

# A VIRTUE EPISTEMOLOGY FOR RULES OF DEDUCTION?

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**Abstract.** I tentatively explore what a virtue epistemology for logic might look like, why one might be motivated to look for such a view, why it might target logical rules specifically, and how such a perspective might be better suited from some practical standpoints such as teaching logic, mixing philosophical views with insights from mathematical practice, and connecting the epistemology of logic with the psychology of expertise.

**Keywords:** natural deduction, logical rules, epistemology of logic, virtue theory, critical thinking skills

## 1. *CAPTATIO*: THE PEDAGOGY CONNECTION

Picture yourself back in the classroom, teaching your students logic. You expect them to *know how* to prove the theorem or build a counterexample, build a tree or translate a sentence in English. After a while, if tests go well, you might expect some of them to be *conscientious* at solving problems, to show *imaginativeness* in raising objections to what you say, to be *careful* in applying rules to *formulae*.

Moreover, you might wish for your students to become able to *apply* abstract logical sequences to public discourse, the history of ideas, or everyday arguments they themselves or their friends produce. You'd like them to be able to *identify* logical fallacies and to *explain* why they're fallacious. The more theoretically inclined might *make connections* between logic and set theory, logic and topology or geometry, or use different domain-specific axiomatizations as a way to clarify how they understand those fields.

This is more than an instructor's dream; subject cards for *Introduction to Logic* or *Formal Logic* often include a requirement to specify which abilities students acquire if they are to perform well in the class. Students might excel, or they might only pass the class. Which abilities they acquire or consolidate, and to what degree, will correspondingly vary. Logic, in particular, might instill transferable, topic-neutral, abilities in its students.

Abilities reaped in learning logic are seldom viewed as important in the foundations of logic; I aim to remedy that. There has to be some tangible connection between the foundations of logic, the justification for it, explaining the groundwork

logic achieves in our cognitive lives, on the one hand, and the abilities we gain and use as a consequence of learning and using logic, on the other hand. I am not arguing for anything as grandiose as a total shift in the foundations of logic; I only advocate for not excluding logical abilities from the foundations relevant for logic.

## 2. JUSTIFYING RULES OF DEDUCTION

Is justifying logic a strange project? If you think there is no such thing as justification to begin with (you're an "epistemological nihilist"), you'll dismiss this project. If you're of the view that thinkers with our cognitive make-up can never tell whether their logical patterns of reasoning are ever justified (you're a "meta-epistemological skeptic" with respect to logic), you'll likewise dismiss this project. If you think (perhaps with Aristotle in the *Prior Analytics*, though exegesis is tricky) that the rules of logic, when properly identified, are *self-evident*, you'll again dismiss this project.

Interest explicitly devoted to justifying logic was revived by W.V.O. Quine's (1970) *Philosophy of Logic* and Susan Haack's (1976) "The Justification of Deduction", to take only two classics. The question is *what one means* by the justification of logic. In what follows, I narrow this down to *formal* logic, and raise the issue for each logical system in turn. I focus on *sentential* logic mainly because the philosophical issues I'll consider apply to it equally well as to richer *calculi* or theories, and simplicity brings them into focus.

Little use talking about the justification of sentential logic wholesale. Theorems are proven, hence justified, by applying rules of deduction to the system's axioms. I'll refer to a system of *natural deduction* in what follows (e.g. Forbes 1994), for it circumvents the thorny issue of what it might be for a system's axioms to be justified, whenever such issues aren't already called for by justifying rules of deduction. Penelope Maddy's (2011) project of justifying axioms shows both its philosophical depths and how tricky it is to settle on firm epistemological conclusions.

