something philosophically perplexing about formal logic, but that it by no means follows that the study of formal logic should be dropped from the roster of "must take" pre-law courses. Quite the contrary: students who intend to study law need not only to study formal logic, but also to extend their study to the history and the philosophy of logic, and to have

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1 ROBERT E. RODES, JR. & HOWARD POSPESEL, *PREMISES AND CONCLUSIONS: SYMBOLIC LOGIC FOR LEGAL ANALYSIS* (1997).

their doubts and disquietudes addressed head-on rather than dismissed as mere quibblings. Only then will they be in a proper position to appreciate some of the limitations of formal logic, and hence also to appreciate ways it can provide appropriate and genuinely valuable assistance when reasoning about legal matters.

I. THE PERPLEXITIES OF THE PRE-LAW LOGICIAN

Every semester in colleges and universities across the country thousands of eager pre-law students enroll in logic courses. Why? Because they have been told that if they are to be lawyers they must learn to reason clearly and cogently. Logic is the science of clear and cogent reasoning. Hence, they need to take logic. And besides, logic is supposed to help with the Law School Admissions Test (LSAT).

I want to begin my discussion of the pedagogical value of logic as preparation for a career in law by describing the typical experience of the pre-law undergraduate in an introductory logic course. I write here from my own experience teaching such a course, but I suspect the course I teach is similar in basic format and content to the logic courses taken by many pre-law students. We begin with a bit of informal logic, then quickly move on to a fairly substantial chunk of formal logic, and, if there is any time left over, finish up with some samples of non-deductive reasoning that might well include (of all things) legal reasoning. At each step along the way, there are predictable moments of perplexity.

The brief unit on informal logic with which I begin my course introduces the notion of an argument and works on developing basic skills involved in recognizing, constructing, and evaluating arguments, but without yet offering any systematic or formal sets of rules. Instead, students are required to rely heavily on their intuitions about what does or does not strike them as a compelling bit of reasoning. Some of the difficulties students experience as they work their way through this introductory material are the usual sort attendant to assimilating new and unfamiliar concepts. Anyone who has ever taught a beginning logic course knows, for example, how much difficulty students have at the outset grasping the notion that the defining mark of a proposition is its having a truth value as opposed to its actually being true, or how hard it is at first for many students to keep validity separate from soundness when confronted with the practical task of evaluating an argument—and this despite the fact that they often grasp the distinction theoretically the first time they hear it explained. These initial confusions are most likely rooted in the touching faith these students have that logic is going to be of practical use to them. They

assume, I suspect, that in most practical contexts there is little to be gained by putting forward an argument that is valid if it is not also sound, or in knowing a proposition has a truth value unless one also knows that value to be "true." Hence, they run together the concepts of "validity" and "soundness," "truth value" and "true."

Any perplexity students experience as they work informally to sort out basic logical concepts quickly pales, however, beside the perplexity born of comparisons between their own intuitions and the intuitions of the authors of their texts when working out solutions to exercises. A group of conscientious students carefully reconstructs several pages of a Platonic dialogue into a complex configuration of arguments and sub-arguments only to discover that their authors have reduced the whole affair to two tidy syllogisms. Or a garbled bit of prose a budding logician has labored mightily to turn into a plausible bit of reasoning, supplying suppressed premises and unstated conclusions galore, the authors have judged to contain no argument at all, while the text another thoughtful student has rendered as an invalid deductive argument the authors have transformed, by means of a bit of clever rewording, into a relatively reliable inductive one. Discrepancies of this sort can easily throw even the best of students into a mild panic, especially when they believe their eventual success in their chosen career rides on their ability to get the "right" answers to the sorts of questions posed in their logic texts. What accounts for the slippage between their answers and the answers supplied by the text? Can anything be said to reassure these jittery future lawyers?

The world being an imperfect place, some of the slippage can no doubt be put down to inattention or sloppy work, and such cases call for something rather different than reassurance. Often, however, the discrepancies reflect quite legitimate differences of interpretation owing to alternative ways of filling in missing background information. This comes out especially clearly in exercises requiring students to identify informal fallacies. In some cases it may be difficult to decide if an appeal to a point of character is truly irrelevant unless one knows more about the context than the textbook explicitly supplies. Fill in one scenario, and there is a fallacy. Fill in another, and a relevant point has been made. In other cases, deep and difficult philosophical issues about, say, the relationship between reason and the emotions may be brought into play, and diametrically opposed decisions may be made about whether a snippet of prose contains a fallacious appeal to sympathy.

How one fills in the situational and philosophical context can also affect the degree to which one is willing to apply the principle of charity when interpreting another's argument. For example, an attor-

ney operating in a courtroom setting might do well to be charitable in her interpretation of her opponent's arguments, so as to insure that her eventual objections carry the greatest possible weight and are not subject in turn to straw man accusations. A law school professor evaluating a student brief, on the other hand, might be far less charitable in his interpretation, because his overall aim in this context is, paradoxically, far more charitable. That is, his aim is not to defeat his students but to push them to present their arguments in ways that leave as little room for misinterpretation as possible. Missing context that can also make a difference as students struggle to second guess textbook authors' answers is the training in formal logic which the authors have and which the students so far lack. Authors trained in the formal niceties of syllogistic reasoning will find it natural to ignore vast swatches of a text in order to get out a handy sorites; a student without that formal training will feel less free to undertake so sweeping a reduction.

