THE EPISTEMOLOGICAL STATUS OF LOGIC

by

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Abstract

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The dissertation evaluates the nature and strength of our warrant for axiomatic logical principles. I argue that logical principles are non-trivially *a priori* justified, if *a priori* warrant is understood in a way that is free of the inessential properties that have, historically, been associated with the concept. To defend this claim, I argue against the dominant, rival views of how logical principles are justified – for example, Quinean empiricism and conventionalism – as well as some less familiar accounts.

Various empiricist conceptions of logic are considered but found to be inadequate on two general grounds: first, proponents of empirical accounts of logic are unable to demonstrate how logical principles should be answerable to experience, and, second, the need to presuppose some logical principles in the evaluation of others effectively precludes the possibility of showing all of logic to be empirically justified in a non-circular way.

Attempts to show that logic is analytic are examined, as are some more recent attempts to locate the genesis of knowledge of logic in meanings without taking logic to be straightforwardly analytic. I argue that none of these strategies succeed. Conventionalist accounts of logical truth are implausible for a number of reasons, and alternative conceptions of analyticity trade on ambiguities in the concept that, once understood, eliminate their prospects for providing the requisite reduction of *a priori* justification.

Other linguistic strategies build knowledge of the validity of logical principles into their accounts of meaning, so they can't appeal to meanings to explain that knowledge.

Finally, I consider rule-circular arguments in support of deductive principles. I argue both that the appeal to the truth tables that these arguments typically make is question begging and that these arguments fail to add to the credibility of the rule over and above showing it to be coherent with other logical principles. So a satisfactory account of the justification of logical principles remains to be given.

An account of our first-order justification for logical principles based on the inconceivability of their invalidity under the idealization assumptions that govern their conditions for employment is defended. Understandably, skeptical worries can be raised, about the merits of this first-order warrant, and these worries are taken up and addressed. A full account of the justification of logical principles requires a metajustificatory component to show why the first-order considerations are veridical. I argue that the instrumentality of logical principles to our knowledge claims can provide the needed assurance. Finally, some residual worries concerning the compatibility of an account of a priori justification along these lines with naturalism are addressed. I reject the idea that the concept of the a priori can be reduced to naturalistic terms; however, I argue that my proposed account of *a priori* warrant for logical principles is consistent with the most compelling features of those arguments that seek to reconcile justification, generally, with a naturalistic metaphysics. Thus a naturalist can accept a non-reductive account of *a priori* justification for logical principles.

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CONTENTS

INTRODUCTION

The epistemological status of logic is a topic that, arguably, has not received the attention that it deserves. Logic has figured prominently in the analysis of a priori subject matters in modern analytic philosophy, but often in ways that assume its certification. So, for example, the logicist program sought to reduce mathematics to logic. And moderate empiricists have sought to show that conceptual truths are analytic in the sense that they are transformable into logical truths by the substitution of synonyms for synonyms. It was thought that if a priori claims could be understood as claims about logic and meanings, their objectivity would be secured and our knowledge of them explained. Arithmetic was eventually reduced to set theory rather than "pure" logic, and debates about whether any form of an analytic/synthetic distinction can be maintained continue to this day. But even if these projects had been a resounding success, they left the status of logic unexplained. What about logic itself? If we do have a priori-justified beliefs, logical belief is a paradigmatic case, yet questions about the nature and merits of our a priori grounds for logical belief, at least until recently, have received comparatively little attention.

Challenges to the cogency of the analytic/synthetic distinction paved the way for a more radical empiricism, championed by Quine: no class of statements could be said to have the status of being analytic, and so rationally irrevisable; therefore, no claims could be a priori justified because both of these attributes are identified with the a priori on Quine's view. So logic must be empirical. Quinean empiricism has been widely influential among naturalistically-minded philosophers, yet those who embrace empiricism about logic have been hard pressed to say how logic is answerable to experience. Empiricists, as well as defenders of a priori justification, have not focused on the details of how logic might be justified.

In this dissertation, I argue that logic is a priori, although the notion of the a priori that I defend is stripped of certain properties that, historically, have been associated with the concept. Some of these properties, which may be objectionable to critics and supporters of the a priori alike, are inessential to the concept. But eliminating the extraneous commitments that attach to a priori warrant does not alleviate all of the concerns that may be raised about this type of justification.

One of the primary objections that is often made against a priori warrant is that it is incompatible with naturalism. The idea that we have the capacity to acquire knowledge without empirical observation might appear to be incompatible with the requirement that human knowledge be explicable as a natural phenomenon. Rationalist claims that we have direct insight into a realm of Platonic truth obviously violate the tenets of naturalism and make a mystery of how we could we could possess a priori knowledge. On the other hand, if this traditional rationalist picture is rejected, a defender of a priori justification may be hard pressed to say how a priori considerations establish the objective truth of those claims that they are said to justify. A priori considerations in favor of axiomatic principles are often psychologistic in a way the raises question both about their intersubjective reliability and the content of their target claims: does a priori warrant tell us about anything more than the limitations and functioning of our own minds? I argue for an account of the a priority of logic that is compatible with naturalism but addresses these concerns about objectivity.

In my first chapter, I articulate what I take claims of a priori justification to entail, and I identify the challenges for an a priori account of logic. A priori justification, as I characterize it, allows that experience might be needed to acquire the composite concepts of an a priori claim, but denies that the particulars of experience are part of the evidence for what is claimed. I argue that this construal of a priori justification avoids certain objections based on the role of experience. The notion of the a priori that I defend does not identify a priori-justified propositions with necessary truth or rational irrevisability, so these objections to the concept of the a priori are rendered moot on my account. I

argue that our a priori knowledge claims include an empirical indefeasibility requirement, but one which allows that an a priori claim might come to be undermined in light of further conceptual developments.

In Chapter Two, I take up the question of what is included in the extension of logical principles that we may know a priori. Because my topic is the epistemological status of logical principles, I am interested in examining the type of justification that may be given in their favor, rather than adjudicating disputes about which principles we know or are justified in accepting. To this end, I take as my starting point that we appear to have a priori knowledge of elementary principles of classical logic (under certain idealization assumptions and excluding well-known paradoxes of the material conditional), but I invite the supporter of any reasonably-well-motivated, alternative logic that does not challenge classical logic on empirical grounds to interpret my claims as pertaining to their favored logic. I identify what conditions a proposed revision to our (classical) logic would have to meet, and I consider what would count as an empirical, as opposed to a conceptual, revision to logic.

In my third chapter, I consider the question of whether logic might be empirically justified. The claim that logic is empirical is one empiricist strategy. An alternative strategy, which I take up in subsequent chapters, is to show that knowledge of logic is not substantive and is to be explained in terms of meanings. The strategy of taking logic to be empirically justified might be preferred because it appears to hold the promise of demonstrating how knowledge of logic is both objective and non-trivial.

I examine three versions of empiricism about logic: (1) a simple inductive account, along the lines advocated by Mill for some logical principles, (2) the Quinean picture of logic as confirmed indirectly and mediately through considerations of equilibrium within an overall system of beliefs, and (3) a view that I call second-order empiricism, according to which logical principles are initially accepted for a priori reasons, but logical principles must be shown to be reliable in experience in order to be fully justified. I argue that it is crucially unclear how logical principles either could be

established empirically or how they should be understood to be answerable to experience. Moreover our need to presuppose some logical principles in order to evaluate others precludes the possibility of giving a satisfactory empirical account of all of logic. I argue that even if the empiricist could show how a given logical principle should be answerable to experience, the presupposition of others in the evaluation would effectively create a closed circle of axioms and rules for which a non-circular empirical justification could not be given.

In Chapter Four, I examine the question of whether logic could be analytic. The challenge for the empiricist here is to give an account of analyticity that is suitable to the task of fully explaining the a priori justification of logic in terms of knowledge of meanings. Historically, the leading candidate notion is based on the idea that axiomatic logical principles are linguistic conventions, according to which an analytic statement is one of the conventions or a statement immediately derivable from the conventions. I argue that conventionalism is untenable for a number of reasons. I discuss Quine's celebrated regress argument, which shows conventionalism to be incoherent if the conventions are construed as having been explicitly formulated. I consider an alternative of account of convention, due to David Lewis, according to which conventions need not be explicit. But I concur with Quine that dropping the attributes of deliberateness and explicitness risk depriving conventions of their explanatory force. And Quine's argument shows that some logic would be *required* for novel inference from the conventions, so logic could not be purely conventional, even if conventions are taken to be non-explicit. Finally, I look at some post-positivist characterizations of analyticity to which philosophers have appealed in order to show that logic is analytic, but not in the conventionalist's sense. I argue that these notions trade on ambiguities in the concept of analyticity that, once understood, eliminate their prospects for providing the requisite reduction of a priori justification.

In Chapter Five, I examine some recent attempts by Paul Boghossian and Christopher Peacocke to locate the genesis of knowledge of logic in meanings without

taking logic to be straightforwardly analytic. The key notion upon which their accounts rely is the claim that if a deductive principle is meaning constituting for a logical constant, it must be valid. But I argue that knowledge of meanings can't then be used to *explain* knowledge of the validity of the defining principles because the latter is required in order to know when a legitimate logical concept has been defined in the first place. An important component of Boghossian's account is that explicitly-held logical beliefs are justified via rule-circular justification. I challenge these claims and argue that rule-circular arguments for the validity of logical principles, in general, are not genuinely justificatory.

Having rejected empiricist strategies for justifying logical principles, I turn my attention to the basis for our a priori acceptance of logical principles in Chapter Six, my final chapter. I argue that the first-order warrant for the acceptance of logical principles is based on our finding it inconceivable how logical principles could fail to be true or truth preserving under the idealization assumptions that determine the conditions for their employment. To address skeptical worries about our first-order grounds, a full account of the justification of logical principles requires a metajustifcatory component to show why the first-order considerations are adequate, which I argue is located in the need to presuppose logical principles in reasoning and communication. In the final sections of this chapter, I explain how my view of the a priori justification of logical principles is compatible with a broadly-naturalistic orientation, and I consider how we should understand the normative component of justification within such a framework.

Debates about a priori justification are often characterized as debates between the rationalist and the naturalist. I think that this is a mistake. The a priorist need not be committed to the dogmatic views and metaphysical excesses that have been associated with rationalism. A priori justification is compatible with a sensible naturalism, so the debate about the epistemological status of logic is not between the rationalist and the naturalist, but between the a priorist and the empiricist in his various guises. So long as a priori justification is seen as standing in opposition to naturalism, a naturalistically-

minded philosopher will embrace empiricism about logic, regardless of whether there is a plausible empirical account on offer. I hope to have provided an account of the justification of logical principles that removes this obstacle to the acceptance of a priori warrant.

CHAPTER ONE

THE A PRIORI: WHAT IT IS AND WHAT IT NEED NOT BE

I. A Priori as an Epistemological Concept

The distinction between a priori and a posteriori justification is an epistemological distinction. Various different interpretations of the a priori have been advanced, or implicitly assumed, by both critics and advocates of a priori knowledge alike, so I will first need to be explicit about what notion of the a priori I wish to defend.

Loosely, a priori knowledge is thought of as knowledge that is independent of experience, in contrast to a posteriori knowledge, which is knowledge gained through experience – a characterization dating back to Kant.[1] On the face of it, the phrase, 'knowledge that is independent from experience', could be interpreted as referring either to a description of how the knowledge was acquired or to the kind of justification upon which the knowledge claim is based. It is the latter interpretation that picks out the relevant epistemological concept.[2] To give an account of how a particular instance of knowledge was acquired would be to give a causal explanation of how a person came to have a particular true belief. A causal explanation for the existence of a belief might be that the belief was acquired from others, or that the belief was the result of direct

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[1] Kant did not require that a priori knowledge be independent from all experience in that some experience may be needed to acquire the relevant concepts that are involved in an a priori claim. So, for example, to claim to know that an object's being red at one time and place excludes its being green at the same time and place is not to deny that the concepts of green and red are empirically acquired; what is said to be a priori is our understanding that the relation of exclusion would hold in the circumstances described. (Kant 1781/87, Intro., B9-B10)

[2] Kant thought that reason was a *source* of a priori knowledge, and presumably, if there is a priori knowledge, it does have its source in reason. However his a priori/a posteriori distinction concerns the conditions for knowledge, not the causal history of our beliefs insofar as it may vary among individuals.

observation, or that some of the concepts constitutive of the content of the belief are innate. But to claim, for example, that our knowledge of certain principles of mathematics or logic is a priori is not to make a claim about the causal history of how we acquired these mathematical or logical beliefs, but rather to say something about their justificational status. It may be the case that observation played a role in the discovery of certain mathematical and logical principles, but the a priorist's claim is that their justification is not a matter of empirical confirmation.[3]

It is important to maintain the distinction between the conditions for the justification of a belief and the conditions for its existence in order to avoid confusion about what the a priorist is claiming. An advocate of a priori knowledge can allow that experience may be needed to acquire certain concepts or that empirical observation may have played a role in how we initially came to learn about certain a priori truths. What the a priorist denies is that the truths in question owe their justification to experience.

II. A Priori Justification

If the a priori/a posteriori distinction pertains to the *justification* conditions for knowledge, then the distinction can be said primarily to contrast two different types of justification.[4] I define a priori justification as follows:

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[3] This point is made by clearly by Ayer (1946), among others.

[4] There may be special cases, such as animal knowledge, where justification is not a condition for knowledge. But typically, justification is needed to distinguish mere true belief from knowledge.

Also, as I will be discussing later, it has been argued that no non-circular justification of certain elementary rules and propositions can be given, in which case some elementary rules and propositions would not be justified *per se*; however, the epistemological concern is with the basis for our endorsement of these rules and principles, not their causal origins.

apj: A priori justification is justification that does not appeal to empirical evidence for its justificational force.[5]

By 'evidence' I mean the beliefs, perceptual states and sensory states that may be taken to support or negate a particular judgment.[6] Empirical evidence is evidence based on sensory experience or observation.

In order for my definition to demarcate the a priori/a posteriori distinction, one caveat is needed: evidence must be taken to be a necessary condition for empirical justification. If evidence were not a requirement for empirical justification, beliefs that we should clearly want to classify as empirical would count as a priori on my definition simply because their justification does not involve any appeal to evidence – empirical or otherwise. While it may seem obvious that evidence should be required for empirical justification, some accounts of empirical justification do not incorporate any reference to evidence. On a reliabilist account, for example, justification is solely a matter of the reliability of the process used to arrive at the belief; no explicit appeal to the presence or use of supporting evidence is made as a condition for a belief to be justified. However, a reliabilist presumably would want to incorporate evidence in at least the following minimal way: a reliable method or process must be applied to the appropriate sensory input or observational beliefs if it is to confer empirical justification on a belief brought about by that process. If this construal of reliabilism is acceptable, empirical evidence would enter into the overall justification of a belief via the specification of the causal processes that are relevant to the formation of the belief in question. (And if it is not

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[5] The locution 'justificational force' is due to Burge (1993).

[6] While some epistemologists take the position that only beliefs can enter into evidential relations, I favor a direct realist approach. A direct realist holds that perceptual and sensory states themselves, unmediated by belief, can be reasons for a judgment. However, it will not matter to my analysis of a priori justification if one takes the more restrictive view that evidence is required to be based on beliefs.

acceptable, it is hard to see how the reliabilist account captures any ordinary notion of justification.[7])

The definition of a priori justification that I am advocating allows a priori justification to depend on experience in a general way, whereby experience may be needed to acquire concepts utilized in an a priori claim, but the particulars of experience cannot constitute the evidence upon which the force of an a priori justification is based.[8] On this construal of a priori justification, certain objections to a priori justification should not count as genuine objections. For example, Chisholm (1977) has argued that long and complex proofs that require reliance on memory cannot be a priori because they are contingent upon our experience of remembering. However, as has been pointed out by Burge (1993), this objection is ill-founded because the role of memory in such instances is to preserve the propositions that constitute the proof, and it is the inferential steps of the proof that supply the a priori justification for what is proved. In a similar vein, Kitcher (1984), has noted that paper and pencil are needed to engage in a complex mathematical proof, and so he claims that knowledge of the proof cannot be a priori because we must rely on perception to complete the proof. But again, this objection misses the point. The markings serve to preserve the steps in the proof; the sequence of propositions taken together are what justify the proposition proved, the markings themselves are no part of the justification. While I do not intend to offer a general account of the conditions under which evidence supports a judgment, it should be clear that the role of experience in the preceding examples is trivial and should not count as evidence constitutive of justification.

However, it might be thought that while non-evidential experience should be unproblematic for a priori justification, some allegedly a priori claims do appear to rely on empirical evidence. For example, if there are a priori justifications in ethics, they may

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[7] See Feldman and Conee (1985) and Haack (1993) for discussion of the requirement of evidence for justification.

[8] This is consistent with Kantian notion. (Ibid, B1)

make some appeals to empirical evidence. The claim "Torturing babies for fun is wrong" may appeal to empirical connections between torture and pain.[9] However, while the connection between torture and pain may be empirical, the judgment of the wrongness of torturing babies is based on a more general principle condemning the infliction of unnecessary pain on innocent beings. Understanding that torture causes pain is necessary to form a moral judgment about its rightness or wrongness, but the appeal here to empirical evidence is limited to what is needed to acquire knowledge of a causal connection that, once understood, can be seen to fall under a general a priori principle. Just as some experience may be needed to acquire concepts employed in a priori claims, some evidence may be needed to recognize an action as an instance of a certain type to which a priori moral principles may apply.

As I am defining a priori justification, a person could, in theory, be a priori justified in believing something false. A priori justification, like the empirical justification to which it is contrasted, may be such that it is insufficient for knowledge. In the case of justification that is sufficient for knowledge claims, a priori justification need not be taken to guarantee the necessary truth of a proposition that it is said to justify.[10] My definition thus parts ways with any account of the a priori that, in keeping with the tradition established by Kant, takes what can be known a priori to be the class of necessary truths,

Moreover, on my account, a belief that is a priori justified could be revised. *Pace* Quine and Putnam, a priori justified beliefs need not be taken to be rationally irrevisable.[11] The definition of a priori that I will defend allows that an a priori claim could be revised in light of new conceptual developments. A priori knowledge claims

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[9] The relevance of this example was suggested to me by Jonathan Adler.