A *caveat* to appease those fully persuaded by Saul Kripke's (1982) *Wittgenstein on Rules and Private Language* – and to unsettle those unpersuaded by it. In considering how to justify rules, we're not considering how to justify rule-*following* or letting oneself be *guided*, in a rational way, by the rules in question. Even if our communities could never fully ascertain whether rule-following (as opposed to mere rule-conformity) existed, or even if, as a matter of meta-epistemological metaphysics, it were impossible for any such community to do so, we can still raise the question: conformity to *what*? *Why* would a transition (albeit sound) count as a rule rather than not, for whatever entity that applies it? Seeing things this way has a conceptual benefit: it isolates the justification of rules of deduction from the justification of rule-following. It also has a practical benefit: it is egalitarian, affording deductive rule-applications by software, by angels, by Martians, and by everyday people like myself, in a way that is neither species-specific nor parochial.

### 3. THE NEED FOR PRACTICAL CONSIDERATIONS

In this section I argue that practical considerations are unavoidable when it comes to logical systems and logical rules in particular.

Lewis Carroll recounts what the tortoise told Achilles, who thought MP (*Modus Ponens*) justified moving from  $p$  and ‘if  $p$ , then  $q$ ’ to  $q$ . But how to justify MP, the tortoise asks. By that line of reasoning, you would need MP\*, which justifies transitioning from  $p$ , ‘if  $p$ , then  $q$ ’ and MP to  $q$ . And MP\*\* which justifies transitioning from  $p$ , ‘if  $p$ , then  $q$ ’, MP and MP\* to  $q$ . And so on up. That looks like an infinite regress. Or, if MP is self-justificatory, blocking regress, that seems circular, and to simply assert the circularity is virtuous seems unwarranted.<sup>1</sup> Without deciding on the merits of Carroll’s conundrum, it has been influential and it tends to get a grip on students whenever they first encounter it. Carroll’s conundrum provides a *pro tanto* reason to look for non-theoretical justifications of MP.

Whatever your views on the tortoise, in some logics counterfactual MP fails (cf. Lewis 1973), which shows MP has distinctive cognitive content, separate from that of other rules, such as idempotence, even if, metaphysically speaking, they all necessarily apply in all possible worlds. This prompts the question of how to choose between alternative logical systems. Metatheoretical considerations might play a role here, but mathematical alternatives will almost always be available. We choose among these based on our goals or on tradition – both practical.

Jean van Heijenoort (1967) pointed out we can characterize systems in terms of their expressive power and their computational power, which trade off against each other. Classical logic (first-order, non-modal, monadic) is complete, and for that reason often preferred to more complex alternatives. But if you wish to translate “Courage is a virtue” differently than “All the brave are virtuous”, the most natural choice might be a second-order setting. Expressive gains often come with different computational properties. What to favor? The choice necessarily depends on what goal one uses that *calculus* or theory for.

Carnap’s (1950) distinction between internal and external questions might help. Asking if MP is sound can be an internal question, answered by hypothesizing that MP can produce sequences that are not semantically valid, and then showing that hypothesis leads to contradiction. Or this can be asked as an external question: what do students who learn MP get out of it?<sup>2</sup> How does it illuminate everyday discursive practices, and how could we run an analogue of the proof just sketched in

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<sup>1</sup> In order to get Carroll’s objection going, we would need to first have a clear grasp of MP in its generality – across languages and systems, both formal and informal. In order to do so, we would require a clear grasp of the meanings of conditionals. This, however, has been quite contentious (e.g. Priest 2008, the first volume of which is entirely organized around alternative accounts of conditionals). Such a reply to Carroll would equally question whether the project of justifying rules of deduction can be carried out in full generality. I am grateful to James Cargile for reminding me of these grounding concerns.

<sup>2</sup> The genuine question here, it seems to me, is what constitutes a contradiction. Not just a formal result. Not an experience of conflict. What, then? In what does the paraconsistent theorist improve upon its classical cousin? This grounding topic is, however, too large to tackle here.

natural languages like Romanian or English? Asking and answering such questions with reference to argumentative practices might constitute skills that logic students may come to enjoy. If the mathematics in question floats free of the world, students might legitimately wonder how to anchor it in their everyday lives, and learning how to answer such questions would again partly call for practical decision; reflecting on their classroom practice might make them into more critical thinkers.