In the end, the most effective way of reassuring students distressed by their inability to get the "right" answers to exercises in informal logic is to tell them the truth. Many of these exercises do not have right or wrong answers, but only have better or worse ones. Being able to reason effectively in concrete, practical, everyday contexts is an extraordinarily complex art, and as is the case with any art, while one's skills can improve over time, there are no simple formulas for success. How well one reasons depends, among other things, on how sensitive one is to the many varied and often subtle uses to which language is put, where developing this sensitivity depends in turn on one's familiarity with relevant contexts of use. It follows that the most effective route to expertise in legal reasoning is immersion in the language and the practice of law. As a first step in that direction, Rodes and Pospesel's work has enormous pedagogical potential, for even were it to accomplish nothing else, in focusing on a single area of discourse, namely legal discourse, their text cannot help but to deepen their readers' sensitivity to the kinds of argumentative maneuvers characteristic of legal reasoning.

Of course, Rodes and Pospesel are after much bigger game than that. They also want to show how legal discourse can be effectively analyzed using the tools of formal logic. One crosses the line separating informal from formal logic when general strategies for honing intuitions about what works are developed into systematic sets of rules. Historically, logicians have been primarily concerned with formalizing deductive reasoning, and hence the formal logic component of most introductory logic courses tends to focus on deduction, leaving induction to the statisticians in social science departments. In my course,

this means spending the bulk of the semester teaching students how to determine validity by applying distribution rules, drawing Venn diagrams, working out truth tables, and constructing formal deductions.

Despite their initial anxiety when confronted with unfamiliar symbols and strategies, most students manage eventually by dint of hard work and perseverance to become moderately competent in applying these formal techniques. The payoff is the relief that comes with having finally entered an arena in which some answers are clearly right and others are clearly wrong. There is, however, a catch: none of these techniques can be applied until arguments are translated out of the complex and often ambiguous language of ordinary discourse and into the artificially regimented and unambiguous symbolic language of a system of formal logic. There are no easy formulas that produce the "right" translations, only endless interpretive judgment calls to be made. As was the case in the informal evaluation of arguments, one must factor in assumptions about background context, decide how charitable to be, and take into account the implications of various philosophical biases as they affect choices between alternative translations. Success is measured by conformity to the translations of expert practitioners engaged in similar translation projects. This is an elusive measure made doubly so for areas of discourse where the majority of expert practitioners do not bother translating their arguments into symbolic form. How many lawyers, for example, bother?

In my experience, the more complex the symbolism and hence the more difficult the translation, the more grim the mood in the classroom. While there are always a few students who respond to formal languages from the start with aesthetic revulsion, most students are initially open to the prospect of formalization, balking only when formal languages begin to require more determinate semantics than their intuitions can support. For example, students almost always smell a rat when they encounter the truth table definition of "if . . . , then . . . , " and this quite apart from any prior acquaintance with the paradoxes of material implication.² Intuitively, it seems to them that a false antecedent in an "if . . . , then . . . " statement yields an indeterminate truth value for the conditional as a whole. But truth tables can only be used to determine validity if truth values are completely determinate. Conditional statements with false antecedents must thus be assigned some truth value, and the one logicians choose is "true." This turns out to be extremely convenient from the perspective of the logician looking for the simplest and most elegant algorithm for de-

2 For a discussion of one form of these paradoxes, see RODES & POSPESEL, *supra* note 1, at 259–73.

termining validity, but appears quite *ad hoc* from the perspective of most students' everyday intuitions about such matters. Such clashes between intuition and the requirements of formal systems can sometimes cut quite deeply, posing challenges to the whole project of formalization. For many students, the breaking point comes somewhere in the midst of their struggles with predicate logic when they suddenly realize that they have stronger intuitions about the validity of the untranslated version of an argument than they have about how to effect a translation.

I see these various student reactions as reflecting a deep and to some degree justified confusion about how to construe the task of translation. Are we being asked to discover and to make explicit a logic that was there all along implicitly in the original? Or are we being called on to revise the original, creating a new and more precise bit of reasoning? Most textbooks use language that sometimes suggests one of these possibilities, sometimes the other. In their introductory chapter, Rodes and Pospesel tell their readers that one purpose of their text is to "elucidate" key logical terms like "unless," "not," and "providing," explaining that their aim is to understand the meaning of such terms and consequently the meaning of sentences structured around them.³ This suggests that translation is a matter of discovering something already there, but not yet fully grasped. And yet, a few lines further on, they add that the point of these elucidations is to "eliminate ambiguity and vagueness in statutes and other kinds of legal discourse."⁴ This suggests that translating is transforming to create a more determinate meaning than was there in the original. The point here is not to fault Rodes and Pospesel; they are, after all, writing a textbook in logic and not in the philosophy of logic. Rather, the point is to illustrate how students reading even a very carefully crafted text might fall into philosophical confusions about the business of translating into formal languages.