[10] As has been pointed out by Kripke (1972/80), the claim that if something is known a priori, then it must be necessarily true requires argument; the *concept* of a priori knowledge does not include that of necessary truth.

[11] Putnam (1978, 1979); Quine (1951/1953, 1954).

need not be any different from other knowledge claims in this respect. In considering the development of our body of empirical knowledge, some factual claims that were held to be true at one point in time have been subsequently overturned by further observation or refinements of our theories. Presumably we would want to allow that a claim that was revoked upon additional evidence was nevertheless justified prior to the discovery of the undermining evidence. Similarly, a claim justified on a priori grounds at time t_1 might be revised upon further conceptual developments at time t_2. A claim that is presently justified on a priori grounds could, in theory, be revised by further *conceptual* developments and still retain it's a priori status. An example of a revision based on conceptual, as opposed to empirical, grounds would be the revision of naive set theory, as axiomatized by Cantor and Frege, to avoid the set-theoretic paradoxes. The axiom that says that given any property, there exists a set whose members are just those entities having that property leads directly to the paradoxes. Hence, naive set theory is inconsistent. Modern set theory blocks the paradoxes by restricting assertions about membership in a set, e.g. by requiring that a set be previously given before such assertions can be made, such that the paradoxes cannot arise.

III. Classification of a Subject Matter as A Priori

While I take the a priori/a posteriori distinction to be a distinction pertaining to justification, philosophers have been concerned with what propositions or subject matters can be known or justifiably believed a priori.[12] The claim that a particular proposition can be known a priori should not be understood as the claim that it must be known a priori.[13] A sensible a priorist will want to allow that a person could have empirical

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[12] By "proposition" I don't mean to make any ontological assumptions about propositions over and above taking them to be that which is expressed by a sentence. In particular, I am not assuming propositions to have a mode of existence that is independent from the assertions and beliefs of which they specify the content.

[13] This point has been emphasized by Kripke, ibid., and Kitcher (1980).

justification for a proposition that can be known a priori. For example, consider a child just learning to count. For the child, combining a set of five objects with a set of seven objects and counting them up could provide evidence for that 5 + 7 = 12. But once the concepts of numbers and counting have been acquired, 5 + 7 = 12 can be calculated without the aid of objects.

Just as someone could have empirical justification for a proposition that can be known a priori, it is arguable that someone could have an a priori warrant for believing a proposition concerning a matter that is clearly empirical. Burge (1993) argues that we have an a priori entitlement to believe that people are telling the truth when they present information to us as true. On Burge's account, an entitlement is a form of epistemic warrant that need not be understood by or even accessible to the subject. Burge argues that we are a priori entitled to accept as true something that is intelligible to us and presented as true, in absence of evidence to the contrary. Burge calls this principle the Acceptance Principle, and it is an epistemic default position that can be overruled by further empirical evidence. According to Burge, we are justified in adopting the Acceptance Principle because the intelligibility of propositional expressions presupposes some rational capacity on the part of the individual who is the source of those expressions, and both the intelligibility of what is expressed as well as the prima facie rationality of the source indicates a prima facie source of truth. However, whether or not people usually do, in fact, tell the truth is determined by empirical evidence; so if Burge's argument is successful, we have an a priori warrant in favor of a propositional claim concerning an empirical matter.

What makes a given subject matter empirical or a priori? We classify something as a priori or empirical based on what we take to be the typical or ideal justification conditions for our knowledge claims. To say that a particular proposition <u>is</u> a priori is elliptical for saying that the justification conditions for knowledge of it are a priori. So while the term 'a priori' describes a type of justification, we sometimes speak of a particular proposition or set of propositions as being a priori, and when we do, we are

claiming that our knowledge of the proposition(s) in question is a priori justified. It might be thought that the justification status of a proposition does not depend our having knowledge of it. But to claim that a proposition is a priori is to claim that the justification conditions for knowledge of it are a priori, which is tantamount to saying that if the proposition were known, it could be known a priori.

Presumably, if we have a priori *knowledge* of something, the a priori justification in favor of our knowledge claim is sufficient to underwrite it; additional empirical support is not needed. So while we might have an empirical justification for a claim that can also be known a priori, if the a priori justification were available to us, whatever empirical justification we might have in favor of the claim would be superfluous. In the case of the child, were the child to have the *concepts* of 5, 7, 12, + and =, he or she might not need to count objects to know that 7 + 5 = 12 because the truth of the equation would be understood without reliance on observation.

Further, if a proposition is known a priori, we would not expect empirical evidence to count against it. If we could *foresee* how our knowledge claim could be undermined by empirical evidence, then we would take the justification conditions for knowledge of the proposition to be empirical, not a priori. In the Burge example, we know that whether or not someone is telling the truth is ultimately to be settled by the empirical evidence. While we may be a priori entitled or justified in adopting the view that people are telling the truth in absence of evidence to the contrary, our warrant stops short of a justification sufficient for knowledge in any given instance. To classify a proposition (or set of propositions) *as* a priori, and not just having some a priori justification or other that might be defeated once the available empirical evidence is in, is to take the justification for what is claimed to rely, ultimately, on non-empirical considerations in it favor.

In light of the foregoing considerations, I take the claim that a proposition is a priori to include the requirement that we take it to be empirically indefeasible. If we could understand how further empirical evidence might outweigh an a priori

consideration in favor of a proposition, I do not think that we would regard the justification conditions for knowledge of that proposition as a priori. So while a priori justification is justification that is not based on empirical evidence, I think that the ordinary notion of a priori knowledge implies that we do not anticipate the a priori justification ever to be undermined by empirical evidence.[14]

As a first approximation then, the notion of a priori, insofar as it might be used to classify a particular subject matter, that I want to defend is as follows:

app: A proposition is a priori iff (1) it can be justifiably believed without empirical evidence and (2) it is empirically indefeasible.

A notion that will be equally important for my purposes is that of an a priori rule or system of rules.[15] In considering whether or not logic is a priori, I will want to consider whether our justification for adhering to certain inference rules, e.g. modus ponens, is a priori. The definition of an a priori proposition can be extended to a system of rules as follows:

apr: A rule or system of rules is a priori iff (1) it can be justifiably employed without empirical evidence and (2) it is empirically indefeasible.

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[14] The question of the empirical indefeasibility of a priori claims is the focus of Field's 1996 and 1998 articles on the a priority of logic. Even if my general characterization of a priori knowledge as including the empirical indefeasibility condition may be disputed, I agree with Field's view that a priori claims are of little epistemological interest without it.

[15] Here, I am following Field (1996, 1998) in extending the notion of a priori justification to a system of rules or a methodology. Field (1998) defines an a priori proposition as one that can be reasonably believed in absence of empirical evidence and that is empirically indefeasible. I prefer to use the term 'justifiably believed' rather than 'reasonably believed' because I think that we classify propositions as a priori based on our justification conditions for knowledge claims, not about what might or might not be reasonable to believe – although the term 'reasonably employed' may be a more natural expression when considering the a priority of rules. However, with the empirical indefeasibility requirement in place, lowering the justificational standards for holding a belief to what is reasonable should not make a difference as to what counts as a priori.

I will want to clarify the sense in which an a priori proposition or rule is to be considered empirically indefeasible, but first I want to address the meaning of 'justifiably believed' and 'justifiably employed' in the above definitions and raise a challenge for an a priori justification of logical principles.

A. Equivocality of 'Justifiably Believed' and a Puzzle about Logical Belief

The term 'justifiably believed' in the definition requires some discussion and clarification because it is equivocal between the following two interpretations:

i) A proposition can be justifiably believed if there is a justification for it, i.e. the *content* of the belief is justified.

ii) A proposition can be justifiably believed if there is a justification for *believing* it. One may be epistemically justified in holding a belief in absence of what might be considered evidence or grounds for what is believed (example to follow). I use the term 'epistemically justified' to rule out merely pragmatic reasons for holding a belief.

I intend the term 'justifiably believed' to cover both the senses of (i) and (ii). An analogous distinction holds for the term 'justifiably employed' as it occurs in the definition for the a priority of rules; however, we do not speak of the "truth" of an inference rule, but rather its validity, reliability or some other measure of its utility in meeting our epistemic goals. Whether or not a rule is justifiably employed depends on whether or not it can be shown to be a good rule, where 'good' is to be understood epistemically in that the rule is instrumental to the attainment of knowledge.

It has often been observed that some elementary propositions cannot be given a non-circular justification. In particular, basic logical principles cannot be justified without appeal to inductive or deductive methods of justification. One standard objection against the use of *inductive* methods to justify logic is that inductive methods are too weak because they confer mere probability, not certainty, on the conclusions they support. On the other hand, a *deductive* justification of logic would be circular. Yet it seems that we are justified in accepting elementary inductive and deductive principles, even if we cannot provide a non-circular justification for them. If so, these principles

would be such that they are justifiably believed in the second sense given above. While I will be evaluating various answers to the question of how logic might be justified, I want to state at this point that it is not obvious that elementary logical principles require a demonstrative justification in order for us to be able to claim that they are justified: there may be considerations in favor of logical principles that are non-circular in character but can be understood to underwrite our claims that these principles are true or truth preserving.

It is sometimes argued that certain elementary principles can be given a rule-circular, as opposed to a straightforwardly-circular justification, and that a rule-circular argument is genuinely justificatory. An example that is often cited would be that of justifying the rule of modus ponens by appeal to the truth table for 'If, then', even though this requires prior understanding of the truth conditions for the material conditional. In a rule-circular argument designed to show that modus ponens is truth preserving, one would have to take a step in accordance with the rule of modus ponens, but the validity of modus ponens is not assumed as a premise of the argument. Proponents of rule-circular arguments do not take them to be persuasive to a skeptic; instead, they are intended to provide a kind of explanation of why we value the inferential practices that we do. If such circular arguments count as genuine justifications, then there would be no need to countenance the sense of 'justifiably believes', whereby we may be epistemically justified in adhering to a rule or believing a proposition in absence of a justification for it because our elementary principles that we hold to be true could no doubt be given rule-circular justifications.[16]

While logical rules and principles are no doubt self-supporting, the question is whether rule-circular arguments should count as genuine justifications. I will examine some of the arguments in favor of rule-circular justification in some detail in a later

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[16] Michael Dummett (1973) notoriously advocates rule-circular justification for deductive principles, and as I will be discussing in Chapter Five, so does Paul Boghossian (1996, 2000).

chapter, but my view is that justification must be non-circular. Briefly, my reasons for excluding rule-circular arguments as being justificatory are as follows: While rule-circular arguments might demonstrate why we value the principles that can be supported in this way, as their proponents say, they fall short of providing genuine justification because a principle could not fail to come out as "justified" when evaluated by a rule that we already accept, if that rule implies the principle under evaluation. Furthermore, even if we did allow for rule-circular justifications in support of deductive principles, whereby a deductive principle could be justified by appeal to the relevant truth table, we would still need to explain our knowledge of the truth table. Perhaps this could be done by appeal to yet another rule. But if this process were to be continued, eventually we would reach some core group of axioms and rules that could not be given a justification outside the closed circle that they together form. Perhaps one might argue that these core rules and axioms become justified upon evaluation for coherence. But then a standard objection against coherence theories would apply: consistency of a set of beliefs doesn't guarantee their truth or plausibility. A set of beliefs could be false, yet wholly consistent. Likewise, a set of rules could be counter-deductive or counter-inductive and still be consistent. Something more than consistency is needed to show that we might be justified in believing in or adhering to a set of rules or beliefs.

In rejecting rule-circular arguments as being justificatory, I am not denying that the evaluation of a principle by reference to established rules has value. A coherentist might argue that rule-circular "justifications" are needed to establish the coherence of a principle with other beliefs and that one is not justified in accepting a particular logical principle unless it can be shown to be consistent with other accepted principles. For example, it might appear to a beginning student of logic that $\sim q$ can be inferred from the premises $\sim p$ and $p \supset q$, but evaluation of the validity of the inference using an established proof procedure will demonstrate that this is not so. It may be that certain principles that initially appear plausible to an individual are not justifiably believed unless they are evaluated for consistency with other principles. But, while evaluation for consistency

can legitimately cause us to reject a principle, findings of consistency alone cannot establish its truth or plausibility. Consequently, I take circular arguments in support of a principles to be insufficient for genuine justification. If this is right, then it would appear that no non-circular justification is available for some elementary rules and principles. Axiomatic logical principles are a paradigmatic case of principles for which justification by way of a demonstrative proof that does not rely on those same principles cannot be provided.

Although an independent certification of logical principles would appear to be unavailable, it also seems that we are warranted in accepting logical principles in absence of such a certification. What sort of considerations might justify us in believing a proposition or employing a deductive rule in the absence of a (non-circular) justification for the proposition or rule in question? One answer is that if the principle in question must be presupposed in reasoning, we do not have the option of rejecting it. Yet we might feel that this observation about the role of logical principles in reasoning is not sufficient to establish their validity. Expression of this worry can be found as early as the writings of Frege:

> If we step away from logic, we may say: we are compelled to make judgments by our own nature and by external circumstances; and if we do so, we cannot reject this law – of identity, for example; we must acknowledge it unless we wish to reduce our though to confusion and finally renounce all judgment whatever. I shall neither dispute nor support this view; I shall merely remark that what we have here is not a logical consequence. What is given is not a reason for something's being true, but for our taking it to be true.[17]

Another reason that we may be justified in accepting a logical principle in absence of a demonstrative proof of it is if the principle is prima facie plausible and we cannot conceive of how it could be false. Consideration of what is or is not conceivable is a conceptual matter, and while this type of evaluation may rely on empirical evidence in the sense that empirical evidence constitutes part of our background information, any claim being tested for counterexamples in this way is only tested in thought. So any

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[17] Frege, G. (1893/1903), ed. and trans. by M. Furth, 1964, p. 15.

justification based on considerations of conceivability should count as a priori. The test of conceivability that I have in mind entails being able to construct counterexamples to a proposition or rule that demonstrate its falsity. It would not be sufficient to find the falsity of a proposition thinkable merely by entertaining the possibility that we might be deceived in holding it to be true. So our being able to conceive, in the relevant sense of 'conceive', of the falsity of 2 + 3 = 5 would depend on our being able to describe a case in which 2 + 3 did not equal 5, not our conceiving of the possibility that we may be deceived by an Evil Demon or some other such device. In the mathematical case, we can demonstrate the equivalence of 2 + 3 to 5, but a similar demonstration is lacking for the case of our most elementary logical truths. Still their falsity may be unthinkable. Unlike the mathematical case, however, alleged counterexamples to elementary logical truths have sometimes been suggested. The question for evaluation of an elementary logical principle is whether or not an alleged counterexample is both plausible and sufficiently convincing to cause us to retract our belief in the truth of the principle so challenged.

For the case of a rule of inference, whether or not the rule is justifiably employed in absence of a demonstrative justification for it may depend on the degree to which its employment helps us to achieve our epistemic goals. In general, we do not speak of the truth of a rule, but rather the reasons for which we find it advisable to employ the rule. In the case of a deductive rule, we employ the rule if we take it to be truth preserving in all cases, in other words, if we judge it to be valid. For example, in the case of modus ponens, we may not be able to provide a non-circular justification for the rule, but neither can we produce a convincing counterexample to it.[18] So we may be justified in adhering

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[18] Modus ponens, however, is not without it detractors. Adams (1975) has raised problems for inferencing according to modus ponens based on what might be rational to believe, and McGee (1985) denies the validity of modus ponens for the case of certain multiple embeddings of "if..then" statements on the grounds that in such cases we may have good reasons for believing the premises but not be justified in accepting the conclusions. But *pace* Adams and McGee, these objections should be understood as problems for rational belief, and are not convincing as they stand as challenges to the validity of modus ponens.

to the rule without a proof of its validity. In the case of an inductive rule, it is less clear what would make adherence to the rule reasonable or justified – perhaps similar considerations concerning the availability of alternatives could be given – but unlike a deductive rule, an inductive rule may be advisable to employ based on considerations of power or speed as well its perceived reliability.

Arguments based on what is or is not conceivable are often thought to be bad arguments because of the embarrassing history of some claims that were supported in this way having been subsequently overturned. However, the embarrassment arguably lies not in taking arguments based on what is or is not conceivable to be justificatory, but in taking these arguments to be conclusive in a way that rules out the possibility of revision in light of further conceptual developments.

So it looks like we have the following puzzle about logical belief: On the one hand, a justification for logical principles appears to be lacking because an inductive justification for a deductive principle would be too weak, and a deductive justification would be circular. Yet there are considerations that seem to justify our acceptance of logical principles. So it would seem that we are justified in accepting logical principles in absence of a demonstrative or conclusive justification for them. But, if so, there is a worry that, rather than establishing the validity of logical principles, our reasons for accepting them show only that our assent to logical principles is an intersubjectively reliable feature of human thought. A satisfactory account of a priori warrant for logical principles will need to resolve this apparent dilemma.

It has also been suggested by some that modus ponens fails in cases of vagueness: Suppose n grains of sand are not a heap. If n grains of sand are not a heap, then n + 1 grains of sand are not a heap, so n + 1 grains of sand are not a heap. But repeated applications of this rule eventually results in a heap. Some have accordingly found fault with the rule of modus ponens. But without a proposal for how the rule of modus ponens might be revised or given up in light of the paradox, faulting the rule of modus ponens strikes me as ill-advised and hopelessly ad hoc.

B. Interpretation of the Empirical Indefeasibility Requirement

The empirical indefeasibility condition also requires some clarification. An a priorist need not claim that a priori-justified propositions and rules are empirically indefeasible in some kind of "absolute" sense, whereby they are insensitive to any expansion of our overall knowledge base. The notion of empirical indefeasibility that I want to support is as follows:

empirical indefeasibility: A proposition is empirically indefeasible just in case no empirical observation should count against it, but allowing that further conceptual advancements, which we cannot now anticipate, might show it to be empirically defeasible after all.