#### 4. CONTRACTARIANISM

In his *In Praise of Reason*, Michael Lynch (2012) argues that traditional epistemologies fail to provide good accounts of what justifies rules of deduction. He says:

„the fundamental principles we should be committed to are those that persons concerned to advance their interests would endorse in a position of epistemic and social equality. The principles that would be endorsed in such a position are open and objective. So it is rational to commit to such principles” (Lynch 2012, p. 96)

The point is to have an epistemic state of nature, akin to that thematized by Craig (1990). And, in it, if impartial agents reach consensus over MP, MP is the chosen rule for their deliberations. One might think this applies specifically to MP and we might pick different rules differently, undermining any general epistemology of logical rules. Yet the method generalizes, as long as rules for accepting results of choices are in place. This, *inter alia*, is what makes the approach practical: choices made in an epistemic state of nature would ground rules of deduction.

Theoretical justifications for MP (or similar) are seen as lacking: they are either circular or lead to a regress in justification. Maybe, the contractarian warns, we shouldn't seek justification outside any social practice of reasoning or debate. Sophisticated replies to Lynch might be possible; I will not pursue them. Rather, I think the radical novelty of Lynch's proposal is different. He opts for a “practical” approach, one in which our social practices of reasoning play a constitutive role in justifying the rules of deduction we use in making an argument.

Lynch's gambit is to import views from ethics, social and political philosophy into the philosophy of logic.<sup>3</sup> He (2012, p. 110 ff.) draws an analogy with John Rawls' (1971) *A Theory of Justice*, arguing that rules of deduction are justified in much the same way that a basic institutional arrangement of rights and duties is set up: by a contract between epistemic agents in an original position, under a veil of ignorance with respect to which rules should be chosen. (I stay neutral on whether the analogy with Rawls is good, for that presupposes clear decision procedures, as Lynch points out, and it is unclear how those procedures can be fully general unless they presuppose some logic to begin with.)

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<sup>3</sup> And what an enlightened reply to postmodern thinkers who regard philosophy as inherently political.

One might worry that Lynch's attempt to justify rules of deduction fails for reasons analogous to the non-ideal theory objection to Rawls advanced by Charles Mills (1997). Personally, I find myself in much agreement with Mills' view, and think it an eye-opener. Whether Rawlsian metaethics and methodology can overcome the objection that it produces idealizations that cannot be reconciled with our situated moral lives is a topic that spans literatures and decades, one I cannot arbitrate here. I will not prejudge whether an analogous objection can be marshaled against Lynch in his contractarian epistemology of logical rules. I only note this as a possible objection, not because I endorse it.

While I share Lynch's turn to practical justification, I differ from him in that I argue in favor of a virtue epistemology for rules of deduction. To that I now turn.

## 5. CONTRACTS AND SAGES

The view I articulate in the following sections is not one I wholeheartedly endorse. Rather, I choose pluralism and think that different epistemologies might be better suited in different research contexts.

I believe Lynch's overall project of a practical justification for rules of deduction can be rescued in virtue epistemology. The point is that a community of epistemic agents (with or without a veil of ignorance) comes to choose a rule of inference not necessarily by vote- or contract-like procedures, but by observing instances of excellent cognitive behavior (the sages and experts among us), and emulating them because we were built to be attracted to excellence, as Linda Zagzebski (2017) suggests.

As Linda Zagzebski (1996) and James Montmarquet (1998) have articulated it, virtue epistemology is the *locus classicus* of importing insights from ethics into epistemology. Its core idea is that a belief we hold is justified if it was formed and sustained in the right way, i.e., by manifesting intellectual virtues (like intellectual courage, open-mindedness, or conscientiousness) and/or cognitive skills (like imaginativeness, or ease and fluency in making computations others find difficult).