Once philosophical questions about translation arise, larger philosophical issues about the whole enterprise of formal logic soon begin to surface. There is a lovely little story by Lewis Carroll, *What the Tortoise Said to Achilles*,⁵ that works extremely well as an introduction to these issues. Achilles is discussing a favorite Euclidean syllogism with the Tortoise when he discovers, to his surprise, that the Tortoise is unwilling to accept what seems to be an obviously legitimate inferential move from the two premises to the conclusion. The Tortoise

3 *Id.* at 11.

4 *Id.*

5 Lewis Carroll, *What the Tortoise Said to Achilles*, 14 *MIND* 278-80 (1895).

presses Achilles for some justification of that move, and Achilles offers it in the form of a principle that if one accepts premises of the sort supplied in this syllogism, then, logically speaking, one simply must accept the accompanying conclusion. He then adds this principle to the original syllogism as an additional premise. The Tortoise, however, now wants to know why he should accept that the conclusion follows from these *three* premises—which leads Achilles to form yet another principle, and another, and another, *ad infinitum*. This result strikes most readers as highly unsatisfactory. Surely there must be something that ends the regress, something that grounds our logical intuitions without needing further grounding itself. But what? A similar question might be asked about the rules comprising formal systems. Where exactly do these rules come from? Are they grounded somehow in the way reality is structured? Or in the structure of our minds? Do they have their source merely in convention? Or in nothing at all?

These are deep philosophical waters, and pre-law students can only splash about for so long before it occurs to them that with the hard work of mastering a new set of tricky techniques and the distracting business of sorting out the philosophical worries these techniques have provoked, they have completely lost track of how any of this is to pay off in the practice of law. Although they have been reminded *ad nauseum* that Socrates' mortality can be derived from his humanity and the general fact of human mortality, unless they are lucky enough to have been working with Rodes and Pospesel, they are unlikely to have run into many examples or exercises dealing directly with legal matters. Furthermore, once they entered into the domain of formal logic, the sample arguments they encountered were likely to have become increasingly stylized and artificial, and although, as these students will gratefully accede, this does make translation a bit easier, it also makes it more difficult to imagine practical contexts in which such prose would appear. Further aggravating the impression that formal logic is an elaborate game with dubious practical value in the "real world" is the fact that so many of the examples that are not simply inventions of the authors are selected from materials that by their very nature provide respite from the serious pursuit of practical affairs rather than being deeply embedded in them—even Rodes and Pospesel frequently end up mining the comics page for at least some of their material. It is hardly surprising, then, when the suspicion begins to dawn that although there is something quite theoretically dazzling and at times even engrossing about the study of formal logic, it may not have the direct practical relevance to legal reasoning these pre-law students had been led to expect.

Some textbook authors anticipate this response and include a chapter on legal reasoning to ensure that the pre-law students who make up a sizable proportion of many introductory logic classes come away satisfied they have got their money's worth. In my experience, however, such materials tend only to provide further confirmation of their suspicion that the agonies they were put through in the unit on formal logic were not worth the time nor the effort they absorbed. For what they are likely to learn from these discussions of legal reasoning is that although deductive reasoning of the sort amenable to formalization does arise with some frequency in legal contexts, the most characteristic form of legal reasoning is inductive rather than deductive. What they really should have been working on all along are arguments from analogy, sharpening their facility to perceive similarities and differences between cases so as to be able to construct compelling arguments based on legal precedent.

At this point there is nothing for it but to hope for the fortuitous intervention of members of the class who, returning ecstatic from a Saturday spent filling in the dots, reassure their classmates that it was all worth it after all because, wonder of wonders, formal logic really does help with the LSAT.

II. TRACING PERPLEXITY TO ITS HISTORICAL ROOTS

We can summarize the perplexities described in the first section of this paper as follows. Informal logic, although it deals with arguments as they occur naturally in contexts of practical use, offers no easy algorithms for determining how successful these arguments have been. Formal logic, on the other hand, does offer some algorithmic techniques for determining at least one kind of argumentative success, namely, validity, but requires recasting arguments in the unambiguous symbolism of artificially regimented languages, hence losing touch with our reasoning as it actually occurs in contexts of genuine practical use. Furthermore, whether pursued formally or informally, logic is a philosophically puzzling enterprise, as it is not clear what grounds the intuitive judgments we make about the worth of an argument unless, at least in the case of deductive arguments, it is the rules supplied by formal systems. What grounds these, however, is equally mysterious.

As a first step in the direction of demystification, I want to look more closely at the peculiar role of algorithms in logical theory. In this section, I approach these matters somewhat indirectly via a historical expedition to classical Greece. I contrast Plato's and Aristotle's very different attitudes toward logical theory and ask why Plato, who

makes competent use of many of the argumentative techniques systematized by Aristotle and his descendants, never developed his own theory of formal logic. The answer, I suggest, may be that Plato saw something problematic in the algorithmic tendencies of formal systems.