The allowance for the empirical defeasibility of an a priori proposition given in this definition of empirical indefeasibility is intended to express the way in which our knowledge claims, generally, may be defeasible upon the expansion of evidence. Allowing for the defeasibility of a knowledge claim in this way should not be taken to undermine our knowledge of the claim – what is claimed as known is known according to the limits of our current knowledge; rather, the defeasibility condition allows for the purely epistemic possibility of the claim being subsequently overturned via the expansion of our overall knowledge base. Analogously, to allow that the a priority of a claim might be *empirically* defeasible in the future upon the expansion of our overall knowledge need not undermine its a priori status according to our existing body of knowledge. (Note: In allowing knowledge claims to be defeasible in the way described, I am not denying closure principles. So long as the original presuppositions for knowledge of a proposition are in effect, we will know to be true both the proposition and its known logical consequences. Non-closure arguments typically shift the contextual presuppositions for knowledge of a proposition to different, higher standards for knowledge of its consequences, and, therefore, fail to establish non-closure.[19])

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[19] Michael Williams (1991) diagnoses this problem as a general problem common to all non-closure arguments.

In theory, a priori justification could be defeated in either of two ways: We might come to discover that a proposition held to be a priori true is not, in fact, a priori justified, but is empirically true. In this imagined case, only our a priori justification, not the proposition itself, would be defeated. It is difficult to think of a case where a priori justification has been defeated in this way, although Quine would claim that principles of classical logic are a case in point. More typically, a proposition held to be a priori true is defeated on empirical grounds such that both the proposition and our a priori warrant for it are simultaneously overturned. Empirical indefeasibility, as I have defined it, allows for the *purely epistemic* possibility that propositions taken to be a priori true might turn out to be empirically defeasible in either of the two ways described, although we cannot now imagine or anticipate how the defeasance could occur. What I am calling "purely epistemic" possibility here is possibility only in a very weak sense that does not entail logical possibility. It should not be confused with the epistemic possibility that may be said to be characteristic of some modal sentences of the form "It is possible that P," where 'P' is in the indicative mood. So, for example, S's assertion, "It is possible that John has cancer" reflects S's state of not knowing whether, in fact, John does have cancer.[20] 'Possibility' as it is employed here entails logical possibility. By contrast, what I mean by purely epistemic possibility is possibility that does not entail logical possibility, but describes the subjunctive case where the possession of a greater conceptual understanding than we have at the present time is being entertained such that what is understood to be logically impossible now may not be logically impossible in the future.

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[20] This example is due to Keith DeRose. The epistemic character of modal sentences employing possibility in the indicative mood is discussed by DeRose (1991), Hacking (1967) and G.E. Moore (1962). Hacking also identifies a sense in which possibility is epistemic in subjunctive cases: it is logically and perhaps causally possible that I should have been blind by now, but it is not possible that I am blind now, thought it is possible that I shall be blind tomorrow. 'Possibility' as it is employed in these cases entails full logical possibility, whereas the epistemic sense that I am allowing for defeasibility claims for logic does not.

The allowance for the purely epistemic possibility of revision characterizes a type of a priorism that Field (1998) calls undogmatic. Undogmatic a priorism allows for the purely epistemic possibility of defeasibility (empirical or otherwise) of an a priori proposition upon further developments. Undogmatic a priorism may seem puzzling because what we typically consider to be possible is constrained by what is logically possible. It might seem that if there is an epistemic possibility of revision of logic on empirical grounds, then it must be *logically* possible that logic will be empirically revised, and so logic is empirically defeasible after all. But this conclusion does not follow because the two senses of possibility are not the same: The allowance for the purely epistemic possibility that logic could turn out to be empirically defeasible is not a logical possibility, according to our understanding of logical possibility. It is possibility only in the very weak sense that allows that what may or may not be conceivable at a given point in time, including what we understand to be logically possible, may change.[21] So, purely epistemic possibility does not entail logical possibility, i.e., $\Diamond_E \Diamond_L \not\supset \Diamond_L$. According to Field, while the undogmatic a priorist thinks that logic is not empirically defeasible, he allows that perhaps it is only a failure of the imagination that prevents us from seeing how empirical observations should count against his favored logic.[22]

Opponents of the a priori have objected that our lack of certainty that a particular claim could never be empirically undermined counts against its alleged a priori status. One reason that the notion of the a priori has been maligned is that certain principles that were originally taken to be known a priori – notably Euclid's parallel postulate – have subsequently been found to be false on empirical grounds. A version of Euclid's

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[21] Here I am understanding conceivability to be good evidence of possibility rather than taking the two notions to be equivalent. See Yablo (1993) for discussion of the relationship of conceivability to possibility.

[22] By way of illustration, Field draws an analogy to set theory. He says that most of us think standard set theory is consistent, but are undogmatic about it: we think it conceivable that further developments could show otherwise. So, it may be epistemically possible that someone will derive a contradiction in set theory; but to get actual inconsistency, you need the logical possibility of such a derivation.

postulate states that through any point not falling on a straight line, there is exactly one line through that point parallel to the given line. As a claim about physical space, the parallel postulate is false according to the Theory of General Relativity. Hence, the worry is that other beliefs that are currently held to be a priori and empirically indefeasible will similarly be overturned at some point in the future by further scientific advancement. However, our lack of certainty that an a priori claim will never be empirically undermined does not count against a priorism if 'empirically indefeasible' is interpreted in the undogmatic sense. I think that, generally, one should allow for the possibility that what is inconceivable now may not be inconceivable in the future. Still, for the a priorist, there is something disquieting about the history of a priori claims that have been subsequently overturned on empirical grounds. Are current a priori claims likely to suffer the same fate as Euclidean geometry? Are there any considerations that might suggest otherwise?

Since I will be arguing that our knowledge claims for certain elementary rules and principles of logic are a priori, one question that I will want to consider is whether or not the status of logic is any different from that of certain other a priori claims, such as Euclidean geometry, with respect to the possibility of its revision. In general, I will be arguing that logic is a priori and empirically indefeasible, which allows for the purely epistemic possibility that further considerations might undermine its indefeasibility. Yet I will also argue that the pervasiveness of logical principles in reasoning makes the possibility of their revision (empirical or otherwise) remote. I will argue that elementary principles of logic, if true, are a priori true in the undogmatic sense. However, I will also want to argue that for a thinker at any given time *t*, at least *some* set of logical principles is empirically indefeasible because for anything about which we might reason, including logic, some logical principles must be assumed in the reasoning process. If this is correct, it will provide the basis for an argument for the empirical indefeasibility of a priority itself with respect to logic because, even though no *specific* subset of logic may

be determined to have the status of being eternally empirically indefeasible, at least some logical principles at any given point in time must be presupposed in reasoning..

IV. Defining A Priori in the Negative

By defining a priori as justification that is not based on empirical evidence, I am defining 'a priori' in the negative in that I do not specify what a priori justification is. This will be objectionable to some. A positive account of a priori justification would give a characterization of what a priori justification is in its own right such that reference to its being "non-empirical" would not be necessary. However, there may be more than one answer to the question of what kind of justification counts as a priori. For example, our a priori knowledge of certain conceptual truths might be explained by their analyticity, whereby the truth of an analytic proposition is guaranteed by the meaning of its constituent terms plus logic. But, this account of a priori justification leaves the a priority of logic unexplained, unless it turns out that logic can also be explained in terms of analyticity. (I argue in Chapter Four that it cannot.) I will want to claim that our knowledge of logic requires a different kind of explanation; consequently, a characterization of a priori justification as justification based on analyticity would be incomplete. Another example that illustrates why a positive characterization of a priori justification is difficult to provide is Descartes's *cogito*. The *cogito* does not seem to be easily characterized either as a logical or an analytic truth, yet it is an a priori argument. Since there may be more than one kind of answer to the question of what a priori justification could be, I think that it is best not to build any one answer into the basic definition, but to allow that a plurality of different types of justification might count as a priori by virtue of their being non-empirical.

V. Objections to the A Priori

On my account of the a priori, certain objections to the existence of a priori knowledge do not apply. First, my definition does not connect a priori justification with

necessary truth, so objections to a priori knowledge based on the denial of the existence of any necessary truths would not count against the conception of the a priori that I wish to defend. Second, my account of a priori justification does not require that a priori-justified beliefs be rationally irrevisable, so it is not vulnerable to the objection that there can be no a priori knowledge because, in principle, no belief is rationally irrevisable. A priori beliefs may be revised in light of further conceptual developments, and it may even turn out that a principle – knowledge of which is considered to be a priori – could subsequently be empirically undermined in ways that are not anticipated. However, this purely epistemic possibility should not be taken to negate the a priori status of the principle because the prevailing knowledge conditions for the principle do not hold it accountable to experience. So one can be a fallibilist both about whether a principle is *justified* a priori and whether it is justified *a priori*.

Yet other worries about a priori knowledge that have been raised by philosophers remain. In particular, philosophers have been concerned that the postulation of a priori knowledge is mysterious and inconsistent with a naturalistic view of the world, i.e., a view that only natural properties and things exist, and these are ultimately explicable in terms of science. It may appear that all knowledge must be empirical because it is inexplicable how we might have knowledge of any factual matter in advance of empirical investigation. One response to this worry that I will consider later is the claim that certain a priori propositions such as logical claims are "non-factual," which is to say that they do not express anything true or false but should be regarded as rules that govern the use of logical expression in our language. I will not find this suggestion satisfactory because I think that we must understand logical principles to be true or truth preserving. If the non-factual strategy is set aside, it is a challenge for the a priorist is to say how a priori knowledge might be possible within a naturalistic framework.

A priori justification is also seen as mysterious in that we don't understand the processes whereby we are able to comprehend elementary a priori truths. By contrast, we

do have some understanding of our sensory and perceptual processes.[23] Sometimes an account of a priori justification is given in terms of warranting processes that are independent of experience (See, for example, Kitcher 1980 and 1984). While certain "processes," such as proof procedures that rely on previously established rules and axioms, perhaps can be satisfactorily explained in this way, this kind of explanation is unsatisfactory as an explanation of a priori justification for axiomatic principles. The processes to which a reliabilist typically appeals in order to explain the reliability of axiomatic rules and principles are not those of some acquired method, but are native psychological processes. However, (1) we don't know very much about the processes that subserve elementary logical reasoning, so it is hard to see how such processes could provide the justification for our a priori claims, and (2) the cognitive processes that subserve reasoning may not always be reliable. Cognitive scientists have documented a myriad of ways in which people reason sub-optimally and even fallaciously, so whatever processes may be operative within a postulated language of thought or some alternative cognitive architecture sometimes lead to fallacious reasoning as well as good reasoning.[24] While a priori reasoning must be governed by sub-doxastic processes in some sense, it is implausible that sub-doxastic processes provide the *warrant* our a priori claims; warrant must reside in considerations that are more accessible to our consciousness.

In the final chapter of the dissertation, I will try to sketch how a priori-justified beliefs and the cognitive processes that generate them might be understood to be compatible with a naturalistic orientation. While we may not have a complete understanding of the cognitive processes that generate a priori knowledge, I do not think that this lack of understanding merits any denial of the possibility of a priori warrant. I will argue that a priori warrant, as I have defined it, can be accommodated within a

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[23] This point is made by Pollock (1974).

[24] There is an extensive literature on this topic. The work of Kahneman and Tversky is often cited as providing evidence of the prevalence of non-optimal reasoning practices.

naturalistic metaphysics, and so there is no reason to reject the possibility of a priori knowledge on the grounds that is it incompatible with a commitment to naturalism.

CHAPTER TWO

LOGIC

I. Formalization and the Assessment of Arguments

My concern is with deductive logic insofar as it may be employed in ordinary reasoning, which is to say my interest is in the rules and laws of logic insofar as they may be observed, either explicitly or implicitly, in thinking about a broad range of subject matters. Certain deductive inference patterns that we may employ enable us to advance legitimately from old beliefs to new ones and to revise existing beliefs in accordance with new information. We are interested in identifying which patterns of reasoning permit us to advance from one belief or set of beliefs to another in a way that is truth preserving and which patterns of reasoning may lead to falsehood.

The question of *justification* for a logical rule or law is a question about the justification of its validity and, hence, the legitimacy of its potential employment in deductive reasoning. A logical inference rule allows us to proceed from a premise or set of premises of a certain form to a particular conclusion of a related form. Similarly, a law of logic, which tells us that any statement of that form is true, may be employed in chain of reasoning leading to a particular conclusion. As has been emphasized by Dummett, our interest in a logical law lies in the fact that it can be appealed to in a course of deductive reasoning: in the presence of one rule of inference, it will license another.[25] When a logical law is utilized in a chain of reasoning, we might say it is being appealed to as a principle of inference. For ease of exposition, I will refer to both simple logical inference rules as well as familiar tautologies such as the law of non-contradiction, the

[25] Dummett (1991), Ch. 8, "The Justification of Deduction," p. 184.

law of excluded middle, and the distributive laws as logical "principles," except when it may be important to distinguish between them.

In order to evaluate deductive principles that may be utilized in informal reasoning, we need to formalize them so that they can be made explicit and precise. A formal system provides a means of articulating and identifying those principles that we might want to endorse and those that we might want to reject. The formal system may be constructed either by specifying that certain formulas of a formal language L are axioms and adopting one or more rules of inference, or by assuming only inference rules for L, some of which then generate schemata (the theorems of the system) from any premises whatsoever. A system of formal logic is of epistemological interest only insofar as it may embody deductive principles that we might want to endorse prior to the formalization. If a formal system made no attempt to capture the principles that may be employed in ordinary reasoning, justification for the employment of the principles licensed by the system would be a trivial matter: their justification would be fully explained by the fact that the rules and axioms were stipulated as such, and they would be justifiably employed only within the system. The properties of such a system might be of formal interest, but its rules, axioms and theorems would not be of any epistemological significance.

While formalization is needed to facilitate the study of deductive principles, a formal language is an idealization of a natural language in favor of precision and clarity. The idealization typically includes a characterization of logical connectives in terms of their truth tables and their role in the axioms and inference rules of the system.[26] The ensuing distortions in the meanings of the connectives from their natural-language

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[26] Depending on whether the formal system is an axiomatic system or a system of natural deduction, either the truth-functions or the introduction/elimination rules for logical connectives may be presented as defining them, but these two ways of characterizing the connectives typically work in tandem. An exception is Koslow's structuralist logic, where the logical operators are characterized as certain kinds of functions on implication structures (non-empty set with implication relations defined on them) such that their characterization does not rely on reference to truth conditions in any way.

counterparts are well documented. For example, 'and' is sometimes used to mean 'and then'. This aspect of the meaning of 'and' is not captured by a truth-functional analysis of the logical connective '&'. But while a characterization of the logical connectives within a formal system may not fully capture the meaning of their natural-language counterparts, it should preserve what we take to be their role in inference.[27]

The semantic principle of bivalence, the principle that every proposition is either true or false, is central to the semantics for many logics, and it represents a significant idealization of natural languages, which are rife with vague terms. The occurrence of vague terms directly threatens the principle of bivalence because when it is unclear whether or not a vague predicate applies, and the lack of clarity is not merely due to epistemic limitation, a sentence containing a vague predicate may be neither true nor false. So, for example, if John exemplifies a borderline case of baldness, the statement 'John is bald' may be neither true nor false because the boundaries for the application of the term 'bald' are imprecise.[28] Given the prevalence of vagueness in our language, the presumption of bivalence obviously represents an idealization to which ordinary discourse can only approximate.

While formalization does entail certain idealizations, a good idealization of our deductive inference practices should represent, on the whole, at least some of the deductive principles of informal reasoning that are amenable to regimentation. Because deductive arguments are judged according to standards of validity, judgments about the validity or invalidity of arguments within a formal system should more or less correspond

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[27] The degree of distortion created by construing "If...then" as the material conditional leads to a divergence between judgments concerning the truth of conditionals in a natural language and their representation in the formal system, and so understanding the indicative conditional as a material conditional is considered unacceptable to many, myself included.

[28] As a philosophical concept, 'vagueness' has evolved into a term of art that pertains to cases of blurred boundaries as opposed to other phenomena that may be covered by the colloquial use of the term such as lack of specificity as in 'He is between three and seven feet tall', or ambiguity as exemplified by expressions such as 'She went to the bank', where 'bank' might refer either to the edge of a river or a financial institution.

to judgments about the informal arguments that the formal arguments may be taken to represent. The correspondence may not be exact because either the argument may be such that it cannot be translated perspicuously into the formal language or there may be disagreement about how the argument should be regimented. Moreover, while the formal rules should conform to our intuitive judgments of validity, it has been observed that the study of deductive rules through formalization might also cause us to revise some of our intuitive judgments.[29]

I have said that one aim of a formal logic system is to facilitate the study of principles of deduction, and that the standard for evaluation of deductive arguments is validity. If a formal system is to reflect our intuitive judgments of validity, the definition of validity in a formal system should represent our understanding of that concept prior to formalization. I take our metalogical notion of deductive validity to involve something like the joint claims that (1) an argument is valid just in case it is impossible for its premises to be true and its conclusion false and (2) its conclusion follows necessarily from its premises in virtue of their logical form.

Informally, a valid argument is sometimes defined simply as one where it is impossible for the premises to be true and the conclusion false. However, this definition fails to give us *logical* validity as may be seen from the following examples:

(a) Roses are red.
∴ Roses are colored.

(b) Water is wet.
∴ H_2O is wet.

These arguments might be considered valid in a some general sense, but as they stand, they should not count as *logically* valid because the conclusions do not follow from the premises in virtue of a relation that is determined by the form of the respective

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[29] This is Goodman's principle of reflective equilibrium, which is articulated in Goodman (1979/1983) as follows: "A rule is amended if it yields an inference we are unwilling to accept; an inference is rejected if it violates a rules we are unwilling to amend." (p. 64)

sentences.[30] In order to capture this formal relation, we must distinguish between the logical and nonlogical terms of a language. Then, for an argument to be valid, the conclusion must be such that it holds true for all interpretations of the non-logical constants.[31] Our intuitive notion of validity can be said to embody both semantic and syntactic elements: The semantic element of validity is expressed by the informally-specified truth conditions for a valid argument, and the syntactic element is captured by the idea of "following from" implicit in the requirement that the conclusion *must* be true if the premises are as well as the requirement that this relation hold in virtue of the logical form of the sentences involved.