My approach is new in two ways. First, it shares Lynch's focus on practical approaches to justifying rules of deduction. Second, it takes that approach further, by focusing on the thinker herself or himself – as opposed to seeing thinkers as heteronomous parts of a larger epistemic community that jointly applies a rule of deduction that calls for justification. It is the individual thinker's intellectual virtues and skills that matter in ascertaining whether their use of a rule of deduction is – or isn't – justified.

I would caution against reading too much into this virtue-theoretic approach. There is no hard and fast dichotomy between following or emulating experts (the sages) and vote-like procedures. Sages might be popular, and an informal vote-like approach might suit the spread of their ways of thinking. If so, a virtue-based approach and a contract-based approach seem closer than ever. A wrinkle: this might make the objection against ideal theory apply to virtue theory too. Where are these

experts to be found? Do they coincide with practicing mathematicians, now or of old? Should we trust Cantor in logic but not when it comes to tacit applications of the Axiom of Choice? Should we trust Frege in logic but not when it comes to unrestricted applications of the Axiom of Comprehension? Should we consider only the classics of mathematical logic or cherish alternative traditions such as Jainist logic (e.g. Priest 2008)? If by appeal to experts we mean only “a word from the wise”, it can’t shoulder the burden of a full-fledged epistemology of logical rules.

## 6. TRUTH AND SUCCESS

One might think that attraction to excellence follows attraction to truth, whether truth paid off in evolution (Millikan 1984) or not. However, I think we need to reconceive why truth matters, if by truth we mean what truth-functions range over. We can opt for a *quasi*-realist view inspired by Simon Blackburn (2001) and think that what we qualify as truth is, in a virtue-theoretic setting, what experts designate as truth. If, however, we distinguish truth conditions from conditions of warranted assertibility, along with Michael Dummett (1980), then consensus among experts in an epoch is consistent with its being overturned later on, and what they termed “true” because it was warrantably assertible at the time could prove questionable. Here, it suffices to revert to the Cantorian and Fregean examples, and Wittgenstein’s advice to proceed “with care” when dealing with logical paradoxes.

The very contrast between theoretical and practical epistemologies for rules of deduction is in question when we consider truth. William Alston’s (2005) criticism of contextualist epistemic *desiderata* might seem to falter if we don’t regard truth as the unique ultimate epistemic *desideratum* to which all others should in some way boil down to. Such *desiderata* include explanatory value, predictive power, simplicity, empirical adequacy, problem-solving prowess, and more. Why should they all cohere, coalesce, pull in the same direction, that of truth? Maybe truth is one among several epistemic *desiderata*, and whatever its evolutionary value, it now needs to face the competition. All the more so since, as Catherine Elgin (2004) has shown, the ubiquitous and seemingly ineliminable roles idealizations play in the history of scientific pursuits make them into “felicitous falsehoods”, stepping stones to the truth even for hardliners who think truth remains the ultimate goal of science in general. Theoretical values (explanatory power) and practical ones (problem-solving prowess) blend inextricably. Predictive power is a halfway house: theoretical, for the prediction is generated, but also practical because we make predictions in order to avoid risk and seek benefits.

One might speculate that, just as rule-following isn’t key to rules, so truth isn’t key to rules for truth-preserving deductions. Maybe a contract-based view fits here: sometimes we vote without being fully apprised of what we vote. A virtue theory cannot afford that: virtuousness requires that success and excellence are graspable by community members – if, in the case of logic, that success is not truth, what could it be? “Getting it right” seems the appropriate phrase, in Kristoffer Ahlstrom-Vij and

Stephen Grimm's (2013) sense: a common denominator for all the plural varieties of reaching epistemic success. But, then, rightness will vary with context, whereas what we were after was the justification of rules of deduction, i.e. truth-preservation, not the preservation of some context-shifty global epistemic value. (An interesting epistemological project, only not one in the epistemology of deductive logic.)