The claim that Plato never developed such a system is hardly controversial. Aristotle is universally acknowledged as the first thinker in the West to undertake the systematic construction of a formal logic.⁶ More controversial is the claim that Plato mastered many of the techniques subsequently worked out by logicians. Counting against the claim is the fact that Plato's dialogues contain numerous examples of invalid arguments, and that many of these come directly out of the mouth of his chief protagonist, Socrates. "The reading of his dialogues," one historian of logic writes, "is almost intolerable to a logician, so many elementary blunders are contained in them."⁷ My own view is that these elementary blunders reveal more about the character of Socrates' interlocutors than they do about Plato's lack of logical acuity. I would argue that careful attention to the dramatic context in which a fallacious argument appears more often than not reveals a pedagogical purpose. When Socrates reasons poorly, there is almost always some lesson he is trying to teach his interlocutors about the consequences of acceding to reasoning that appears plausible, but is really inadequate.⁸ Whatever account we give of the invalid arguments in Plato's works, however, there is still no denying that the dialogues also contain plenty of valid arguments. Analysis of the latter using contemporary logical techniques has shown Plato to be capable

6 At the close of *De Sophisticis Elenchis*, Aristotle describes the ground-breaking nature of his logical inquiries as follows: "it was not the case that part of the work had been thoroughly done before, while part had not. Nothing existed at all." ARISTOTLE, *DE SOPHISTICIS ELENCHIS*, reprinted in *THE BASIC WORKS OF ARISTOTLE* 208–12 (Richard McKeon ed. & W.A. Pickard-Cambridge trans. 1941).

7 I.M. BOCHENSKI, *ANCIENT FORMAL LOGIC* 17 (1951).

8 The series of arguments in the *Phaedo* leading up to Socrates' exposition of the method of hypothesis at 101d illustrates my point nicely. The arguments are often cited as examples of Plato's poor grasp of the principles of valid argumentation. A closer look, it seems to me, reveals each argument to be a very deliberately constructed illustration of a misapplication of the method of hypothesis. These arguments are put forward, I believe, to show Simmias and Cebes something about how philosophical reasoning can go wrong, and to prepare them for Socrates' subsequent explanation of proper methodology. The final, quite valid, argument that follows this explanation illustrates an error-free (if still possibly incomplete) application of the method. See PLATO, *PHAEDO*, reprinted in *THE COLLECTED DIALOGUES OF PLATO* 40–98 (Edith Hamilton & Huntington Cairns eds. & Hugh Tredennick trans. 1963).

of some extremely sophisticated logical maneuvering—too sophisticated to put down to mere intuitive good luck.⁹

So let us suppose that on occasion Plato did in fact employ quite complex logical techniques. We now return to our original question: Why did Plato, unlike Aristotle, show so little interest in developing a system of formal logic? The answer, I think, has less to do with Aristotle's achieving a greater degree of technical sophistication than did Plato, than with his having different purposes in view. While both philosophers are deeply concerned with issues of philosophical methodology, their approach to these matters differs significantly.

In the first place, Aristotle aspires generally to a much higher degree of methodological systematization than Plato, assuming that we can classify our various rational methodologies to reveal some as more critical to the acquisition of knowledge than others. He puts forward the syllogism not simply as one form of inference among many, but as a privileged means of access to the truth. Plato, on the other hand, makes use of a variety of valid inference patterns, some of them syllogistic, some of them not, without ever giving pride of place to any one pattern in particular or attempting to work out connections between patterns. To quote a standard work in the history of logic:

Although it is clear that Plato discovered some valid principles of logic in the course of his argument, he is scarcely to be called a logician. For he enunciates his principles piecemeal as he needs them, and he makes no attempt to relate them one to another or to connect them in a system as Aristotle connected the various figures and moods of the syllogism.¹⁰

This failure to systematize is of a piece with Plato's decision to write dialogues rather than essays. A well-written dialogue is an open-ended communication designed to encourage new interpretations with each return to the text. Its aims are thus at odds with the project of logical formalization which, rather than seeking to open up a range of interpretations, works to narrow the range to a single, unambiguous reading. When Aristotle undertook the development of a formal logic, he quite sensibly abandoned the dialogue format to write treatises.

Although Aristotle did not conceive of the principles of syllogistic reasoning algorithmically, his work in logical theory is far more likely

9 For a further defense and elaboration of this point, see Kenneth M. Sayre, *Propositional Logic in Plato's Protagoras*, NOTRE DAME J. OF FORMAL LOGIC 306-12 (1963).

10 WILLIAM KNEALE & MARTHA KNEALE, *THE DEVELOPMENT OF LOGIC* 11-12 (1962).

to inspire the search for an algorithmic set of procedures than is anything one finds in Plato. Plato's dialogues present us with an array of methodologies. Although some of these are accompanied by fairly clear rules for their employment, these rules fall short of being algorithms because determining how best to follow the rule always requires making judgments that are not themselves rule-governed. Consider, for example, Socratic *elenchus*, where the aim is to refute a claim by drawing implications from it that will force an interlocutor to abandon it. Knowing what sorts of implications are most likely to turn the trick requires knowing something about the interlocutor's belief system. In the *Euthyphro*,¹¹ for example, Socrates' success in defeating the first of Euthyphro's proposed definitions of piety depends on his ability to make some shrewd guesses about Euthyphro's attitudes toward traditional stories about the gods.