In a formal system, the semantic component of validity is given by the standard definition for logical consequence whereby B is a logical consequence of Γ if B is true in every model in which all the members of Γ are true.[32] The syntactic elements are captured by the designation of certain terms as logical constants and by the rules that determine the derivability of formulas in the system. Validity in a first-order logical system may be characterized either proof-theoretically, in terms of the derivability of formulas, or model-theoretically because the extensions of the two methods of

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[30] These standard examples are discussed in Hanson's (1997) examination of the informal concept of logical consequence. The general point is also made in some elementary logic texts, e.g. Fogelin and Sinnott-Armstrong (1997), whose authors see fit to discuss the issue.

[31] Hanson (ibid.) notes that the formal requirement is sometimes given as the requirement that no substitution of nonlogical terms for nonlogical terms produces true premises and a false conclusion. Sometimes, the formal condition alone is offered as a definition of validity. (See, for example, Quine 1935 and 1970B/86.) The shortcomings of both versions of the formal requirement, taken as a complete definition of validity, are well-known and are exhibited by the following argument:

$$\frac{\exists x)\,(\exists y)\; x \neq y}{\therefore\ (\exists x)(\exists y)(\exists z)\;(x \neq y\ \&\ y \neq z\ \&\ x \neq z)}$$

Intuitively, the argument should not count as valid. But the strictly substitutional or interpretational account of validity must classify the argument as valid because the premise and conclusion are both true and they contain only logical terms. See also Hinman, Kim and Stich (1968) for discussion of this issue.

[32] The canonical account is found in Tarski (1936/56).

characterization coincide: a soundness proof for the system ensures that what is provable in L is true in all models, while completeness proofs demonstrate that every formula in the system that is true in all models can be proved. On the plausible assumption that the semantic and syntactic aspects of our informal notion of validity are adequately captured, respectively, by the model- and proof-theoretic concepts employed in the formal system, our informal notion of validity is fully represented by the system.[33]

Sometimes, one of the ways of characterizing our metalogical concept of validity, either the semantic notion or the proof-theoretic notion, is privileged over the other. However, I think that both are needed to give an adequate account of validity: our interest in the derivability relation is that it is truth-preserving, but the semantic account fails to pick out logical relations unless some terms are identified as logical constants. Furthermore, our informal judgments of validity rely on both the proof-theoretic and semantic notions, and in practice, both are employed in argumentation. In order to refute an argument, we often attempt to produce a counterexample that demonstrates how an argument with the same form could have true premises and a false conclusion. On the other hand, the syntactic concept is the one employed when giving a proof or demonstration whereby a deductive chain of reasoning leads us to a particular conclusion.

II. The Extension Problem: What Logical Principles Can We Know A Priori?

I will take as my starting point the view that we have what seems to be a priori knowledge of elementary principles that are represented in classical logic, where 'a priori' is understood to include the empirical indefeasibility requirement (except insofar as knowledge claims need to allow for defeasibility in the purely epistemic sense

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[33] Kriesel (1967) argues for the adequacy of the standard model-theoretic definition of logical consequence via the completeness theorem as an account of our metalogical notion of logical consequence for first-order systems, but notes that his argument does not apply to systems for which there are no complete proof procedures. Kriesel's arguments are discussed in Field (1991) and Hanson (1997).

discussed in the previous chapter). However, there is disagreement about *which* principles we may know a priori, i.e., which principles of logic are valid. This is a separate issue from whether the justification that we offer for adherence to those principles that we do accept is a priori. An advocate of an alternative logic may disagree with the classical logician about which principles of logic are valid, but still take the position that her alternative logic is a priori justified.[34] I will speak of non-classical logics as "alternatives" or "challengers" because they are less widely accepted than classical logic. Because my topic is the epistemology of logic, I want to focus on the nature of our justification for our logical beliefs rather than attempting to adjudicate metaphysical disputes concerning which, if any, of the various, competing logics that have been proposed as alternatives to classical logic may be correct. I will state my reasons for adhering (with certain qualifications) to classical logic; however, it would take me too far astray from my purposes to argue against all reasonably-well-motivated alternatives. Consequently, I propose to modify my claim somewhat to accommodate certain differences of opinion about what might be included in the extension of the first-order logic of which I want to claim we have a priori knowledge. However, before I address the issue of alternative logics, I want to say something more about what is included and what is excluded in my general claim.

By 'classical logic' I mean first-order predicate logic with identity. In addition to the elementary principles of first-order classical logic, I want to include the metalogical concepts of consistency and exclusivity as being within the scope of our logical knowledge. I am concentrating on "elementary" principles because I think that they are more likely to be utilized or observed in informal reasoning than some of the more complex principles that can be derived from them. I am restricting my discussion to first-order logic in order to avoid the various controversies and complications of set theory. I

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[34] The non-classical logician may also hold that logic is a priori justified, but empirically defeasible, or that all of logic is in some sense empirical. But if the reasons given for the divergence with classical logic are empirical, then the logic should count as an empirical challenge to classical logic, and so would be a direct challenge to my claim.

also want to restrict discussion to classical logic as opposed to extensions of classical logic such as modal logics that employ additional logical vocabulary. Whether the concepts employed in such extensions can be made sufficiently precise is a topic of dispute, and there is disagreement over how some of these logics should be axiomatized. And while there may be expressions other than the ones employed in classical logic that are suitably general and topic neutral for study, it is at least generally agreed that the constants of first-order classical logic meet these conditions if anything does.[35]

In stating that we have a priori knowledge of principles of first-order logic, I intend my claim to extend to first-order logic only insofar as it is freed of existential commitment. While quantifiers are thought of as ranging over non-empty domains, obviously what materially exists, and so may or may not be eligible for inclusion in the domain, is not an a priori matter. I do not mean to prejudge the issue of a substitutional vs. objectual interpretation of quantifiers by this observation; I only wish to exclude statements about what exists that would clearly depend on empirical investigation from any a priori claims. Two further caveats are needed: First, to the extent that some subset of classical logic fails to adequately represent our (idealized) reasoning practices, we may judge it to be epistemologically unsound, and so exclude it from any knowledge claims. It is widely acknowledged that the material conditional has major shortcomings, and I do wish to exclude the paradoxes of the material conditional, e.g., $p \rightarrow (q \rightarrow p)$, $p \rightarrow (\neg p \rightarrow q)$ and $(p \rightarrow q) \vee (q \rightarrow p)$, from any knowledge claims. I do not propose to offer an alternative to the material conditional – providing an analysis of conditionals is notoriously difficult – although I will say that I consider conditional statements to be factual as opposed to non-factual, and so inferences involving them may be truth-evaluable. But in any event, I do

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[35] Ryle (1954) discusses topic neutrality as a criterion for the selection of an expression for treatment as a logical constant, but notes that expressions not typically included for study in a formal system such as '>' or '<' also meet the condition. My own view is that much of what can be said about our knowledge of elementary logic extends to propositions containing some of the other topic-neutral concepts as well, but I will restrict my discussion to what are commonly accepted as the logical constants.

not want to claim that the paradoxes generated by the material conditional are principles that we should endorse. As I have already mentioned, objections have been raised to the formal treatment of the other logical connectives, but none that I find serious enough to constitute general grounds for disqualification.

The second caveat is that in defending classical logic, I am assuming that the sentences that are to be represented by the logical schemata are taken to be bivalent. The threat posed by sentences with vague predicates to the law of excluded middle and the sorites paradoxes suggest that classical logic may not be straightforwardly and fully applicable to a vague language, or at least that a non-standard semantics for classical logic would be required to handle vague terms.[36] So unless vagueness is to be accounted for in terms of our ignorance of where the boundaries for precision lie, a satisfactory logic and/or semantics for vagueness may be non-classical.[37]

In making the idealization to bivalence, I am not suggesting that natural languages ought to be made precise, but rather that the presumption of bivalence is needed if principles of classical logic are to apply straightforwardly to the sentences of a language. It might be objected that natural languages are ineradicably vague, and because vagueness is so widespread, the idealization of bivalence precludes us from coming to learn about the logical relations between the propositions that we actually believe most of the time.[38] To this I would reply that as a pragmatic matter, we often

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[36] Vagueness is typically understood to be a linguistic phenomenon, although some philosophers take the view that reality itself might be vague, which is to say that objects, properties or states of affairs themselves might be vague independently of the ways in which we describe them. However, the coherency of this view has been challenged. Cf. Evans (1978), Lewis (1988) and Parsons and Woodruff (1995).

[37] Multi-valued and infinite-valued logics have been proposed that alter the classical deducibility relations, and while supervaluationist systems aim to preserve classical reasoning principles, they adopt a non-standard semantics. For example, the addition of a "definitely" operator in a supervaluationist system permits a disjunction to be true when neither disjunct is.

[38] The objection is raised by Machina (1976).

reason about propositions that we believe on the assumption that they are either true or false, and the conclusions that we draw, if they are valid, reflect what must follow from our assumptions. It is difficult to say what the logical relations are between vague propositions because there are a variety of competing, alternative systems to account for these relations, and it is unclear which, if any of them, are correct. However, systems designed to handle vagueness would appear to rely on classical logic: a supervaluationist approach aims to preserve classical reasoning, and it is questionable whether an alternative logic for vagueness can make do without assuming classical logic in the metalanguage; so while the study of relations between vague propositions may well be worthwhile, it may require (at least some) classical logic.

Another objection to the bivalence assumption might be that one cannot separate the vague from the non-vague terms in a language, and so everything will need to be treated as if it were potentially vague. While I concede that we cannot neatly divide the vague from the non-vague terms, we do claim that some sentences are clearly true or false, and we may examine logical relations between sentences on the assumption that they do have determinate truth values. Moreover, systems designed to handle vagueness that employ a non-standard semantics need to make the vague/non-vague distinction. For a supervaluationist system, one needs to know both what should count as an admissible precisification of a vague term in order to supervaluate and when a sentence is to be considered true or false without precisification. Likewise, infinite-valued and multi-valued logics assume that there is a means of determining when a sentence should be assigned an intermediate, non-classical truth value and when it takes a value of true or false. Unless one adopts the position that nothing can ever take the value true or false, some distinction between vague and non-vague terms will need to be made – even if it is only a pragmatic one.

The topic of vagueness is large and complex. To what extent classical principles may apply to sentences that contain vague predicates, I do not know; but my claims for the principles of classical logic are to be understood as applying to sentences on the

assumption that they are true or false, not something in between. In the discussion to follow, I will not consider alternative logics designed to handle problems of vagueness because I concede the point that some revision of classical reasoning and/or classical semantics may be needed to accommodate vague terms.

III. Challenges to Classical Logic

A. Conditions for Revision

While I will want to claim that we have a priori knowledge of most of the principles of classical logic (under the idealization assumptions just discussed), nearly every elementary principle of classical logic has been challenged in one way or another. Of course, the mere fact that a principle has been challenged does not mean that the challenge should be taken seriously. In order to evaluate the merits of a challenge to classical logic, one must consider what a revision of logic should be understood to mean and what the conditions for the acceptance of a proposed revision would be. I will make use of two very useful distinctions articulated by Susan Haack in her discussion of alternative logics. (Haack 1974, pp. 3-6) The first distinction is between a rival to and an extension of classical logic. If a logical system purports to embody those principles to which our reasoning in general should conform, and that same system is incompatible with at least part of classical logic; then it is a *rival*. By contrast, some logics include all of the theorems and valid inferences of classical logic but also include additional vocabulary for which new theorems pertaining only to the extended vocabulary have been generated. Such logics may be regarded as *extensions* or, more precisely, conservative extensions, of classical logic rather than rivals. Conservative extensions do not pose a revisionist challenge to the underlying logic that they extend.

The second distinction is between a local and a global revision of logic. A *local* revision of logic is a revision that is intended to apply only to some specific subject matter and not to others. An example of local revision would be intuitionist logic as is was originally proposed to apply only to mathematics. By contrast, a *global* revision is

intended to apply to "across the board" to all subjects, which is to say, the alternative logic is being proposed as an all-purpose logic.

It is often observed that logic is characterized by its topic neutrality, which suggests that proposals for revising classical logic should be taken to be global – unless the proposal pertains to a subject matter that can properly be understood to lie outside the scope of classical logic. If one were to challenge the topic neutrality requirement, one might take the view that different logics are suitable for different purposes, and which logic we choose may depend on the subject matter. In the case where first-order, predicate logic is being extended or an alternative logic is being proposed for a subject that, for special reasons, should legitimately be understood to fall outside the scope of classical logic, this view might be unproblematic. But if the alternative logics are intended to apply to subject matters that don't enjoy this special status, it is hard to see in virtue of what the different "logics" could be said to be *logics*. Perhaps it would be that the logics would share some principles and logical connectives, although the connectives would be interpreted differently, depending on the logic. But the connectives attain their meaning in the first place from their analogs in a natural language, and the selection of certain words in a natural language as logical connectives was presumably made on the basis of their generality of application as well as their amenability to precisification. It would be peculiar to think that words such as 'and', 'or' and the like should change their meaning depending on the subject matter. Moreover, there is a question as to how we would determine which logic should be applicable to a given area. Presumably, we would have to use some logical principles in reasoning about which logic to choose. If we use logical principles in reasoning about a logic for a given subject, we are committed to endorsing those principles that we use; to then disallow their applicability in some range of discourse on the grounds that some other logic is more suitable to the topic would be disingenuous. So I am inclined to think that topic neutrality should be preserved. The challenges to classical logic that I will take most seriously, then, will be alternative logics that are advanced as global revisions; however, some attention will be

paid to logics advocated as local revisions. I will refer to alternative logics that are advanced as global revisions as 'genuine rivals'.

In determining whether or not to adopt a rival logic, the following considerations would need to be met:

1. The alternative logic must be well-motivated. The revision should be proposed in order to solve a problem of significant proportion and for which no less radical solution can be found that would be acceptable.

2. The alternative logic proposed must provide a satisfactory solution to the problem. The alternative logic should solve the problem for which it was designed, and for the solution to be satisfactory, it should not create problems that are as incontrovertible as those it was designed to solve.

3. The logic must be sufficiently specified such that it can be used. A logic that is so underspecified that it could not be employed would not have much to recommend it as a rival to classical logic. An advocate of change should say either how we are to get along without rejected logical principles, even when the principles may appear to be needed or desirable to use, or she must specify the special conditions for which the rejected principles hold, even though they do not hold true in general.

4. The proposed reform should be global. To reiterate the point just made, logic is supposed to be topic neutral. Logic purportedly tells us which argument forms are valid, so the rules of logic should be applicable universally and independently of the subject matter of the arguments. If this is right, then for an alternative logic to be a genuine rival to classical logic, the envisioned revision must be global.

B. Types of Challenges

Keeping the aforegoing in mind, I want to consider what challenges to classical logic might need to be given serious consideration. One type of challenge that I propose to ignore is any challenge that arises out of a paradox without an accompanying proposal as to how our logic might be revised to accommodate the exclusion of the allegedly responsible principle. Consider a version of the sorites paradox whereby it can be shown

that iterations of modus ponens take us from the claim that n grains of sand do not constitute a heap to the claim that for some very large n_k, n_k grains of sand do not constitute a heap. Some have attacked the rule of modus ponens as the culprit. But without a proposal for how we might get along without modus ponens, the challenge is simply ad hoc. Unless a challenger is prepared to specify an alternative logic system that makes do without the maligned principle, I see no reason to take the challenge seriously.

i) Special-Purpose Logics

A second type of challenge is found in those revisions that are claimed to hold only for a specific subject matter or area of discourse. It would seem that the advocate of an alternative logic in this instance should be understood in one of two ways: either (1) the claim that logic is topic neutral is being challenged or (2) there is something peculiar to the subject matter in question such that it requires a non-classical logic, but classical logic holds generally. If one wants to uphold the principle that logic is topic neutral, special-purpose logics are instances of (2), where it is claimed that there may be something unique about some particular area of discourse such that the principles of classical logic do not apply to that area. I would like to suggest that the reason classical logic may not apply in such cases is that the subject matter in question may best be thought of as lying outside what we would typically understand as the scope of logic. The alternative logic would then represent an extension of logic to a domain that might, for legitimate reasons, be considered ill-suited to logical treatment. But if topic neutrality is upheld, and if it is *not* the case that the failure of classical logic to apply can be explained away by considerations of scope, then the failure of a logical principle to apply to a specific area constitutes a counterexample to one or more logical principles, and so it should be taken as a failure of the principle to apply generally.

Intuitionist logics, insofar as they were originally advocated to apply only to mathematics, are examples of special-purpose logics.[39] For an intuitionist, mathematical

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[39] The intuitionist logics proposed by Brouwer (1952) and Heyting (1966) were advocated for this purpose.

statements are to be understood as mental constructions of a certain kind, and a claim that asserts the existence of some number with a given property is equivalent to a claim that there is a method of construction for it. If it is not true either that there is a method of construction or that it is known that there cannot be a construction for some number with a given property F, then the statement 'x has F' is neither true nor false, so the law of excluded middle fails. But if this is how numbers are construed, then the failure of the law of excluded middle in a case like this is not surprising: we cannot say what is or is not true of something if its existence depends upon our having a method of construction for it, and it is unknown whether we could have such a method of construction. What is surprising to anyone who does not share the intuitionist's view of numbers is that mathematical statements should be characterized in this way. If this is right, then intuitionism as a special-purpose logic could be understood as an attempt to provide a theory about certain entities, numbers, that exist only if there is a method of construction for them, and for which statements about them are required to be established by proof before such statements can be understood to have a determinate truth value.