That said, Blackburn's perspective on the relationship between what we deem true and expertise might shed new light on projects seeking to offer a new theory of meaning for logical connectives and logical *formulae*. Could one get by without truth as a metaphysical commitment (Dummett 1991)? One might regard how to prove a theorem as what endows it with meaning, and the kinds of *formulae* a connective might feature in as implicitly fixing the meaning of that connective. I am noncommittal on whether such approach are successful. Rather, Blackburn's take provides an additional reason to explore the roles virtues and skills may play in justifying rules of deduction without appeal to truth.<sup>4</sup>

## 7. DEONTOLOGY OR RELIABILISM?

What kind of virtue epistemology can justify rules of deduction? It is unclear what a deontological approach to justifying rules of deduction might even mean. We will not justify MP simply by appeal to MP itself. And, if we have other rules for choosing rules, MP included, what might they be? (Kicking the problem one floor up – choosing the rules for rule-selection – isn't the same as solving it.) To illustrate, consider giving alternative metatheories for a non-classical logic. If in the object language one regards the Liar paradoxical sentence as both true and false (if that language is paraconsistent), one might devise a paraconsistent metatheory for that or, alternatively, one might regard that as a four-valued classical (i.e. explosive) logic, where truth values would range from just true, just false, neither true nor false and, respectively, both true and false. Both options are possible, but the considerations that go into each typically differ (for discussion, cf. Priest 2008). And, as I argued in a previous section, such considerations would partly depend on the practical goal of formalization.

Virtue epistemology affords exiting the regress in rules for picking rules by the intellectual acts performed by logical experts. And it affords regarding the rules chosen not just formally, but also as entities apt to be seized upon or grasped by the working mathematician. This does not make a virtue epistemology for rules of deduction agent-relative, for the rules thus selected could be grasped by a variety of mathematicians with different abilities and coming from different fields and research practices. But it does construe rules as open to apprehension, as the kind of thing beings like us can understand.

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<sup>4</sup> Lavinia Marin raised the concern of what it might be to explore a virtue epistemology for logical rules absent truth. This section was an attempt to address how virtue theory and anti-realism might be harmonized. I am ultimately committed to neither, but believe their combo should be explored.

Reliabilism doesn't fit a virtue epistemology for rules of deduction because reliability is often couched in either probabilistic or counterfactual terms, and genuine entailments are both modally rigid and 100% likely. It might then seem as though the agent is responsible for how they apply logical rules (MP, say). Conscientiousness, open-mindedness, integrity in admitting fault and in keeping track of one's assumptions and commitments – these are intellectual virtues, and at play in a fully logical behavior. Two *caveats* are needed. First, most of our behavior is less than fully logical. Second, even if such virtues were furthered, many others aren't: logic doesn't aid morality. I devote the next two sections to these problems, respectively.

## 8. EXPERIENCES OF FRUSTRATION

Neither the motive of searching for the truth nor beneficial epistemic consequences seem to provide an adequate account of responsibility as intended here. A project of relating our intellectual virtues to the authority we hold over ourselves, as articulated by Dermot Moran (2001) might be more germane, contributing to our constitution as autonomous epistemic agents, manifest in the lack of self-estrangement in our cognitive behavior, e.g. when we solve more difficult logical exercises. The worse we apply logical rules, the more self-estranged we might feel in the activity, on condition that we pay attention to what we do.

Given Christine Korsgaard's (2009) important work on this, it is key to find some notion of epistemic self-constitution that doesn't require reflective endorsement of the rules we apply and norms we satisfy in cognitive behavior. This text stops short of offering any such notion, and only points to the need for one. That said, what Korsgaard calls experiences of "necessitation" – friction, frustration, experiences of falling short, of attempting and failing, of giving up and picking back up again until at last one succeeds – seem to fit not only our normative stance with respect to norms in general, but also our logical behavior.