Or, consider Plato's method of hypothesis, introduced midway through the *Phaedo*.¹² The proper way to substantiate a hypothesis, Socrates explains to Simmias and Cebes, is first to derive consequences from it and to test those consequences for mutual consistency, and then to ground the hypothesis itself by appealing to "whatever more ultimate hypothesis commend[s] itself most to you, until you reach[] one which [is] satisfactory."¹³ Deciding whether an ultimate hypothesis is satisfactory requires weighing its value relative to what, on a given occasion, one is trying to understand. There are no algorithms that apply across the board to determine when one has reached an appropriate stopping place; what needs explaining and what can be accepted without further explanation varies significantly depending on the context.

Nor does the method of collection and division employed in some of Plato's later dialogues provide anything like an algorithm for achieving the desired results. Consider just the process of division. The method requires dividing a class into two mutually exclusive subclasses and then similarly dividing one of the subclasses, continuing the procedure until arriving at a subclass equivalent to the class of things one is attempting to define. Nowhere along the way are there any rules that settle in advance which divisions will prove most profitable in the end, though the more experience one has and the more attuned one is to the relevant areas of discourse, the more likely one is to hit on a division that is deemed to be satisfactory.

11 PLATO, EUTHYPHRO, reprinted in THE COLLECTED DIALOGUES OF PLATO, *supra* note 8, at 169–85 (Lane Cooper trans.).

12 PLATO, *supra* note 8.

13 *Id.* at 83.

Aristotle's rules for operating with syllogisms are presented quite differently than Plato's methodological recommendations. For one thing, these rules do not emerge from an ongoing discussion of some other topic of interest—the immortality of the soul, say, or the definition of piety. Rather, they are presented in a context in which the rules themselves are the main topic of interest. This way of introducing the rules suggests that their sense can be grasped independently of any given context of use. These rules are clearly intended to have universal applicability, an impression further reinforced by Aristotle's introduction of variables in his statement of them.

As a group, moreover, Aristotle's rules governing syllogisms amount to more than a mere list of inference forms. As William and Martha Kneale point out in their history of logic, while Aristotle "does not attempt to derive the whole theory [of the syllogism] from a set of general rules,"¹⁴ he does treat one group of valid syllogisms as more perfect than the rest. These are the syllogisms of the first figure, for "only in the first figure, when the terms are arranged in his usual order, is the transitivity of the connection between the terms obvious at a glance."¹⁵ Aristotle believed that valid syllogisms in other figures could be intuitively justified through appeal to syllogisms in the first.¹⁶ "His interest," the Kneales conclude, "was the same as that of a geometer who tries to construct a deductive system with a small number of axioms and those the most 'natural.'"¹⁷

For each of his inference rules, then, Aristotle has some story to tell about why that rule works. Telling the story involves justifying the rule by appeal to something other than an algorithm: our capacity, for example, to grasp intuitively the link between one term and another or one syllogistic figure and another. Once the rule has been established, however, it can henceforth be applied to properly formed syllogisms quite mechanically. And that is just what one expects of an algorithm.

We are now finally in a position to speculate a bit about why Plato never bothered to develop a theory of formal logic. It could be that the explanation is quite straightforward: it simply never occurred to him to do so. I know of no way to disprove this explanation, but I find it less than fully satisfactory given the suggestive richness of the dialogues and the sophistication of some of the inferences they contain. Plato is not in general naive regarding methodological possibilities.

14 KNEALE & KNEALE, *supra* note 10, at 75.

15 *Id.* at 73.

16 *See id.* at 76.

17 *Id.* at 79.

My preferred explanation is that Plato had some idea of what it would mean to construct a theory of formal logic, but chose not to pursue the enterprise. Why not?

One explanation might lie in Plato's conception of the objects of knowledge. For Plato the objects of knowledge are aspects of reality rather than propositions; we acquire knowledge through direct grasp of the forms and the relationships between them, and not through the grasp of propositions and their relations. Thus, working out a theory of legitimate inferential moves from one proposition to another is, epistemically speaking, beside the point.¹⁸ Along somewhat similar lines, it might be argued that Plato was generally "averse to logical investigation carried out for its own sake without the further aim of establishing moral or metaphysical truth."¹⁹ In other words, for Plato, logical skill is not a science to be studied in its own right, but a complex capacity or art to be employed judiciously as the occasion requires. Perhaps he suspected that once logical technique is removed from its complex contexts of employment, it cannot help but become artificial and hence in some way falsified.

Pushing this notion a step further (and this is the possibility that fascinates me the most), it may be that Plato saw something deeply problematic about a project of systematization that opens the door to algorithmic summings up of our activities as reasoners. Once you have an algorithm that allows you to determine validity in a purely mechanical way, you transform the activity of reasoning into an activity that has no further need of reason. The laws of thought can operate without any need for thought.