Some early advocates of quantum logic also intended it to be understood as a special-purpose logic, applicable only to the microphysical domain. Thus understood, quantum logic is a special-purpose logic applicable only to a unique subject matter for which it is required. But if the failure of the distributive law (in one direction) is really a claim about *logic*, not just physics, and logic is held to be topic neutral, then it hard to see why the logic that is applicable to physics would not count as our most broad-based and general logic, given that physics is generally understood to be our most basic science. A more plausible understanding of quantum logic, on my view, is that it should be taken by its advocates to be our universal logic, but that some explanation is to be given – perhaps by specifying certain bridge laws – of why we can reason classically about macroscopic phenomena.

ii) Genuine Rivals

While the cases that I have described thusfar do not challenge classical logic as our all-purpose logic, there are alternative formal systems that do. Rival systems include paraconsistent logics; relevant logics; and when they are advocated as general, all-purpose logics, intuitionist and quantum logics. The key question with respect to my claim concerning the a priori status of logic is whether any of the alternatives proposed are *empirical* alternatives to classical logic. If the reasons given in favor of adopting an alternative logic are not based on empirical considerations, then the logic in question, whatever its merits, does not challenge claims of a priority. Although I do not find any of the proposed alternative logics persuasive for adoption as a general-purpose logic, it will not matter to the overall structure of my argument if *non-empirical* revisions to classical logic are admitted. My concern is with the kind of justification that can be given for logical claims, generally, not with the merits of specific arguments in favor of one logic or another, so long as the justifications for these arguments are of the same general type, i.e., a priori. I will mention my reasons for finding some of the rivals to classical logic unsatisfactory; a serious investigation of the arguments for and against them, however, would lie outside the scope of this dissertation. Therefore, my general strategy will be to accommodate adherents to alternative logics that do not challenge classical logic on empirical grounds by amending my original claim as follows:

> We have a priori knowledge of the elementary principles and inference rules of either classical logic (excluding certain paradoxes of the material conditional) or some subset of classical logic as may be specified by an alternative logic that does not challenge classical logic on empirical grounds.

I do not know if paraconsistent logics represent empirical or non-empirical challenges to classical logic, but I am not inclined to adopt any one of them over classical logic for present purposes because, while, in some respects, I am sympathetic to the denial that anything follows from a contradiction, formalizations of paraconsistent logics create distortion with respect to other inference rules; so I find it more conservative to

adhere to classical logic while excluding those anomalous principles resulting from formalization that fail to adequately capture our idealized reasoning practices.[40]

There are various formulations of paraconsistent logics, but what makes them paraconsistent is that they block explosive negation. That is, for some set of statements Γ that is closed under logical consequence, $\{A, \sim A\} \subseteq \Gamma$ but it is not the case that for all B, $B \in \Gamma$. One motivation for paraconsistency is the denial that anything follows from a contradiction. More radically, some paraconsistent logicians (notoriously Graham Priest) accept dialetheism, which is the theory that some contradictions are true.[41] Examples of "true" contradictions that are sometimes cited are the paradoxes of naive set theory and naive semantic theory. The peculiarities of cases of self-reference not withstanding, it is hard to see why one should accept a contradiction as true, so I do not accept the exclusion of the law of non-contradiction from the set of logical principles that we claim to know on the grounds that there is no coherent *thought* that p and not p.

Some, but not all, relevance logics are paraconsistent; however, their advocates may be motivated by a broader concern for relevance. Relevance logicians such as Alan Anderson and Nuel Belnap object to the paradoxes of material implication, where 'implication' is understood to be the deducibility relation. For the relevance logician, in order to legitimately derive B from A, A must be relevant to B such that the proof genuinely "uses" A to arrive at B. Belnap and Anderson (1960) construct an axiomatic system that analyzes the notion of relevance syntactically by requiring B to be "contained" in A if A is to be relevant to B. Further restrictions are added to ensure that the deducibility relation is also one of entailment. However, if the relevance relation is analyzed syntactically, our recognition that the relevance relation obtains in a given case

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[40] Paraconsistent logics may not be without interest, however. One could accept paraconsistent systems as special-purpose logics applicable to inconsistent theories. They might also be applicable to an analysis of vagueness that allows for "truth-value gluts," whereby propositions containing vague terms are said to be both true and false.

[41] See, for example, Priest (1979, 1987, 1989, 1998).

does not require empirical investigation, and so relevance logics of this type do not represent empirical challenges to classical logic.[42]

Intuitionism is one of the more familiar alternatives to classical logic. One motivation for the adoption of intuitionist logic as our basic logic is anti-realism, and one of the best known proponents of intuitionist logic for these reasons is Michael Dummett.[43] According to Dummett, an anti-realist of a verificationist or a constructivist bent has reason to reject bivalence, and with it, the law of excluded middle ("LEM") because whether something exists is not independent of our means of knowing that it exists. On Dummett's view, while the realist claims that a statement can be true independently of our knowledge of its truth, the anti-realist identifies truth with our means of verification. A sentence may be neither true nor false if we do not have an effectively-decidable procedure for justifying its assertion or denial. As a result, the principle of bivalence, as well as LEM (and equivalently, in intuitionist logic, the law of double negation), fail to hold generally under anti-realist assumptions because if the truth of a statement consists in our knowledge of the means of its verification, there is no ground for assuming that every statement is true or false.

A very different set of considerations in favor of taking the universal laws of logic to be those specified by intuitionist logic can be found in Koslow's work on structuralist logic. Koslow gives an account of the logical operators that does not require them to range over sentential items, but instead explains them in terms of implication relations on non-empty sets. Koslow gives necessary and sufficient conditions for the implication

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[42] Anderson and Belnap (1962). The authors have been criticized for objecting to the use of disjunctive syllogism in the following proof whereby an arbitrary B can be derived from a contradiction: A & ~A. A. A v B. ~A. ∴ B. Their objection is that the rule of addition is permitted via the truth-functional analysis of 'or', but to conclude B from A v B and ~A requires A and B to be relevant to each other, which in turn, requires 'or' to be understood "intensionally." However, once A v B is *available* in the proof, it, in conjunction with ~A, certainly appears to be relevant to concluding B. One might also be skeptical about the prospects for formalizing the concept of relevance in terms of syntax as well as the need for relevance as a further condition on the deducibility relation.

[43] Dummett (1977, 1978, 1991).

relation, and then proceeds to define the logical operators individually as particular types of implication relations, specified by their introduction and elimination rules as they might be standardly understood in the style of Gerhard Gentzen.[44] The intro/elim rules for negation for a system of intuitionist logic are, respectively:

$\neg$I: $(\Gamma \cup \{A\} \vdash B), (\Gamma \cup \{A\} \vdash \neg B) \vdash (\Gamma \vdash \neg A)$
$\neg$E: $A, \neg A \vdash \perp$.

The rule of double negation, $\neg\neg A \vdash A$, must be added to the intro/elim rules if negation is to behave classically. The analogous negation operators in Koslow's system are such that intuitionist negation holds for all structures where negation is (intuitionistically) defined, but classical negation holds for only a subset of those structures. The rules and principles that are found to hold for all structures, then, are just those licensed by intuitionist logic.

That there are two such disparate arguments for taking intuitionist logic to be our most basic, universal logic as can be found in Dummett and Koslow is not without interest. However, for one who is a realist, at least in the sense of believing that a proposition could be true or false independently of our knowledge of its truth or falsity, Dummett's defense of intuitionism based on considerations of anti-realism will not be persuasive. Koslow's structuralist logic is harder to assess: Should the rule of double negation be included in the definition of the negation operator? If the members of the implicational structures (the sets with implication relations defined on them) are sentences of a language, the answer to this question depends on whether or not LEM should be understood to hold for the structure. This, in turn, depends on whether the truth operator is Tarskian, i.e. the analog for Convention T in Koslow's system, $T(A) \dashv\vdash A$, holds for all A in an implicational structure, and whether the principle of bivalence

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[44] Gentzen (1933, 1934). Koslow refers to this general account of the operators as the Gentzen-Hertz account, acknowledging the contribution by Gentzen's teacher, P. Hertz.

holds.[45] In Koslow's system, if bivalence fails, LEM will hold only if the truth operator is a modal operator. Yet these considerations are similar to those of the classical logician vis-a-vis vague predicates,[46] and if bivalence is assumed, Koslow is not in any disagreement with the classical logician. But in any event, neither Dummett's anti-realism nor Koslow's conclusions based on an examination of abstract sets represent an empirical challenge to classical logic.

So, while I will adhere to classical logic, with the exceptions noted for the material conditional, the advocate of a logic that does not challenge classical logic on empirical grounds is free to interpret my claims concerning the a priority of logic as pertaining to their chosen logic.

C. Empirical Revision

While the alternative logics that I have been discussing do not purport to be empirical alternatives to classical logics, other logics have been advanced as revisions based on empirical evidence. In particular, quantum logic has been advocated in response to certain anomalies of quantum mechanics such as the impossibility of the simultaneous measurement of both the position and momentum of a particle: while a measurement of some magnitude m_1 may be correlated with some range of values for another magnitude m_2, no single value for m_2 can be correlated with the measurement for m_1. Quantum logic aims to solve the problem of the anomalies through a revision of logic whereby the laws of physics are preserved but the anomalies will not arise.

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[45] Koslow (1992), Ch. 33. '$\leftrightarrow$' is to be understood as an implication relation in both directions, as it is defined for Koslow's system. It is not to be read as a biconditional for strict implication.

[46] In a supervaluationist system, where bivalence is not assumed but LEM is preserved, truth is understood to be truth on all admissible valuations (supertruth), and this notion of truth is modal.

More than one quantum logic has been proposed,[47] yet the logic that is most widely understood to be quantum logic is a system pioneered by Birkhoff and von Neumann (1936) that rejects the distributive law. Putnam (1968) argues that this logic will successfully eliminate the anomalies of quantum mechanics, including various formulations of the measurement problem and the results of the "two-slit" experiment, because the distributive law is needed to derive them. The general strategy employed by Birkhoff and von Neumann is to correlate the logical constants 'and', 'or' and 'not' with the lattice-theoretical operations of 'meet', 'join' and 'orthocomplementation', respectively, and the relation of set inclusion is understood as corresponding to implication. In a lattice that represents a quantum system, the sets are sets of propositions corresponding to subspaces of a Hilbert space, where the subspaces are understood as representing possible measurements. The resulting calculus preserves the usual axioms and theorems governing the constants, including LEM and double negation, but the distributive laws are said to fail because for some sentences a, b, and c, while a & (b v c) may correspond to a nontrivial subspace, the subspaces corresponding to both (a & b) and (b & c) may be trivial. (The distributive law in the other direction, (a & b) v (a & c) $\vdash$ a & (b v c), does hold, however.) Quantum logic allegedly solves the paradoxes of quantum mechanics because the failure of the distributive law precludes the paradoxes from being formulated. We are free to invoke the distributive law when describing macroscopic events because "classical logic is approximately valid 'in the large' just as Euclidean geometry is approximately accurate 'in the small'." (Putnam (1968) p. 184)

I find this proposal unsatisfactory for several reasons: First, Putnam claims that the distributive law is needed to formulate the anomalies, but it has been argued that the anomalies can be derived without illicit use of the distributive laws,[48] and one would at

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[47] For example, Reichenbach (1944) proposed a three-valued logic, but it failed to meet its desiderata.

[48] See, for example, Gibbins (1987), pp. 147-49. Gibbins argues that if quantum logic preserves the logical ordering of propositions, one can derive anomalous statements without any illicit use of the distributive laws.

least suspect that if the distributive law in one direction could be identified as the source of all of the paradoxes of quantum mechanics, quantum logic would have received far more attention from the physics community than it has. Second, quantum logic claims to retain the definitions of the classical operators, but no two-valued, truth-functional analysis of the operators can be given for quantum logic.[49] However, if the connectives of quantum logic differ from the connectives of classical logic with respect to their truth conditions, then it is arguable that they differ in meaning. But if the logical connectives differ in meaning, then it is unclear whether quantum logic conflicts with classical logic or whether it is a special-purpose logic in which new constants that obey only some of the classical laws have been introduced. (On the other hand, there *would* be a conflict if the connectives of quantum logic differ in meaning from those of classical logic, and classical logic is then judged to be inapplicable.) Third, it has been observed that quantum logic postulates a mysterious cut between the physical microworld and macro phenomena. The quantum logician wants to respect classical logic for macroscopic events, but it is unclear just where classical logic is supposed to take effect. Finally, quantum logic is not explanatory. Adopting the quantum logic proposed would not give us any kind of satisfying explanation of the anomalies that it allegedly handles. Quantum logic does not provide an illuminating resolution of the paradoxes of quantum mechanics, but merely restates them as paradoxes of logic.

However, even if quantum logic is not convincing, it does seem to be the kind of challenge that should count as empirical. But, in general, what should count as an empirical challenge?

This issue is somewhat complicated. Some challenges that may be said to be brought empirically may be such that they could equally well have been anticipated

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[49] See Hellman (1981), Dummett (1976), and Bostock (1990). Hellman gives a proof that if quantum logic is truth preserving (i.e., for any subspaces, M, N, if $M \leq N$, and M is assigned true, then N is also assigned true) and negation is truth functional, then 'or' cannot be truth-functional because it can be shown that on these assumptions, disjunctions can be derived on the structure that are true when both disjuncts are false.

through reflection alone. It may be open to the a priorist to argue, in a given case, that the empirical evidence given in support of a proposed revision acts only as a catalyst for the development of the revision, but that the possibility for revision first could have been recognized on purely conceptual grounds and independently of the evidence. While the impetus for the revision might be empirical, the *revision* itself would be a conceptual matter, and so the conceptual possibility of revision could have been recognized prior to the discovery of the empirical evidence.[50]

An illustration of the difficulty in determining whether a revision is empirical or conceptual might be provided by considering the question of ontic vagueness, that is to say, the question of whether reality itself – not just our representations of reality – could be vague. Suppose that the notion of ontic vagueness is a coherent one (I am not saying that it is or it isn't), and suppose further that we have established what should count as a genuine case of ontic vagueness. If it were discovered that there is vagueness in the world, one could argue that logic should be revised in light of this empirical discovery. But the ways in which logic might need to be revised in response to the discovery of vagueness in the world are already recognized. That a statement could be indeterminate in truth value because what it asserts is vague is a recognized possibility, regardless of whether the source of vagueness is ontic or linguistic. The need for a revision of logic to accommodate vagueness is already recognized as a conceptual possibility, so whether a revision to logic based on the discovery of vague objects in this imagined example should count as empirical is not a straightforward matter.

Still, explaining away all possible empirical challenges to logic as triggers for previously unacknowledged conceptual ones does seem to be something of a cheat. And it does seem that if anything should count as an empirical revision, revisions such as those based on quantum phenomena should. I don't think that a distinction between an

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[50] This possibility is emphasized by Field (1996, 1998) and Rey (1998). It is interesting to note that alternatives to Euclidean geometries were developed prior to the discovery of the Theory of General Relativity.

empirical vs. a conceptual revision can always be clearly drawn, but perhaps it may be of some help to consider the reasons offered in favor of the acceptance of an alternative logic. Even if a revision of logic prompted by empirical considerations would be a conceptual matter, if the preponderance of our *reasons for adopting* the revised logic were largely empirical, then perhaps the revision ought to count as empirical. This does not give us a decisive criterion for determining whether a revision should count as empirical, but the a priorist should not dismiss the possibility of empirical revision out of hand merely because the construction of the revised logic would be a conceptual matter.

CHAPTER THREE

COULD LOGIC BE EMPIRICAL?

I. Motivations for an Empirical Account of Logic

Contemporary philosophers have found reason to object to the idea of a priori knowledge because it is sometimes seen to be incompatible with naturalism. 'Naturalism' is not a univocal term, but I think that it is most commonly thought of as the view that only natural properties and things exist, where what is 'natural' is typically understood to mean spatio-temporal objects and processes insofar as they might be explained by science. For a naturalist, our knowledge should be explicable as a phenomenon in the natural world because human beings are part of nature. For some naturalistically-minded philosophers, the demand that human knowledge be understood as part of the natural order is reason to reject the possibility of a priori justification outright because it is hard to see how and by what means we could have knowledge of what must be true in the world prior to investigation. Such philosophers will take the view that all knowledge must be empirical.[51]

In order to understand the alleged incompatibility of naturalism with a priori methods of justification, we need to consider what a commitment to naturalism might entail. There are many varieties of naturalism, and naturalism is applicable in different ways to different domains such as metaphysics, epistemology and ethics.[52] I will focus

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[51] I will not be discussing psychological behaviorism or verificationist theories of meaning separately as motivations for empiricism because both seem to be motivated by naturalistic concerns, so I view them as falling under the rubric of naturalism.

[52] Various different types of naturalism are discussed in Audi (2000), Goldman (1999, 1994) and Stroud (1996). I will be discussing forms of naturalism that pertain specifically to epistemology later on in Chapter Six. These include the project of "naturalizing" epistemology, which may be understood either as an attempt to reduce justification to non-normative notions or reduce and reclassify epistemology itself as a

on those aspects of naturalism that would likely be understood to lend support to empiricism.

The thesis that what exists is natural strongly suggests an ontological commitment to some form of physicalism, although the physicalism involved need not be reductive but may allow for the non-reductive supervenience of higher-order properties on physical base properties. The view is also associated with a commitment to the causal closure of physics, which is the denial of the possibility of non-physical causal agents: the causes of physical events are physical. Yet these ontological commitments in and of themselves do not entail empiricism because a view about what sorts of properties exist is logically independent of what concepts or justified beliefs we might have.[53] The traditional subject matter of the a priori, e.g. logic and mathematics, has often been understood to be Platonic, and if the admission of a priori knowledge or justification is understood to entail a commitment to Platonic entities, then it would be ruled out by a naturalistic metaphysics. But accepting a priori methods of justification need not entail a commitment to either propositions, understood Platonically, as the truth makers of statements of logical principles or to Platonic entities as the referents of numbers. If the a priori/a posteriori distinction is understood to be simply a distinction pertaining to justification, then the ontological commitments of naturalism are not obviously in conflict with the admission of a priori knowledge. Empiricism does not follow from naturalism, if the latter is understood simply as a metaphysical thesis; something more is needed.

Empiricism enters the picture when the methodological commitments of the naturalistic view are considered. The methods that tell us about spatio-temporal processes and bodies are the methods of science, and scientific method is typically

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branch of science. These naturalization projects are not projects that I support. I will eventually be giving an account of a priori justification that is naturalistic in the sense that it is compatible with the ontological commitments of the naturalistic view here described.

[53] This point is emphasized by Audi, ibid, p. 40.

characterized as empirical. Ratiocination alone cannot tell us about the nature and structure of physical entities and events if they are matters to be investigated empirically. Consequently, a naturalist will want to reject first principles that make excessive metaphysical claims about what must be true of the nature of the universe in advance of scientific investigation, and as a result, she may embrace a thorough-going empiricism. However, a naturalistically-minded defender of a priori justification will also want to reject such first principles; where the a priorist and empiricist disagree is with respect to whether the methodological commitments of science preclude any form of a priori justification or knowledge. The empiricist takes the commitment to scientific method to be incompatible with the acceptance of a priori means of justification. But a commitment to the empirical methods of science rules out a priori justification only if the methods of science do not involve any a priori elements, and I will argue that a priori-justified elements are an integral part of scientific method.