Such experiences are paramount because they typify a student's first encounters with logic and its instructors. It is only by repeated practice of exercises that get more and more difficult and require more and more creativity that students can come to gain both the end-result reasoning patterns that logical rules such as MP authorize and, by that very practice, the virtues and/or skills that would make applying those rules consonant with how they themselves come to think.

Here, a virtue epistemology gets a distinctive edge over contractarianism about rules of deduction. It's not sheer consensus between instructor and students that supports logical rules. Rather, each of the students in the classroom's community gains distinctive skills and/or virtues that empower them to use those rules in deductive reasoning, with more or less success. The relative epistemic achievement is individual, be it greater or smaller (Pritchard 2024). Of specific interest here are textbooks such as Mendelson's (2010), where exercises, ordered in pedagogical order, recapitulate famous theorems. In going through them one by one, the student gets some sense of how the field might have developed, and how far in gaining a firm grip of its fundamentals they are.



Once we move away from theoretical justifications for rules of deduction, we also open the door to phenomenological justification, doing justice to the intuition that experiences in doing logic differ in content as well, not only in how certain one feels of the result. Undoubtedly there are phenomenally conscious experiences such as “having a feel for the proof”, “getting the idea”, “you can hear the penny drop”, “Aha! now it all makes sense”, and more (cf. Lynch 2017). Moreover, we can distinguish (Dumitru 2024 is groundbreaking in this) kinds of cognitive *qualia* at play here. Proof *qualia* might emerge when we see how conclusions depend on premises. Semantic *qualia* might emerge when we understand what a formula means relative to a model and how its meaning might vary. Geometric *qualia* might emerge when we consider axiomatizations of geometry. And so on. Such experiences might accompany both student and instructor in the logic classroom, to varying degrees. Elsewhere (Mărășoiu 2016) I suggested that experiences don’t merely fit cognitive skills when they emerge, but that they are telling and part of what it is for beings with our cognitive make-up to manifest rationality in thought.

If the question of justifying rules of deduction is raised as an external question, not as a mathematical one, talk of which experiences resonate with which rules might make sense. The underlying epistemology might be foundationalist: you *believe* that MP works because you *see* it work and would experience incomprehension if it didn’t work (Chudnoff 2013). It is a *bonus* for virtue epistemology that it can accommodate this. What experts experience often differs from what novices experience. Our intellectual intuitions may vary with expertise. Far from excluding our conscious experiences, then, a virtue epistemology for logic would make room for them as partial indications of how far we have internalized the workings of a logical system and how reflective we have become of its benefits, limitations, and how to apply it to non-formal discourse.

## 9. VIRTUES MEET SKILLS

To construe virtue epistemology for rules of deduction in responsibilist terms faces a hurdle. As Gary Watson (1996) pointed out, skills and virtues differ. Logic students may come to well put to use some of the skills that logic exercises foster. Yet only a *modicum* of the rarer and more resource-consuming intellectual virtues can be acquired in an introductory class.

A host of skills could be invoked here: imaginativeness, being quick to seize formal conclusions of given sets of *formulae*, an inclination for formal methods and constructions, delighting when a proof is simple or includes some theoretical novelty. These are skills that most practicing logicians possess. Notwithstanding, they don’t seem to be the right kind of reasons for attributing intellectual responsibility. Maybe in some contexts you could blame someone for not being imaginative enough; in most cases that would sound like grasping at straws. It might seem as though classical virtue epistemology, as found in Ernest Sosa’s homonymous (2007) monograph or in Linda Zagzebski’s classical (1996) *Virtues of*

*the Mind*, might suffer from equivocation.<sup>5</sup> The problem is: how could one be held responsible not for intellectual virtues but for cognitive skills?