This result is unsatisfactory on at least two counts. First, it robs the logical principles of any explanatory value they might have in accounting for the nature of rational thought. Second, although there is a sense in which Plato ultimately wants us to transcend the activity of reasoning to arrive at something that might be described as insight, insight is diametrically opposed to a purely mechanical application of rules. The latter dulls our awareness of what we are doing, and indeed, does not require consciousness at all; the former, on the other hand, is a kind of super-awareness, a form of heightened consciousness. Plato describes this state in the Seventh Letter as "a flash [of] understanding [that] blazes up" as the mind, exerting "all its powers to the limit of human capacity, is flooded with light."²⁰ This state is

18 I owe this suggestion to Kenneth Sayre.

19 KNEALE & KNEALE, *supra* note 10, at 14.

20 PLATO, LETTERS, *reprinted in* THE COLLECTED DIALOGUES OF PLATO, *supra* note 8, at 1574–98 (L.A. Post trans.).

achieved only through a long apprenticeship of "practicing detailed comparisons of names and definitions . . . scrutinizing them in benevolent disputation by the use of question and answer without jealousy."²¹

There are, in other words, no algorithmic short-cuts to wisdom, and, indeed, there is something decidedly peculiar about setting out to understand how we reason by pursuing an algorithmic account of it. Aristotle may not have thought of his principles of syllogistic reasoning as algorithms, but in undertaking the project of systematic formalization he opened the door to perspectives on human reasoning that are in some respects radically inhuman—perspectives that, for better or for worse, have given rise in our own century to the project of artificial intelligence. It is no accident that the objections to the algorithmic tendencies of formal logic I have just been imputing to Plato are quite similar to fundamental conceptual difficulties that bedevil contemporary cognitive scientists. Just how is it that a purely mechanical sequence of interactions between neurons or microchips manages to become something more, namely, a meaning-laden sequence of thoughts? And how are we to account for the phenomenon of consciousness if we are operating within a mechanistic paradigm? There are conceptual tangles lurking here that have yet to be sorted out, and in rejecting the project of formal logic, it may just be that Plato was rejecting a move he recognized to be fraught with potential confusions.

III. GUIDE FOR THE LOGICALLY PERPLEXED

Let us return now to our perplexed pre-law students and consider what they are likely to make of this lengthy historical digression. I am willing to bet that at least some of them will be rather pleased at having discovered a potential justification for abandoning the project of formal logic. Not all the formal techniques they have learned in their introductory logic class are algorithmic—formal deduction being the most notable and, from their perspective, often the most frustrating exception. Even so, given that much of the enterprise seems designed to teach them how to think by teaching them how to evade thinking, they can hardly be blamed if, once they have taken the LSAT, they gratefully put the whole difficult business out of their minds.

But if not formal logic, then what? Just as there is no short-cut to becoming a wise and virtuous person, there is no short-cut to becoming an adept practitioner of legal reasoning. Were Plato to be in-

21 *Id.* at 1591.

formed that future lawyers in training would be promised the benefits of such short-cuts in courses that teach them an array of razzle-dazzle formal techniques, it would no doubt only reinforce the rather dim view of the legal profession we get in the dialogues. Lawyers, Socrates suggests in the *Theaetetus*,²² are fundamentally rhetoricians, concerned with winning their case as opposed to getting at the truth. In building a case, a lawyer is "always talking against time, hurried on by the clock; there is no space to enlarge upon any subject he chooses, but the adversary stands over him ready to recite a schedule of the points to which he must confine himself." Small wonder that lawyers should be interested in finding short-cuts whenever they can, even if in the process they become "dwarfed and twisted" in their growth and robbed of their "free spirit." And small wonder, Socrates concludes, that ["w]hen you compare men who have knocked about from their youth up in law courts and such places with others bred in philosophical pursuits, the one set seem to have been trained as slaves, the others as free men."²³

There is nothing inevitable about this discouraging account of legal training. The perspective on rational methodology we have been attributing to Plato can just as well be used to draw the following much more positive conclusions. If Plato is right that skilled reasoning is an art that can only be acquired through a long and serious apprenticeship, then the best way to become adept at legal reasoning is to apprentice oneself to those who practice the law, and to immerse oneself in the language and activities carried out in the legal arena. One needs to have patience in this apprenticeship; there are good reasons why one does not become a partner overnight. Furthermore, because our legal concerns touch so many other areas of concern in our culture, both informing and being informed by them, the best preparation for the intense phase of the apprenticeship we call "going to law school" is a broad-based liberal arts education.

What are we to say, then, about the specific pedagogical contribution of formal logic to the curriculum of the pre-law liberal arts student? Our discussion so far suggests that at its worst, the study of formal logic has the potential to stunt souls by raising false hopes of a royal road to legal wisdom. At its best, the study of formal logic would seem to contribute no more to pre-law training than any other course that requires students to sharpen their analytic skills. The same purpose might just as well be served by studying mathematics or analytical

22 See PLATO, *THEAETETUS*, reprinted in *THE COLLECTED DIALOGUES OF PLATO*, *supra* note 8, at 845–919 (Francis Macdonald Cornford trans.).

23 *Id.* at 878.

chemistry or the history of philosophy. But this is not the end of the story. In the space left to me I want to argue that despite all I have just said, the study of formal logic has a special pedagogical role to play in the undergraduate training of future lawyers. The trick is to resist the temptation to present formal logic as something other than it is.

So what is formal logic? One way to understand the enterprise is to see it as growing entirely out of practical concerns. We engage in deductive reasoning in all sorts of practical contexts, and formal logic provides us with a more precise set of techniques for carrying out that reasoning. But I would argue that, historically, there have also been theoretical concerns driving the enterprise, and that these theoretical concerns have led us to make grander claims for the accomplishments of formal logicians. We tend to think of the techniques of formal logic as something more than an especially sharp set of tools we keep in a special drawer separate from our blunter everyday instruments, available when we need the extra precision they provide, but not to be used on every occasion. Rather, the work logicians do is often seen as offering a theoretical ground for deductive reasoning across the board.