However, if knowledge of traditional a priori subject matters such as mathematics and logic is real knowledge, then what is said to be known must be objectively true or "true in the world." To say that we know certain propositions of mathematics of logic a priori at least appears to commit us to the claim that we can have knowledge of what must be true "independently of the facts." The challenge to the naturalist is to explain how such knowledge could be possible. A naturalist inclined toward empiricism will find the claim that we have any a priori insight into what must be true in the world implausible because he thinks that only empirical investigation can tell us what is true *in the world* and that empirical investigation does not presuppose a priori elements.

Finally, to the extent that the processes by which we attain alleged a priori knowledge, e.g., processes of deduction or abstraction, resist identification or explanation in scientific terms, the naturalist may find a priori knowledge to be mysterious and occult. By contrast, methods of empirical observation seem to be explicable in terms of external stimuli and physiological processes. While we have some understanding of how perceptual processes work in terms of causal relations to external stimuli, there is no

analogy for the processes whereby we come to understand an a priori proposition. Traditional accounts of a priori knowledge as products of a "faculty of intuition" or "acts of a priori insight" only seem to obscure further the possibility for a scientific understanding of the processes that generate a priori-justified belief.

Because of the naturalist's commitment to the methods and standards of scientific inquiry, empiricism is sometimes assumed to be the only approach that is consistent with a thoroughgoing naturalism. But for those following in the empirical tradition, it has always been a challenge to account for knowledge of mathematics and logic. Mathematical and logic propositions at least appear to be necessarily true, but no inductive methods can establish that a claim is necessary or certain. Nor is it readily apparent what empirical evidence would count for or against mathematical and logical claims. The empiricist has two alternatives: (1) he can give an account of mathematical and logical propositions as vacuous, either because they are analytically true or because they are non-factual and do not express truth-evaluable propositions, or (2) he may hold that, appearances to the contrary, logical and mathematical propositions are empirical, in which case their apparent necessity is to be explained away.

The advantages to the empiricist in choosing the second horn of the dilemma just posed are several: First and foremost, the objectivity of logic would be fully accounted for. Logical principles certainly appear to be factual in that we take them to be either true or false, and not just vacuously so, and we employ logical principles in the attainment of knowledge of other matters. If logical principles could be understood to be empirically justified, they would have their factual content in the same way and same respects as any other empirical claims, i.e., our judgments about their truth would depend upon findings based on our investigations of the world. Second, an account of logic as empirical, if successful, would eliminate the need to countenance any mysterious and occult processes by which we are said to attain knowledge independently of observation. Third, the strategy of providing a full explanation of our knowledge of mathematics and logic in

terms of analyticity has been largely unsuccessful, and an account of logic as empirical avoids the attendant perils of going the analytic route.

What does the claim that logic is empirical amount to? Generally speaking, it means that logical claims are answerable to experience in the same ways and same respects as other scientific claims, which is to say that they are hypotheses to be evaluated in terms of empirical evidence. Some scientific assertions, such as "All ravens are black" or "The next raven observed will be black" are directly testable by experience. Such claims are straightforward inductive generalizations about particular objects and events that may be confirmed or disconfirmed by direct observation – either with our unaided senses or with instrumentation that extends our powers of observation. Other scientific hypotheses, such as fundamental physical laws, are confirmed only indirectly by the evaluation of a range of experiments, some of which may be very complex. These "high-level" laws are broadly applicable, and they are adopted because they unify and explain a large amount of data; but their connection to particular inductive generalizations is indirect and mediated by a range of concerns such a simplicity, explanatory power, and coherence with other scientifically-established beliefs. An empiricist might claim either that logic is directly confirmed by simple inductive procedures or that logical principles operate more like high-level, very abstract, physical laws. The former position was held by Mill, and the latter position is advocated by more modern-day empiricists, notably Quine. However, on both accounts, the justification of logical principles is ultimately provided by empirical evidence.

While the picture of logic as subject to empirical confirmation, either directly or indirectly may be seductive, I will argue that neither version of empiricism described is viable because both misunderstand the way logical principles function as regulative norms of linguistic usage and both underestimate the role of logic in empirical evaluation. Logical principles, in general, do not function as contingent hypotheses about features of the world, and at least some logical principles are presupposed by our methods of evaluation – even an indirect "confirmation" of logical principles requires

some background logic by which the principles are evaluated. However, there is a question as to whether *some* of logic might turn out to be empirically defeasible and, therefore, answerable to experience after all. The undogmatic a priorist can allow for the purely epistemic possibility that perhaps some logical principles might turn out to be empirically defeasible (although it is not clear that there is any good reason for thinking that this will prove to be the case). But for an explanation of logic as empirical to be sufficient to dispense with the a priori status of logic entirely, the empiricist will need to show that she can explain all of logic in such a way that the explanation avoids needing to certify any part of logic a priori. If this cannot be done (and I will argue that it cannot), then the empiricist has not achieved her goal of eliminating any commitment to a priori justification.

I will also discuss an alternative to the more familiar versions of empirical accounts of logic that I will call "second-order" empiricism. Second-order empiricism is the view that logical principles do not function as empirical hypotheses, and our initial acceptance of them is a priori; however, the demonstrated reliability of logical principles in empirical application is required for their full justification. I will argue that the apparent advantages of this version of empiricism are superficial, and ultimately it does not represent any improvement over the other forms of empiricism considered.

What will emerge from the discussion to follow is that empiricism about logic, while initially attractive from the standpoint of naturalism, is a deeply incoherent view. If some logical principles must be presupposed by our methods of empirical evaluation, then there is no hope that all of logic could ever be understood to be fully empirical. While the dependence of our beliefs on those facts that make them true typically should be understood to be a requirement for their justification, I will argue that in the case of logic, the relevant "facts" that could make logic true cannot be ascertained independently of the logic employed in the identification of those same facts. So there is no prospect for the independent confirmation of logical principles by empirical fact.

II. Logic as Simple Induction

An empirical account of logic that takes logical principles to be inductive in a simple and straightforward way analyses logical principles as generalizations about particular objects and events that are directly observed. This strategy is most closely associated with Mill, who analyzes both logic and mathematics in terms of simple inductions. Although Mill's strategy does not seem to have won many converts, there are some contemporary philosophers who are sympathetic to aspects of Mill's general approach.[54] And while the view may seem obviously misguided, I think that it is worth examining exactly how and why it goes wrong because its deficiencies will prove to be instructive to the analysis of other versions of empiricism about logic that may be initially more plausible.

For Mill, the province of logic is reasoning, where 'reasoning' is understood broadly as inference from assertions that are already accepted to other assertions. Logic, on this understanding, includes induction.[55] But our concern is with the subset of reasoning that is deductive, which Mill took to be paradigmatically characterized by the syllogism. On Mill's view, syllogistic inference is not real, but merely apparent:

> All inference is from particular to particulars; general propositions are merely registers of such inferences already made, and short formulae for making more: the major premise of a syllogism, consequently, is a formula of this description, and the conclusion is not an inference drawn *from* the formula, but an inference drawn *according* to the formula, the real logical antecedent, or premise, being the particular facts from which the general proposition was collected by induction. (Bk II, Ch. III, Sect. 4, p. 127)

According to Mill, the general proposition in a syllogism is nothing more than a means of recording in memory various particular observations that we have already made. However, the train of reasoning exemplified by the syllogism may be useful in

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[54] See Kitcher (1979) and Kessler (1980) for a defense of Millian arithmetic. Akiba (1995) defends an instrumentalist view of logic along Millian lines whereby logic serves merely to record inductive inferences already made.

[55] Mill (1843/1950). See introductory chapter by Ernest Nagel, p. 7. Subsequent references to this work will be indicated parenthetically in the text.

that it serves the purpose of extending an induction on observed cases to cases that we cannot directly observe. If we have a collection of particulars sufficient for grounding an induction, we need not frame a general proposition; we may reason at once from those particulars to other particulars. So, for example, if we have observed a large number of cases of men who are mortal, we may infer inductively that the next man observed will also be mortal. We can record this rule of induction by making the generalization 'All men are mortal'. But to conclude of any individual man that he is mortal, we need not invoke the generalization; instead, we can reason according to the rule of enumerative induction that allows us to infer his mortality from the fact that he is a man. However, if we were to reason *from* the premises 'All men are mortal' and 'The Duke of Wellington is a man' *to* the conclusion 'The Duke of Wellington is mortal', the inference would be analytic, and so merely apparent, because the conclusion is really only a restatement or partial restatement of the premises. The real inference resides in reaching the generalization employed as the major premise of the syllogism; what remains to be performed afterwards is "merely deciphering our own notes." (p. 124) For Mill, every syllogistic inference is, at root, an inductive inference because the only real inference involved is that of reaching the major premise.

While Mill's analysis of formal logic focused on the syllogism, he also understood principles of contradiction and excluded middle to be empirical generalizations. So, for example, he understood the principle of contradiction to be based on the observation of our mental states:

> Belief and Disbelief are two different mental states, excluding one another. This we know by the simplest observations of our mind. And if we carry our observation outwards, we also find that light and darkness, sound and silence, motion and quiescence, equality and inequality, preceding and following, succession and simultaneousness, any positive phenomenon whatever and its negative are distinct phenomena, pointedly contrasted, and the one always absent where the other is present. I consider the maxim in question to be a generalization from all these facts.[56]

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[56] Mill (1843/1973), Bk II, Ch. VII, Sect. 5, p. 277.

The law of excluded middle is similarly explained. Mill did not take the law of excluded middle to be true unconditionally, but required the qualification that a predicate must be attributable to its subject in an intelligible sense in order for a proposition to be true or false. But if the qualification is fulfilled, he suggests that the law of excluded middle may be understood as a generalization based on the universal experience that some mental states are directly destructive of other mental states, e.g., thinking of an object as colored excludes thinking of it as colorless. The appearance of any positive mode of thinking of an object excludes a correlative negative mode, and vice versa, such that if consciousness is not in one of the two modes, it must be in the other.[57]

A central difficulty for any empirical account of logic is to explain the apparent universality and necessity of logical principles. Mill argued that the idea of necessity is explicable in terms of association, whereby associations taken to be necessary are those that are common to all mankind early in development and for which their genesis is later forgotten.[58] The strength of these associations is such that we find it impossible to separate any two ideas so associated; consequently, we are denied the possibility of any subsequent experiences counting against them.

Mill has been criticized for confusing the question of the origins of belief with the question of their warrant and for ignoring cases where we come to believe a general proposition by abduction as a hypothesis rather than by simple induction. These criticisms need not concern us here. The epistemological claim of the simple inductive account of logic must be understood as a claim about warrant. What the view says is that logical principles are inductive inferences based on the observation of particulars. The instrumentalist component of Mill's view takes syllogistic reasoning to be eliminable in favor of enumerable induction, or in cases where we do reason from the premises to the

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[57] Mill (1843/1973, p. 279) cites a passage from Herbert Spencer in the *Fortnightly Review* as giving voice to his own ideas on the matter. Mill's views on the principles of contradiction and excluded middle are cited by Ernest Nagel in his introduction to Mill (1843/1950), ibid.

[58] Mill (1865/79), p. 318ff.

conclusion, the inference is understood to be analytic. I will be discussing analytic accounts of logic in the next chapter; here I will focus on Mill's inductivism.

On the fact of it, it is implausible to think that logical principles could be established by simple induction because the features that characterize well-founded inductive generalizations appear to be absent or inapplicable to their case. Inductive generalizations must meet certain conditions before they are understood to be well-confirmed. In typical cases of induction, we consider both the variety and number of observations to be relevant to confirmation.[59] Usually, an inductive generalization is better confirmed if a larger number of positive instances that instantiate the generalization have been observed. This is not to deny that there may be unusual situations in which a single observation is sufficient to justify an inductive conclusion, but in typical cases, the effect of observations are cumulative. In the case of logic, however, cumulative observation seems to have no place. An instructor of logic may appeal to concrete examples of modus ponens to illustrate the rule, but once the student of logic has apprehended the rule, there would be no reason to cite additional examples. A similar point holds for the variety of instances observed. In order to substantiate the claim 'All swans are white', we should check swans in a range of different habitats because all swans in one locale may be white, but non-white swans may be indigenous elsewhere. But again the variety of illustrative examples seems quite irrelevant to the establishment of a logical principle, except insofar as two or three different instances might be needed to demonstrate that the rule is applicable, generally, rather than dependent on the specifics of any one instance that might be chosen to illustrate it. Providing diverse examples in this case would be heuristic, not confirmatory. In those instances where a logical principle does appear to be inapplicable, e.g., when applied to non-referring names or vague predicates, we typically don't count the exceptions as

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[59] These disanalogies are noted by Kim (1981) in his discussion of Mill's account of our knowledge of simple arithmetic as inductive confirmation. Much of what Kim says regarding the disanalogy of simple arithmetic to inductive generalization applies here.

disconfirming; instead, we tend to explain the counterexamples as lying outside the scope of logic in a way that reveals our underlying assumptions about the conditions under which logical principles would be expected to apply. So there appears to be a difference between logic and inductive generalizations with respect to how we treat data based on the variety of instances.

An empiricist inclined toward the simple inductive view would no doubt find the above objections question-begging, claiming that logical principles are confirmed by many instances in many circumstances – that's what establishes their universality. But it is unclear on the inductive account why the number and variety of observations that may be found to conform to logical principles should be understood to confirm them because it is crucially unclear on the inductive account what empirical observations would count against a logical principle. In standard cases of simple induction, we have a pretty clear idea of what would count as disconfirming evidence for the inductive inference. We understand that the discovery of a non-black raven would overturn the generalization that all ravens are black. However, in contrast to standard inductive generalizations, we don't know what observations *should* count against a logical principle or in those cases where an observation might appear to conflict with logic, whether it should be understood to be disconfirming.[60] The absence of any clear criteria for disconfirming observational evidence in the case of logical principles makes the claim that they are inductively established implausible.

Yet it might be objected that the absence of evidence that could be found to count against logical principles does not show that they are not inductively established. The claim that the world was not created five seconds ago would appear to admit no empirical evidence against it, yet we would not take it to be an a priori claim.[61] The reason that we

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[60] The apparent violations of the distributive laws in quantum mechanics might be taken to be comprehensible examples of observations that disconfirm distributive laws, but it is unclear that they should be understood this way.

[61] This example was brought to my attention by Georges Rey.

cannot see how any evidence could count against the claim is that the evidence in its favor is so overwhelming that we cannot imagine how the claim could be falsified. An empiricist might argue that logical principles similarly are confirmed by such an extremely large number of instances that we cannot imagine discovering any evidence that could count against them. Logic is no different from very highly-confirmed empirical hypotheses in this respect.

But there are important disanalogies between the example just given of an overwhelmingly-confirmed empirical hypothesis and logical principles. For one thing, the claim about when the world could have been created is not a directly-testable, inductive hypothesis, so at the very least, an empiricist who wants to uphold the analogy would have to move to a more holistic and indirect account of empirical confirmation along Quinean lines. More to the point, the claim about the timing of the creation of the world is based on a multitude of empirical considerations such as the establishment of the age of objects through repeated observations over a period of time, personal testimonies, carbon-dating, analysis of sedimentation variations as well as theories of the origins of the universe supported by sophisticated physical theories. Collectively, considerations such as these constitute the data that supports the claim about the timing of the birth of the world, and while no evidence could undermine *that* claim, there is evidence that would be understood to count against the individual components of the collective data. The empiricist needs to show that logical principles can be understood to be established by and answerable to collective data in the same way as the claim about the origins of the world so that the absence of countervailing evidence is fully accounted for by the high degree of confirmation.

A further difference between logic and the creation of the world example concerns the alleged necessity of the former and contingency of the latter. We consider logical principles to be necessary in the sense that we find them to be such that they could not fail to be true or truth preserving. By contrast, we understand the question of when the world came into existence to be a contingent matter; if circumstances had been

otherwise, the world might have come into existence at a different time. Whatever necessity there may be to the timing of the birth of the world, it is nomological necessity, which is to be explained in terms of physical laws and their causal efficacy in the prevailing initial conditions.

This brings me to the objection that a simple inductive account is inadequate to account for the apparent necessity – in an epistemic sense – of logical principles. The relevant sense of necessity in need of explanation is that of our finding logical principles to be such that they could not fail to be true or truth preserving. (In describing logical principles as necessary in this sense, I do not mean to imply that they are "metaphysically" necessary; it is not clear that either an a priorist or an empiricist must be committed to this stronger notion.) Because we do not see how a logical principle could fail to be true or truth preserving, we assign a logical principle a probability of one and a logical falsehood a probability of zero By contrast, a conclusion reached by induction, even if well-confirmed, can only be highly probable, i.e., there is no guarantee that an inductive generalization will be substantiated with the next observation.

As already noted, the empiricist response to the above challenge is to give a psychological explanation of why logical principles appear to be necessary, in the sense of being unconditionally true, when, in fact, they are not. The psychological account offered must preserve the allegedly empirical character of logical principles. So, for example, it would not do for the empiricist to explain logical necessity as resulting from innate cognitive structures that subserve deductive reasoning. While an explanation along these lines would be psychological in character, it would deny empirical status to logic because it would characterize logic as being unanswerable to experience. The general strategy employed by Mill and others is to explain the apparent necessity of logical principles and our inability to conceive countervailing evidence in terms of some form of psychological entrenchment. If no counterexamples to logical laws are encountered or entertained, their truth will go unquestioned, and they will become sufficiently entrenched such that we are unable to conceive of their falsehood.

But if the apparent necessity of logic is really to be explained by "entrenchment," we should at least be able to *conceive* of ways in which logical principles might fail. It is hard to believe that human imagination is so limited in this regard that we are unable to think of any plausible counterexamples to logical principles merely because we never happened to discover any or failed to entertain the possibility of counterexamples prior to the establishment of certain habits of mind. In the case of contingent empirical claims, we can usually conceive of alternative situations, however implausible, in which they might have been false. The fact that no one has been able even to conceive of convincing counterexamples to elementary logical principles (under our idealization assumptions) suggests that while even if the perceived necessity of principles such as these is necessity born of our own minds, this necessity is not adequately accounted for by the early establishment of habit.