Experiences of frustration might fuel a first reply to Watson's challenge: the reason why virtues and skills are often lumped together in virtue epistemology, at least in the special case where this concerns the epistemology of logic, is that we wish to describe kinds of scenarios – learning situations – where virtues and skills are acquired and exercised jointly, as part of a whole package of learning experiences, sometimes frustrating and sometimes rewarding, that students encounter. The same mix of skill and virtue shows in the development of logical habits. How do a particular thinker's patterns of reasoning relate to those entrenched in that thinker's epistemic community? Following Peter Railton (2011), it seems to me that intellectual virtues are a species of inferential *habitudes*. Such *habitudes*, when cultivated as part of flourishing epistemic characters, guide us in cognitive behavior much like fairly general and robust rules that are, notwithstanding, situationally flexible and not exceptionless.

For another reply, bite the bullet: in some circumstances, one is largely responsible for how skilled one becomes. This is by analogy with the paradox of creativity (Gaut 2014): even when you cannot blame someone for not coming up with an idea or not exhibiting a skill (imaginativeness, say), it might still have been their own doing to place themselves in an environment where such ideas might not crop up or such skills might not become manifest (Lai 2011). Parenthetically, I hazard the suggestion that skill-based creativity could be invoked in dealing with aspects of the paradox of analysis (Grigore 2007, Balaguer and Horgan 2016).

## 10. VIRTUE THEORY AND THE PSYCHOLOGY OF EXPERTISE

Must a virtue epistemology of rules of deduction based primarily on cognitive skills amount to no more than a psychology of expertise? I'll now briefly argue the answer is "No".

One might be tempted to reason as follows. If a skill epistemology for logic is to make sense, we need more than an abstract characterization. We need to identify a list of skills relevant to the logic classroom. And a joint programme for cognitive psychologists and philosophers of logic and critical thinking educational scientists needs to emerge: to identify those skills, to assess the variety and conditions of their acquisition, their durability, their domain specificity.

The programme might fascinate and it might renew the psychology of logic in important ways. But it cannot fully supplant a virtue (and skill) epistemology for logic (and logical rules) for several reasons. First, any such catalogue would depend on progress in empirical research, in the vein of a naturalized epistemology à la

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<sup>5</sup> Gheorghe Ștefanov raised this worry about a virtue-theoretical epistemology for logic in general. The surrounding sections result from an attempt to address his concerns.

Quine (1969). But what matters in the epistemology of logic are what skills there exist, *realiter*, rather than how far contemporary psychological research got in investigating them. Moreover, the previous section suggested that cognitive skills and intellectual virtues are not always easily dissociable, and so what would feature on the skill catalogue is questionable.

We cannot avoid, then, a central question in the metaphysics of mind: what is a skill? On the view I tentatively prefer here, MacIntyre (1982) is correct to depict the Aristotelian traditional characterization of skills as inherently social, emerging in the context of community-wide standards (norms) of performance, apprenticeship, professionalization and social use. In the next section, I explore what the relevant communities might be for ascertaining expertise in logical rules. The point here is that relativity to community, culture, tradition, make any presumptively universal list of cognitive skills that are relevant to logic chimaeric. Unsurprisingly, overviews of abilities-based critical thinking evaluation avoid such lists even across generations (Facione 2000, Lai 2011).<sup>6</sup>

I'd like to end with an example to put this in context. Dumitru (2024, p. 185) quotes Fine (1985):

‘To illustrate such an episode of an *aha*-experience followed by a conversion in the field of proof/reasoning, let me introduce a quote from a book by Kit Fine. In *Reasoning with Arbitrary Objects* (Basil Blackwell, Oxford, 1985), the preface reads:

“This book had its origin in the classroom. I was teaching natural deduction to a group of students and had come to the point at which the rule of universal generalizations is introduced. I had wanted to give an explanation of the rule in terms of arbitrary objects. But my sense of rigor got in the way, and I gave instead an explanation in terms of schematic names.”<sup>7</sup>