The only proper answer to the question of what actually motivates and has motivated formal logicians in their work is "many things." But it is useful, I think, to view the theoretical aspects of the enterprise as originating in the sense that validity is a puzzling phenomenon in need of explanation. If all men are mortal, and Socrates is a man, then it seems we have no choice but to conclude that Socrates is mortal. How are we to explain the sense of logical compulsion we feel when confronted with arguments of this sort? And not just arguments of this stylized and simple sort, but the more complex and nuanced arguments characteristic of much of our everyday practical reasoning, including much of our reasoning in legal contexts. We are back, it seems, to the question the Tortoise asked Achilles.

From Aristotle on, logicians have done just what most of us do when faced with a difficult question requiring us to explain a phenomenon of daunting complexity. They begin by first eliminating as much of that complexity as possible so as to get a clearer view of the basic character of the phenomenon. For logicians, this means eliminating as much linguistic complexity in the expression of arguments as possible. Just as scientists confronted with a puzzling natural phenomenon retreat whenever they can to the laboratory and try to recreate the phenomenon under more controlled circumstances, so do logicians retreat to the linguistic analog of the laboratory. That is, they retreat to a more highly regimented and less ambiguous formal language than the language we use in everyday argumentation. When doing

sylogistic logic, for example, they refuse to deal with any statements having more than one subject and one predicate, or any argument having more than two premises and three terms. When doing propositional logic, they pare the number of connectives and operators down to the minimum they can get away with while still reflecting something of our everyday intuitions about how sentences might be related to one another.

Once simplified versions of the phenomenon in question have been brought under explanatory control, logicians, again like scientists, gradually work as many of the original complicating factors back into the picture as they can. The aim is to do this without loss of any of the precision and explanatory clarity they gained through simplifying moves made earlier on. Frege and Russell's great accomplishment lay in the dramatic leap forward they made in reintroducing complexities that had been ignored within Aristotelian and Stoic systems. The predicate calculus they developed made it possible for the first time to handle, among other things, inferences resting on relations between both terms and propositions and to distinguish between singular and general terms. Yet as complex as this new symbolism was, it remained highly regimented, designed to be completely unambiguous and precise in what it expressed.

How do linguistic regimentations of this sort help us to understand better that puzzling feeling of necessity that accompanies the reasoning we call valid? That is a philosophical question and not a logical one, but formal systems tend to point in the direction of one answer rather than another. Aristotelian logic, for example, is set up in such a way as to suggest a realist interpretation of logical principles. If terms function, roughly speaking, as labels for the concepts we use to think about things, then the syllogism would seem to provide a means of tracing out relationships between the forms or essences that define those things. Although Aristotle did not himself work out the full square of opposition (that was left to his medieval successors), he was undoubtedly aware that he had discovered a surprisingly tidy set of relationships between the simple subject-predicate statements with which he was working. The elegant way these relationships fell out would be bound to make an impression on whoever undertook to articulate them, and it is little wonder that many Aristotelian logicians, including Aristotle himself, should have believed that logic uncovers something about the basic structure of reality, and that it is our capacity to grasp this basic structure that explains the sense of compulsion we feel when we are confronted with a valid syllogism.

Contrast this with Wittgenstein's appeal to truth tables in his *Tractatus Logico-Philosophicus*.²⁴ Here is a technique for determining validity that requires no thought whatsoever. The purely mechanical nature of the algorithms that truth tables supply would seem, given our earlier discussion of algorithms, to have the potential to drain rules of inference of any semantic content. It comes as no surprise, then, when Wittgenstein concludes that "the propositions of logic say nothing."²⁵ Instead of a realist interpretation of logic, we get a formalist interpretation according to which logical principles have no factual content themselves but simply reflect the formal structure a symbol system must have if it is to be used to represent facts.

Different techniques for determining validity can thus suggest different ways of responding to the Tortoise's query about what grounds logic. I want to suggest, however, that it goes deeper than that. Alternative formal techniques do not merely point to alternative philosophies of logic, but alternative philosophies of logic can also point the way to the development of alternative techniques. Frege and Russell developed their formalizations with a very special purpose in mind, namely, furthering the logicist project of demonstrating that mathematics can be reduced to logic. Logicism is typically motivated in turn by an ontological queasiness about numerical entities that puts constraints on the form this reduction can take. There is no point in reducing mathematics to logic if the same troubling metaphysical issues arise in the context of the latter as arose in the context of the former. That a symbolic language designed with this goal and its attendant philosophical biases in mind should also prove useful in analyzing deductive arguments characteristic of other, non-mathematical areas of discourse is of course possible, but it is odd that we should simply assume as much. Or perhaps not so odd given the long tradition we have of construing formal logic as providing a ground for our reasoning and not simply another, more systematic, style of reasoning.