A fatal objection to the claim that all logical principles could be established inductively through observation is that such methods of evaluation presuppose at least some logical principles, where by "logical principles" I mean to include rules of inference.[62] Empiricists who think that they can give an explanation of logic in terms of empirical observation underestimate the role of logic in making such observations in the first place. Logic is employed in empirical observation in a myriad of ways: First, scientific theorists typically argue for a theory or hypothesis by attempting to show that a particular experimental result or observation bears on a particular theory, and such arguments employ deductive inference. The evaluation of a particular theory is made, at least in part, by analyzing its deductive consequences and the deductive consequences of it competitors, and the determination of a theory's deductive consequences is made according to and with the help of logical principles. Second, theory evaluation also involves analysis of a theory's *probable* consequences; many scientific hypothesis are statistical, and they are evaluated in terms of their probable effects. But logic is built into

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[62] This objection is emphasized by Field (1998) and E. Nagel (1956).

our methods of statistical analysis in that probability theory assigns logical truths a probability of one and logical falsehoods a probability of zero. Finally, many scientific hypothesis involve complex, mathematical notions, and to the extent logic is an integral part of mathematics, it is needed in the formulation and evaluation of these hypotheses.

The simple inductivist account attempts to show how logical principles could be established prior to their employment in more complex scientific reasoning. But it is easy to see that logical principles are employed even at the level of simple induction because they are needed to establish both the test conditions and the relation of evidence to hypothesis. Two examples discussed by Ernest Nagel (1956) clearly illustrate the point. Consider the following principle of non-contradiction, which Aristotle held to be a logical truth: *The same attribute cannot at the same time belong and not belong to the same subject in the same respect.* This principle cannot be put to an empirical test because any case that we might think of that violates the principle would be judged inadmissible for testing it. If one were to claim that a penny is both circular and non-circular on the grounds that its shape differs based upon the angle from which it is viewed, the reply would be that viewing the penny at a different angle counts as a different respect. Similarly, if one were to claim that the penny's diameter was both 11/16 and 12/16 of an inch, the reply would be that predicating one of the two diameters excludes the other, so the two diameters cannot count as the same. As Nagel observes, the Aristotelian principle is employed as a *criterion* for determining what counts as "same respect" or "same attribute." The principle cannot be confuted because sameness and difference of attributes are specified in terms of the conformity of those attributes to the principle. (pp. 57-60)

Or consider how the validity of modus ponens might be empirically established. On the empirical view, the validity of an inference rule can be established only by presenting empirical evidence to show that an inference of that form always lead from materially true premises to materially true conclusions. Suppose "A" and "If A then B" are asserted as true statements. Suppose further that B is found to be false. Assuming

that both the truth of 'If A, then B' and the falsity of B is not in question, should we conclude ~A or reject the rule of modus ponens? The finding of B to be false does not tell us which inference to make, although it seems absurd to reject modus ponens on the falsity of B. (pp. 66-67) But if we really could relinquish our prior commitment to modus ponens, the discovery of the falsity of B might just as well be understood to count against modus ponens rather than the falsity of A.

The examples could be multiplied, but it is difficult even to describe a possible test condition for certain principles. For example, how would we test the law of excluded middle or the law of identity? Elementary logical principles cannot be established by inductive generalization because either there is no means whereby we can put logical principles to a test or, if we really had no prior commitment to them, there would be no means whereby we could show that evidence should count in their favor as opposed to counting against them.

The deficiencies of the inductivist account of logic are easy to see, and many empiricists will agree that the account is implausible. But the view that logic is empirical because it is, in principle, revisable in light of experience has been taken much more seriously. Does Quinean empiricism fare any better? I now turn to this second line of empiricist defense.

III. Quine and the Web of Belief

Quine (1953, 1960a, 1970) takes logical principles to be theoretical postulates that are part of a holistic system of belief. Logic, like the fundamental laws of physics, is confirmed only indirectly by observation and in conjunction with other theoretical assumptions. On Quine's view, logical principles are understood to be part of our body of scientific theory, and they have the same epistemological status as other fundamental and broadly-applicable scientific laws.

By way of illustration, logic might be compared to molecular theory, an example of a broadly-applicable and indirectly-confirmed theory discussed in Quine's "Posits and

Reality."[63] Quine reminds us that the evidence that supports the postulation of molecules is drawn from varied phenomena such as expansion, heat conduction, capillary attraction and surface tensions. The theory of molecules offers a simple and unified explanation of these various phenomena that comports with other scientific beliefs that we hold. The theory gains corroboration as the predictions of future observations based on the theory are fulfilled and insofar as it may be extended to explain additional phenomena. The confirmation of molecular theory is indirect in that it forms the core of an integrated physical theory with broad implications.

The relation of highly-theoretical principles to observation and evidence is captured in what has come to be known as Quine's metaphor of the "web of belief," first expressed in Quine (1953):

> The totality of our so-called knowledge or beliefs, from the most casual matters of geography and history to the profoundest laws of atomic physics or even pure mathematics and logic, is a man-made fabric which impinges on experience only along the edges... A conflict with experience at the periphery occasions readjustments in the interior of the field.[64]

Nearest the very periphery of the web, lie belief statements about what is directly observed. These are what Quine calls "observation sentences." (Quine 1960a, 1970b/78) Observation sentences are sentences like "This apple is red" or "This is a chair," and Quine explains their connection with experience in terms of their association with ranges of perceptually-similar neural inputs. Observation sentences are sentences about occurrent, sensory observations that are intersubjectively reliable, and our assent or dissent to them typically does not vary under the influence of collateral information. Further into the web, but still near the periphery, are statements about physical objects

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[63] Quine (1960b) in Quine (1966/76), pp. 246-48. Quine's discussion of molecular theory illustrates the way in which scientific theories may be broadly and indirectly confirmed, although the point of Quine's discussion here is to argue that while molecules are posits, they are not by that account unreal.

[64] "Two Dogmas of Empiricism," (Quine, 1953) in From a Logical Point of View, 2nd Edition, Revised, p. 42. (Quine 1953/61/80) Subsequent references to "Two Dogmas of Empiricism" will be to Quine (1953/61/80) and will be made parenthetically in the text.

that are not direct observations. These statements are especially vulnerable to disconfirmation by sensory experience.[65] Two examples that Quine gives of such statements are "There are brick houses on Elm Street" and "There are centaurs." In the face of a particular "recalcitrant experience," we can imagine giving up just a claim about something not directly observed and related statements on that same topic. At the interior of the web lie highly-theoretical beliefs – laws of mathematics, physics and logic – that are not linked with any particular experiences, except "indirectly through considerations of equilibrium affecting the field as a whole." (p. 43)

In cases of conflict between observation and theory, there are different possibilities with respect to how our beliefs may be revised. The revision of some beliefs entails the revision of others because there are logical interconnections between them; however, the logical laws themselves are understood to be part of our overall scientific theory and so are revisable, in principle, as well. In the face of a needed revision, an effort is made to preserve both the observation sentences about immediate sensory experience at the very periphery of the web and the fundamental laws that lie at its interior. No statement is immune to revision because any statement could be held true if we were to make drastic enough adjustments elsewhere in the system. Even an observation statement might be revised in the face of countervailing evidence by taking the initial sensory experience upon which the observation statement was based to be hallucinatory or by changing logical laws. Statements at the interior of the web are also revisable, but considerations of equilibrium and our desire to disturb our overall system of belief as little as possible dictate that these principles will typically be preserved in the face of recalcitrant data. And, of course, for Quine, no allegedly analytic statements are immune to revision because no boundary between analytic and synthetic statements can

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[65] A hard-and-fast distinction between observation sentences and those sentences near the periphery that are susceptible to revision would be very difficult to draw, and in Word and Object, Quine speaks of a "grading off" with respect to their observationality and, hence, their revisability. (Quine 1960a, pp. 42-44)

be drawn, *ergo* there is no class of analytic statements for which revision is not possible.[66]

According to Quine in "Two Dogmas of Empiricism," not only is any statement revisable in light of experience, but single statements face the tribunal of sense experience, not individually, but only as a corporate body. (p. 41) A single statement is to be evaluated in conjunction with the entire theory of which it is a part, thus, on the view here expressed, confirmation is radically holistic. Quine's objective in drawing attention to the holistic nature of confirmation is to refute the positivist's assumption that a statement can be confirmed or disconfirmed in isolation and so may be associated with a unique set of confirmation conditions that constitute its meaning. Two results of this extremely holistic thesis are that (1) any belief is potentially relevant to any other belief, and (2) no belief can be a priori justified because justification depends on the entire corpus of beliefs, a large part of which is empirical. Quine later[67] retreats to a more moderate holism whereby the confirmation of a scientific sentence involves a cluster of background theoretical assumptions but not our entire theory.

On the picture that Quine draws, the apparent necessity of both mathematics and logic is to be explained by our determination not to revise our beliefs in these areas but to make revisions elsewhere in the system. Our preferences for revision, in turn, are to be

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[66] As Bonjour (1998, p. 65, fn. 4) notes, Quine equates the a priori with the analytic in discussing verificationism: "As long as it is taken to be significant in general to speak of the confirmation or infirmation of a statement, it seems significant to speak also of a limiting kind of statement which is vacuously confirmed, *ipso facto*, come what may; and such a statement is analytic." (Quine 1953/61/80, p. 41) However, a statement that is confirmed regardless of experience is a specification of an a priori-justifiable statement.

If one were to accept this equation, Quine's arguments in the first half of "Two Dogmas of Empiricism" would count against a priori justification as well as analyticity. But taking allegedly a priori-justified statements to be analytic is primarily an empiricist strategy, so the denial of analyticity will weigh not against the possibility of a priori-justification for many statements as they may be understood by a defender of a priori justification.

[67] See Quine (1991). Also Quine acknowledges that the objections to his "excessive holism" are largely warranted as early as Quine (1960a), p. 13, fn..

explained by the dual goals of simplicity and conservativeness, both of which are essential criteria for the adoption of explanatory theories. The principles of simplicity and conservativeness are the "considerations of equilibrium" that determine how belief revision is to take place within our overall theory, and they dictate that fundamental principles of mathematics and logic will typically be preserved. But in theory, mathematics and logic could be revised if so doing would augment the virtues of simplicity and conservativeness in our overall system of belief.[68]

On the face of it, the metaphor of the web may seem like a credible account of both belief revision and scientific confirmation. Coherence of our system of beliefs is a laudable goal. To the extent that an observation or new theory is inconsistent with beliefs that we already hold, a revision is required, and we do have some choice as to how the revision is to be made. And Quine is certainly right to point out that empirical hypotheses are not confirmed in isolation but may be confirmed only relative to large parts of a background theory. So a moderate holism with respect to confirmation seems reasonable. Quine's account of logic may seem initially attractive because it is immune to some of the objections that apply to the simple inductive account. The picture offered by Quine is that logical principles are theoretical principles that explain and unify a large amount of data, and they are sustained by considerations of equilibrium and the maximization of simplicity. Specifically, the view avoids the objection concerning the asymmetry between simple inductive generalizations and logic with respect to the relevance of the cumulative effects of observation and variety of instances observed. And Quine's empiricism does not rely solely on the psychological notion of entrenchment to account for the apparent necessity of logic, but instead gives a pragmatic explanation in terms of the considerations that govern our preferences for belief revision.

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[68] It has not gone unobserved that Quine's position on the revisability of logic here expressed is at odds with his view that any postulated conflict in logic in a translation between languages would discredit the translation. See, for example, Haack (1974/96, Ch. 1, Sect. 3(ii)) and Dummett (1978, Ch. 16, p. 270).

But while Quine's account does handle some of the objections that can be raised against the straightforward inductive account, it remains vulnerable to others. And although the metaphor of the web of belief initially may seem compelling, it falls short of demonstrating how logical principles are answerable to experience.

Despite Quine's description of how empirical confirmation of highly-theoretical principles is indirect, it remains unclear on his account just how logic is answerable to experience; how evidence, even if mediated by considerations of equilibrium, should be understood to "disconfirm" a logical principle. Quine famously points to the proposal to revise the law of excluded middle as a means of simplifying quantum mechanics as a way in which logic might be understood to be answerable to experience. (p. 43) But for this proposal to demonstrate that logic is answerable to experience, we would need some understanding of how a revision of the LEM would either be more conservative than living with the paradoxes of quantum mechanics or would increase simplicity in our total system of beliefs. Mere mention of the suggestion that logic could be so revised does nothing to demonstrate the accountability of logic to empirical evidence. For the acceptance of the joint goals of simplicity and conservativeness as guiding principles for belief revision to entail the empirical revisability of logic, there would need to be some understanding of how a revision of logic could be more conservative than an alternative revision and how it could result in a net increase of simplicity to the system of belief, which would include *inter alia* some criteria of measurement for simplicity in the system.[69] Quine has provided no suggestion as to how we might come to see a revision of logic as best meeting our goals of simplicity and conservativeness, and critics of Quine have pointed out that there is no reason to think that measures of simplicity, conservativeness or other considerations that govern theory choice will be such that logic

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[69] This point is made by Field (1998), pp. 13-14.

is ever modified.[70] In fact, Quine has suggested elsewhere[71] that there is every reason to think that these considerations will weigh in favor of the preservation of logic.

Only on Quine's (1953) implausibly strong version of holism whereby the justification of any one statement is dependent on the justification of all statements, will logic turn out to be "confirmed" by experience. But there is no reason to accept such strong holism: Quine gives no argument for it,[72] and he eventually even acknowledges its implausibility (see footnote 17). The fact that the confirmation of a hypothesis depends on auxiliary assumptions that constitute part of an overall theory does not mean that every background assumption of the theory is tested along with the hypothesis.[73] But for all Quine has said, on a more moderate holism, some of the background assumptions required for the confirmation of a given statement may have a priori justification conditions. But without the assumption of global holism, Quine has failed to show how logic is answerable to experience.

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[70] See Dummett (1978) and Field (1998).

[71] Quine (1960a, p. 60) writes "Dropping a logical law means a devastatingly widespread unfixing of truth values of contexts of the particles concerned, leaving no fixity to rely on in using those particles." In the chapter entitled "Deviant Logics" of Philosophy of Logic, 2nd ed. (Quine 1970/86, p. 86), Quine states that there would be a serious loss of simplicity and familiarity if we were to adopt a deviant logic in light of the paradoxes of quantum mechanics, and he suggests that consideration of simplicity will weigh in favor of preserving (classical) logic in such cases.

[72] Rey (1993, p. 79) asks, Where, in any case, does Quine get the "only" in "only as a corporate body"?

[73] Clark Glymour (1980) gives a nice discussion of this issue. Glymour points out that both common sense and science tell us that not everything is relevant to everything else. The relevance of evidence to a hypothesis must be established, usually through the implementation of experimental controls. While large parts of a theory may be involved in confirming from given evidence any of it hypotheses, and parts of a theory must be assessed together with background assumptions, it is not true that each of a theory's hypotheses are equally confirmed or disconfirmed by a given instance. Which hypotheses are tested by which bit of evidence depends on the structure of the hypothesis, the theory and the evidence. (p. 151)

Reflection on the history of the analysis of inductive confirmation also supports these observations. The fact that white shoes confirm the statement "All ravens are black,"on Hempel's account of induction is considered a deficiency of the account.

Quine's version of empiricism is no real improvement over simple inductivism because it is similarly vulnerable to the charge that at least some logical principles would have to be presupposed in the evaluation of others. Logical principles are presupposed both in that we utilize them in the revision and formation of our beliefs and by virtue of the fact that they serve a normative role in linguistic usage. The implications for Quine's view are twofold: First, the logic principles by which a theory is evaluated – whether it is the logic of the theory itself or some alternative, background logic – are unlikely to be empirically revisable because the evidence under evaluation would be specified in accordance with them and the consequences of the theory would be determined with their help. While, in general, the presupposition of a principle by a theory does not ensure that the principle won't come to be invalidated by the theory, very elementary deductive principles are not likely to be undermined because they are part of our most basic norms of evaluation. Second, even if Quine could show that any given logical principle can be evaluated on the assumption of others such that the principle being evaluated has the status of being empirically revisable, he won't be able to show that all of logic is empirically justified in a non-circular way because the logical principles assumed in the evaluations would eventually form a closed circle. While some principles might be empirically revisable on the assumption of others, there would be no method available to justify the set of logical principles as a whole. This circularity problem might be avoided if one were to adopt a negative coherence theory of justification, but it will be seen that negative coherence theories are untenable.

On Quine's picture of confirmation, evaluation of a theory proceeds something along the lines of a hypothetical-deductive method. In order to evaluate a theory, we need to be able to recognize what at least some of its consequences are so that we can determine whether various observations that we may make are relevant to a theory and, if so, whether they agree or conflict with the theory. If the observations are determined to be relevant, then they will be understood to disconfirm the theory if they are inconsistent with the predictions. We also reason inductively via inference to the best explanation

from observations to theoretical hypotheses that might explain them. Observational predictions may be deduced from the new hypothesis, in conjunction with auxiliary assumptions, and the new hypothesis can be evaluated in terms of its consequences and against alternative, competing hypotheses. If the logic implicated in a theory under evaluation is viewed as part of the theory, some background logic would be needed to ascertain and evaluate the consequences of the logic-as-part-of-the-theory and to compare it against competing theories. The background logic, whether it is the same as or different from the logic of the theory, would function as a normative standard of evaluation, and so this background logic is unlikely to be empirically revisable.