Dumitru (2024) then mobilizes this example to discuss the role of an *aha*-experience for an expert in the field, Kit Fine. I remarked earlier how conscious experiences associated with logical appraisal might be relative to one's expertise, and so I fully agree with Mircea Dumitru's rendering. However, I'd like to make a different point about the same example. Consider Fine's students: in order for them to understand what quantified *formulae* mean, students have to engage at different levels both technical expertise (what do the clauses for evaluating quantified *formulae* look like?), metaphysical intuitions (do arbitrary objects even exist?), as well as how logic and metaphysics interrelate. I don't see how such careful interweaving of logic and philosophy can make its way into a catalogue of cognitive skills, other than by some generic mention of “abilities to make connections with related fields”. And yet this specific interaction between logical skill and metaphysical reflection is key to evaluating, e.g., rules for quantifiers in a natural deduction system. Because it glosses

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<sup>6</sup> If the foregoing is right, it also disposes of misplaced complaints of psychologism from followers of Frege or Husserl. However interesting and useful the psychology of reasoning and of expertise are, the metaphysical characterization of skills, and its attendant virtue epistemology, are not beholden to them.

over many such fertile crossovers, any list of general-purpose skills associated with critical thinking and logical exercises seems to me to be incomplete.

## 11. WHICH COMMUNITY?

The classroom, professional philosophers and mathematicians, educational scientists, stakeholders in public debate, experts in rhetoric and communication studies, all these form distinct communities. They would hold their contributions to different standards, evince different methodological approaches to logical rules.

One might think that the plurality of communities poses a threat to contractarianism but it doesn't: it only multiplies the compacts. Different communities, and different experts in them, might work with slightly different logical rules, in a manner amenable to logical pluralism (cf. Beall and Restall 2000). It is precisely for this reason that a virtue epistemology for rules of deduction doesn't decide against the use of alternative logical rules; what matters is what one can do with them in alternative solutions to exercises and puzzles.<sup>7</sup> A virtue lesson in intellectual modesty: don't tax as a schoolboy's mistake what might be an insight into a non-classical logic.

Experts and novices with alternative preferences (or institutional constraints) might then group into alternative mini-communities. *Principia*-style logic is prevalent in teaching, and easier to acquire by students than its non-classical counterparts. Instructors in elementary logic join hands, for pedagogical reasons, with mathematicians who wish to be concerned with their own respective fields, and all they want from logic is that it be simple and that they could rely on it. This might begin to explain why classical logic reached its "classical" or "orthodox" status and the stability that brings – and the explanation sketch relies on patterns of social coordination where expert status and perceived expertise are allocated much as in other fields, in the vein of a philosophy of mathematical practice (Mancosu 2008).

Forming subgroups that explore different logical systems might reconcile Carnap's (1950) principle of tolerance and "experimental spirit" with Quine's (1970) penchant for classical logic. It is in the stable background of classical logic, useful in the classroom and for neighboring fields, that one may, with mathematical and philosophical *légèreté*, explore non-classical alternatives in groups of like-minded researchers. Eventually, over time and with enough amassed support, this might lead to changes in "classical" or "orthodox" status. But such changes, as the historiography of science teaches, rarely happen overnight.

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<sup>7</sup> I am grateful to Paula Tomi and Gheorghe Ștefanov for making this point; the entire section was written in an attempt to respond to their rejoinder. Precisely because it doesn't decide between alternative rules of deduction or axioms, a virtue epistemology for logic seems open to the kind of "unprincipled virtue" thematized by Arpaly (2007). Compatibility with alternative rules shows both the partial codifiability of the skills one develops, and that such skills are not beholden to a unique *calculus* or theory – and, if they were, one's genuine logical competence might be in question.

## CONCLUSION

The foregoing remarks have been tentative, and my sole concern has been to develop a few suggestions that might make a virtue epistemology of rules of deduction less implausible than it might seem at first sight. I think the approach is novel in the philosophy of logic and worth airing. My own leanings are pluralistic: alongside more traditional epistemologies of mathematics, I think there is room for virtue theory, for the psychology of expertise, and for their mixes, within practically-oriented approaches to how students and instructors of logic might justify their own common practices.

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