Formal logic is not and has never been a philosophically neutral enterprise, and admitting as much is the first step toward developing a more satisfactory philosophy of logic, one that acknowledges the theoretical and philosophical assumptions that have influenced the development of logical theory. Contextualizing formal logic in this way, however, has a curious result, for it reveals that the very notion that formal logic can ground our reasoning is itself in need of grounding. The urge to explain the mysterious business of validity can be under-

24 LUDWIG WITTGENSTEIN, *TRACTATUS LOGICO-PHILOSOPHICUS* (D.F. Pears & B.F. McGuinness trans. 2d ed. 1961).

25 *Id.* at 121.

stood, but it is not obvious that the best way to respond to this urge is to offer up a systematic theory of deduction. That is, the most appropriate answer to the Tortoise's question might very well be to reject the question altogether. Why exactly is it that if one accepts the premises of a Euclidean demonstration one *must* accept the conclusion? Because that is what one does if one wants to do Euclidean geometry. And why exactly is it that if one accepts the premises of a valid Aristotelian syllogism one *must* accept the conclusion? Because that is the what one does if one wants to engage in formal syllogistic reasoning as developed by Aristotle and his followers. Similarly, we *must* accept the results of a truth table test for validity or a formal deduction if we want to play the relevant versions of the formal logic game. As Wittgenstein taught us, all explanation must come to an end somewhere. Perhaps this is the appropriate place for this series of explanations to end.

What I am suggesting here is that we take a different attitude toward formal systems of logic than the one we are most accustomed to take, an attitude that rejects the notion that these systems can ground our reasoning across the board. We reason as we do because it serves our purposes to do so, and the feeling of necessity that attaches to some of our reasoning activities arises from the ways we have set out to define and to pursue some of those purposes. Furthermore, some of our purposes require a precision and systematization that others do not, and some are best served when we can devise algorithmic sets of rules. When these techniques are useful and when they are not, however, can never be settled algorithmically; formal systems may function in some respects like scientific theories, but knowing when appeal to them is relevant remains an art. With Plato, then, I am rejecting the notion that we treat the highly regimented forms of argumentation we find in formal systems as privileged. Students who experience an aesthetic revulsion to formalization are right to think that something is lost if formal languages are given pride of place over natural ones. They are wrong, as we shall see momentarily, in thinking formal languages have no use at all.

Where does this leave us with regard to the pedagogical value of the study of formal logic as a preparation for law school? The first point to be made is that none of this detracts from the work of Rodes and Pospesel. If anything, it makes that work all the more impressive. Once formal logic is no longer the underlying foundation for all our deductive reasoning in practical contexts, but rather is one form of especially precise deductive reasoning that sits alongside other less precise forms, then there is no *a priori* guarantee that it will be of any particular use in analyzing legal argumentation. To show that can indeed be useful in clearing up ambiguities and tangles that arise in a

whole host of specific legal circumstances is genuinely to show something. But what exactly does it show? The temptation here is to slip once again into the notion that formal logic grounds our reasoning, and, in this case in particular, our legal reasoning. If the principles of formal systems can be put to such good use in analyzing legal reasoning, doesn't that suggest that these principles are in some way embedded in that reasoning, and that they have been grounding that reasoning all along whether most legal practitioners have realized it or not? I prefer to read Rodes and Pospesel's success in relating formal logic to the law in a different way, taking their work as evidence of the degree to which the language of formal logic has through the centuries interpenetrated other areas of discourse. I have suggested that we drop the notion of grounding when thinking about the relation between formal logic and our everyday reasoning in practical settings. But even if formal logic does not ground everyday reasoning, that does not mean that, historically, it has not been enormously influential in shaping that reasoning and in shaping our sense of what is acceptable and what is not by way of deductive inference. The principles of formal logic developed by Aristotle and his successors have got into our bones, as it were, and hence it is no surprise that patterns of reasoning that have received formal treatment should turn up in our ordinary discourse, and that when pressed to justify them in cases where they do not strike us as intuitively obvious, we should turn to formal systems for assistance. The answer to the question of whether when translating into a formal system we are being asked to reveal implicit structures or revise to achieve a precision not yet there in the original is that it is a bit of both. That is, one is revising to introduce a level of clarity that was not there in the original, but which the original may well have been groping to achieve.

The philosophical perspective on logic I have developed here is essentially a plea that we not misconstrue what we are doing when we make use of formal logic. If we think of ourselves as getting at the underlying structure of our thought, then we open the door once again to all the puzzlement undergraduate logicians feel as they confront the gap between the artificial and highly stylized arguments in their logic texts and the actual reasoning that we undertake in practical contexts. Better, I think, to admit that the arguments logicians deal with are indeed often artificially restrictive in their format and expression, but to go on to point out that sometimes that is just what we want. In legal reasoning, where precision is often crucial, we very often want it, and the work of Rodes and Pospesel is important because it reveals just how often we do. But precision is not always and everywhere automatically a *desideratum*, even in law. There is such a

thing as deliberate vagueness and in formulating legal statutes, for example, finding just the right degree of imprecision is often as important as anything else.

So, yes, there is good reason specially to recommend the study of formal logic to pre-law students. Because of the back and forth between practical discourse and formal logic just described, to develop the nuanced sensitivity to language necessary to excel in reasoning of any sort, but especially in reasoning in an arena where argumentation is so very central, one had better study formal logic. But not *just* formal logic. If one is to properly appreciate its worth, and to develop genuine legal wisdom as opposed to mere cleverness, one also needs to study the history and philosophy of formal logic. And not simply in preparation for the LSAT.