It might be thought that the logic of a theory should be understood to be answerable to experience because logical principles have the status of auxiliary hypotheses, and so they are automatically subject to elimination or revision in light of observations that we might make. An observation is predicted by a theory in conjunction with a set of auxiliary hypotheses, so the falsity of a prediction need not be understood to refute the theory, but could be taken to refute one of the auxiliary hypotheses. In fact, auxiliary hypotheses are typically more fungible than the theory being tested. It might seem that if logic has the status of an auxiliary hypotheses, it must be revisable in light of experience. But this is to misunderstand what should count as an auxiliary hypothesis that is a candidate for revision when a theory is being evaluated. An auxiliary hypotheses is identified as such by virtue of its perceived relevance to an observational prediction. A statement that is irrelevant to the prediction thus would be exempted from inclusion as one of the auxiliary hypotheses that might be rescinded. But we should likewise exempt principles that would be needed to be observed in reasoning, generally, because they determine what is logically implied by any set of assumptions, not what is implied from a a set of assumptions in a particular case.[74] A logical principle might become relevant to

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[74] In later writings, Quine notes that logical truths are exempted from the threat of being rescinded because they add nothing to what the set of sentences needed to imply the observation would logically imply anyway. (Quine 1990, p. 14.)

the evaluation of a theory if an observation appeared to conflict with it, as in the case the distributive law with respect to the observation of quantum phenomena. But unless a particular principle is directly implicated by an observation, there is no reason to consider it one of the auxiliary hypotheses that is relevant to the evaluation of the predictions of a given theory.

It should be clear that the need to presuppose logical principles in the evaluation of theory is not peculiar to the hypothetical-deductive method of empirical confirmation, and so this criticism of Quine does not turn on the particulars of his choice of empirical method. For one thing, the regulative function of logical principles with respect to linguistic usage is indifferent to what empirical method we choose. And formalizations of methods of empirical confirmation other than the hypothetical-deductive model likewise incorporate logic in a way that would seem to make logic immune to empirical revision. For example, Hempel's conditions of adequacy for confirmation proceed by way of analyzing entailment relations between hypotheses and evidence. And Bayesian theories incorporate logic in that they assign logical truths a probability of "one" and logical falsehoods a probability of "zero."[75] While there may be room for argument on conceptual grounds about which logic should be understood to be built in to our empirical methods of confirmation, some logic or other would have to be presupposed, and what is presupposed is unlikely to be empirically revisable because it would favor itself over any alternatives.

There is a further question on the Quinean picture with respect to how logical principles become justified through empirical confirmation if they are in no way justified prior to their application in experience.[76] While we may adhere to logical principles at

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[75] Some of the ways in which formalizations of our inductive methods build in some logic or other a priori is discussed in Field (1998), p. 12.

[76] I am here setting aside problems raised by Quine's view expressed in "Epistemology Naturalized" in Quine (1969) that epistemology should be reclassified as a branch of psychology. Whether any notion of justification would survive this reclassification is questionable, but Quine continues to speak of evidence, the relation of theory to

the start of inquiry – perhaps because we find them obvious and natural to employ – logical principles are understood to be confirmed only insofar as they share in the successes scientific explanations, whether these are sophisticated theories or casual observations. But if logical principles are in no way justified prior to empirical testing, then it is unclear how they become justified upon that testing because any data that could be said to count as evidence in their favor would rely on the principles in question. Perhaps logical principles could be understood to become justified on evidence of their self support; self-support would be considered justificatory on a coherence theory of justification. But as I observed earlier, a standard objection against coherence theories of justification is that a set of consistent beliefs could be false, so unless logical principles have some initial epistemic credibility, it is hard to see how they should be understood to become fully justified upon a circular evaluation. Moreover, if coherency is sufficient for justification, then the motivation for empiricism is undermined because one need not appeal to experience to demonstrate the coherency of logical principles.

Alternatively, Quine might be understood as being committed to some form of a negative coherence theory of justification. On a negative coherence theory, all beliefs are prima facie justified, and we are entitled to any belief unless we have evidence against it. On such a view, there is no problem about the justification of elementary logical principles because all beliefs (and belief-forming methodologies) are automatically justified unless we have a reason for rejecting them. On this view of justification, reasons are accorded only a negative role with respect to the regulation of belief formation and revision. But the idea that reasons could play only a negative role in this regard is implausible, because unless reasons have a positive role to play, there can be no such thing as believing something *for a reason* or on any particular basis.

In addition to making the foregoing objection, John Pollock (1986) argues that the negative coherence theorist will have difficulty upholding the principle that if one holds a

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evidence, and the successful predictions of scientific theories, so presumably he intends to be understood as retaining some notion of justification at least for empirical beliefs.

(non-memory) belief for a bad reason or no reason at all, then the belief is unjustified. To uphold this principle, the negative coherence theorist will have to say that if one believes *p* unjustifiably, one is in immediate possession of a belief that is a defeater for the belief that *p*. This seems implausible because one need not always be aware of why one holds a belief. If someone were to believe that *p* because of wishful thinking, his belief that *p* would be unjustified even if the believer has not reflected on why he believes *p*, and so is unaware of any defeater for his belief.[77] A negative coherence theory of justification, according to which reasons play only a negative role in justification, would appear to be untenable. If so, logical principles cannot be said to be prima facie justified on the basis that all beliefs and belief-forming methodologies can be understood to have this status.

If a negative coherence theory of justification is rejected and if logical principles are in no sense justified prior to their empirical application, it is unclear how become empirically justified via the successes of scientific theories. On the other hand, if logical principles are understood to be justified in some sense prior to empirical application, Quine would have to endorse some a priori elements of justification, which would contradict his thesis that all justification is empirical. And Quine would have the further task of showing how logic could become *fully* justified through empirical application. But it is hard to see how non-circular justification could be achieved because background logical principles still would need to be presupposed in order to assess the logic that is allegedly being evaluated and, hopefully, confirmed.

The need to presuppose some logical principles in the evaluation of others effectively blocks the attempt to show that all of logic is empirically justified in a non-circular way. Even if every logical principle could be shown to be empirically revisable according to some method of evaluation or other, there is no way to eliminate the presupposition of logical principles in the evaluation. Let's suppose for the sake of argument that there are only four logical principles, A, B, C and D. And let's assume

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[77] Pollock (1986), p. 86. Pollock takes these two objections to be decisive against negative coherence theories of justification.

further that each of the four logical principles can be held to be empirically revisable on the assumption of one or more of the others. Perhaps A can be seen to be answerable to experience on the assumption of B, C and D. And B can be seen to be answerable to experience on the assumption of C, D and A. And so on. In this example, while each individual logical principle is empirically revisable, how is the complete set of logical principles, {A, B, C, D}, justified?

I see four possible responses to the example. The first is to deny that there is anything like a complete set of logical principles that might need to be assumed in evaluation. But while one might question which logical principles are basic, it is implausible to think that we have an infinite stock of axiomatic logical principles that do not imply or are not implied by each other. And even if we did have an infinite stock, it should be clear that this would not solve the presupposition problem because we would be replacing the closed circle with an infinite regress.

The second response, and the one that I favor, is to conclude that logic in its entirety can't be understood to be empirical because global empiricism about logic is incoherent. Even if it turns out that a few logical principles are properly understood to be empirically defeasible, our methods of evaluation certify some logical principles prior to and independently of empirical confirmation. If our methods of evaluation are any good, we must be able to rely on the logic that they certify. This would suggest that it is reasonable to accept logical principles in absence of empirical evidence and that we have at least some sort of a priori epistemic warrant for doing so.

A third response would be to deny that the presupposition of logical principles in evaluation indicates anything about our need to accept them a priori. In presupposing a principle, we need not make any commitment to it, but could merely take it as an assumption. However, if we make no commitment to the principles assumed in the evaluation, we still could not show logic on the whole to be justified, empirically or otherwise. If we were to abstain from a commitment to logical principles in the way that this response suggests, all that we could conclude about the justification of logic is that

individual logical principles are empirically justified on the assumption of others, but, collectively, logical principles are just a bunch of assumptions.

The fourth response would be to deny that the presupposition of some logical principles in the evaluation of others is problematic for an empirical account of logic on the grounds that all beliefs, including logical beliefs, are automatically justified in absence of evidence against them. This would require the endorsement of a negative coherence theory of justification. Although this line of response does appear to be the best way to circumvent the problems posed by the example, a negative coherence theory of justification does not appear to be tenable. One might also worry that some form of the circularity problem would arise on a negative coherence theory with respect to what revisions should be made in light of recalcitrant data.

It should be clear that the need to presuppose some logical principles in the evaluation of others poses a problem for any empirical account of logic. Quine's particular version of empiricism and his Popperian view of empirical confirmation suggest the fourth line of response to this problem given above. But unless a negative coherence theory of justification can be shown to be tenable, this response is inadequate.

IV. Second-Order Empiricism

I have argued that the justification conditions for logic are not empirical because logical principles do not function as empirical hypotheses. They are, in fact, presupposed by methods of empirical inquiry. But an empiricist might take the position that while our initial acceptance of logical principles may be a priori, the a priori considerations to which we might appeal do not establish that what is accepted is true or applicable in the world. Traditionally, the considerations in favor of axiomatic logical principles that have been cited by a priorists are their self-evidence, apparent obviousness or our inability to conceive of counterexamples to them. While it is easy to see that these considerations do give us some reason for accepting logical principles, one might be reluctant to claim that what is accepted for these reasons alone is objectively true or truth preserving. (The

example of Euclid's parallel postulate illustrates why one might be so reluctant: prior to the development of the Theory of General Relativity, it might have seemed inconceivable that space could be non-Euclidean.) While the a priorist considerations give us reason for accepting logical principles, they do not provide us with a certification of logical principles in the form of a proof or demonstration. Generally, we should be on more firm epistemological ground if we have a demonstrative justification for something as opposed to having reasons for thinking that it is true in absence of such as justification. For example, I may be unable to imagine how the Axiom of Choice could fail, so I am justified in believing it, but I would be on more firm epistemological ground if I were in possession of a proof. Given that a priori considerations appear to fall short of a providing an independent demonstration of logical principles, the challenge posed by the empiricist is to explain why a priori considerations are sufficient to ground the objectivity of logic.

An empiricist might concede that logic is neither established by inductive methods nor shown to be revisable in light of experience in any particular way, but insist that the only way we know our logical "intuitions" to be veridical is through the demonstrated reliability of logic in empirical application. Logic is indispensable to methods of scientific inquiry, so it is understood by the empiricist to be confirmed by the explanatory and predictive successes of science. However, on this version of empiricism, our initial acceptance of logical principles is a priori, and while logical principles may not be empirically revisable, our logic is shown to be reliable by its successful employment in experience. Finding our logic to be reliable in experience may be taken to demonstrate both the veridicality of our logical intuitions and the objective truth of logic. The alleged empirical confirmation is required in order for our logical beliefs to be fully justified because without it, the objectivity of logic is not secured. The thought is that our logic is empirically confirmed through the application of logical principles in experience because experience might have shown our logical intuitions to be misguided or ineffective.

I call the form of empiricism just described "second-order" empiricism because the view allows that we have some sort of commitment to logic based on a priori considerations, but insists that what is needed in order for our logical beliefs to be fully justified is empirical validation. What distinguishes second-order empiricism from Quinean empiricism is that logic need not be understood to be revisable in light of experience in any particular way; instead, experience is taken to establish the reliability of logic in that experience might have shown our logic to be inapplicable, and, for all we know, we may yet encounter situations in which we find our logic to be inapplicable. Second-order empiricism also differs from non-dogmatic a priorism in that the former, but not the latter, takes the independent empirical *confirmation* of logic to be essential to the establishment of its objectivity. The non-dogmatic a priorist allows for the defeasibility of knowledge claims based on expanded evidence, and so the a priori status of some subset of our logical principles might come to be overturned; but on any a priorist view, the justification of logic does not depend on empirical confirmation.

I don't know if there are any empiricists who explicitly endorse some version of second-order empiricism for logic. Ernest Nagel (1956) attributes the view that logic is confirmed by experience because it is found to be reliable in experience to some (then) contemporary empiricists.[78] In addition, the idea that beliefs may be prima facie a priori justified, but full justification is empirical, may be found as early as the writings of

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[78] Nagel cites the following as a contemporary statement of empiricism about logic:

> The laws of logic are isomorphic but not identical with certain structural and functional invariants in nature – remembering that our objective procedures are part of nature... They cannot be disproved, but they may become inapplicable and meaningless. We can say nothing about the *probability* of this being so, but we can just conceive of the possibility that the so-called a priori laws of logic may not enable us to organize our experience. That is why they are not formal or empty. That is why they tell us something about the *actual* world. (p. 65-66)

Nagel goes on to criticize "narrowly" empirical views according to which logical principles are understood to express the limiting structure of actual and possible things.

Locke. Locke suggests that the beliefs we form on the basis of acknowledging the relations among our ideas will be justified only if we are entitled to think that our ideas conform to reality.[79] The worry that a priori means of justification fail to establish a connection between those means of justification and the truth of what is believed is expressed famously by Benacerraf (1973) in relation to knowledge of mathematics. And some philosophers have defended a view of mathematics that corresponds to what I am calling second-order empiricism for logic, whereby mathematical theorems are evaluated with respect to other mathematical theorems and axioms such that mathematical justification is self-contained, yet experience is needed to validate the intuitions upon which the mathematical axioms are based.[80]

I think that the attraction of second-order empiricism for logic is that it appears to solve central dilemmas for both a priorist and more standard empirical views. On the face of it, unlike the forms of empiricism previously discussed, second-order empiricism does not require logic to be "answerable to experience" in a way that is implausible or inadequately explained. And second-order empiricism appears to account for our knowledge of the objective truth of logic, so it might seem that second-order empiricism provides us with what traditional a priorism appears to lack: conclusive justification for the content of our logical beliefs. In providing evidence for the objectivity of logic while acknowledging our a priori commitments, second-order empiricism appears to succeed where a priorism fails. But closer scrutiny of second-order empiricism reveals its credentials as an empirical view to be suspect. Moreover, I will argue that the instrumental value of logic with respect to empirical application is inadequate to establish the objectivity of logic in the desired way. Like the more familiar versions of

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[79] J. Locke (1694-1704/1959), pp. 226-9. Kitcher (1980, p. 220) makes note of Locke's position in his discussion of Mill's theory of the meaning of mathematical statements in which mathematical first principles are taken to be definitions, but their truth is contingent on the applicability of our concepts in the world.

[80] Cf. Morton (1977).

empiricism, second-order empiricism fails to provide a non-circular account of justification for logic.

The first thing to notice about the view is that it does not make logic empirical in any standard sense of 'empirical'. Logic, on this account, is not taken to be established by inductive methods or revisable in light of experience. Instead, experience is taken to show that our logic is reliable. The claim that logic is empirically confirmed by its reliability in empirical application depends upon the fulfillment of two conditions: (1) the reliability of logic must be counterfactually dependent on the empirical "facts" and (2) our finding logic to be reliable in experience must partially constitute the justification for our logical beliefs. Perhaps the world could have been such that our logic were broadly inapplicable, in which case we would not have been able to organize our experience or sustain sequential reasoning. Perhaps our logic is suboptimal: unbeknownst to us, some other deductive methodology is more reliable. But it is unclear what we would believe if the logical facts were different because, for one thing, it is nearly impossible to come up with counterfactual cases that we can comprehend in which our most fundamental logical principles would fail in experience. And, perhaps more significantly, we could not reason about what we would believe in counterfactual cases when the principles *by* which we reason are the very principles that are being called into question.[81] Because we can't make sense of the question of whether our logic depends on the logical facts, the second condition for empirical confirmation, namely that our *finding* logic to be reliable in the world is part of our justification for logic, is not met: the observed reliability of elementary logical principles in experience does not confer (non-circular) empirical confirmation on them because we use at least some of those same logical principles to make the assessment, so we will not find elementary logical principles to be other than "reliable." Some philosophers might argue that the circularity here would not undermine

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[81] Field makes this point in his discussion of why an evidential system that licenses believing something a priori, and so independently of the facts, is unobjectionable in the case of logic. (Field 1996, pp. 370-77; Field 1998, pp. 17-20.)

the justification,[82] but, as I pointed out earlier, if a circular or rule-circular justification is admitted as genuine, there would be no need to "test" logical principles in experience because empirical testing is not required to establish the coherency of logical principles with each other. Part of the point of giving an empirical account of logical principles is to provide a justification for them that goes beyond the observation that they form an internally-consistent system.

The empiricist might object that some logical principles, such as the distributive laws, are found to be inapplicable to some aspects of experience, so we could find logic to fail in at least some cases. But even granting this possibility to the empiricist (although it is not clear that the paradoxes of quantum mechanics should be taken to disconfirm the distributive laws), not all of logic can be claimed to be such that we might find it to be inapplicable to experience – some logic would be needed to make any assessments of inapplicability. At least some logical principles are such that we are unable to give them up based on empirical findings because they would be needed to make those findings in the first place. Logical principles such as the so-called "laws of thought" and inference patterns represented by rules such as modus ponens and modus tollens are likely needed in order to reason about the inapplicability of any given logical principle, and, if so, they are themselves resistant to purported tests of reliability because we would need to observe them both in specifying the test conditions and making assessments of reliability. Any principles that must be observed antecedent to the evaluation of a given principle's reliability are themselves going to be consistent with any observations that we might make.

Beyond its questionable status as an empirical account, second-order empiricism does not establish the objectivity of logic in the desired way because any demonstration

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[82] See Black (1958), Van Cleve (1984), Dummett (1978), Friedman (1979) and, more recently, Boghossian (2000). My main discussion of rule-circular justification for the case of deductive principles will come in Chapter Five. My point here is that finding logical principles reliable in experience does not add to their credibility, except to show that our rules are self-supporting -- which can be done without an appeal to experience.

of the reliability or objectivity of logic that might be provided by successful application in experience would be circular. If the objectivity of logic were really understood to be secured by its successful application in experience, the possibility would remain open that for all we know, some logical principles other than those assumed by our scientific methods might have fared even better.[83] So the evidence for logic provided by the explanatory and predictive successes of science, *assuming that logic*, would be non-conclusive. One of the alleged virtues of second-order empiricism is that it promised to provide a non-circular justification for the content of our logical beliefs. But while the evidence for logic provided by successful empirical application initially appeared to place us in a stronger epistemic position than the considerations offered by the a priorist, the fact that some logic needs to be assumed in the methods that are used to generate the empirical evidence for logic precludes the evidence from providing the desired independent confirmation: the evidence would be only self vindicating. In fact, the circularity on this account illustrates how the requirement of an empirical justification for logic is self-defeating. If the requirement were to be accepted, we could not claim to have knowledge of logical principles at all since our experience cannot provide the independent confirmation we need when scientific methods assume these principles at the outset.

The world could not fail to conform to at least some of our logical principles because any alleged "observations of conformity" would be made with the assistance of logic. Consequently, such observations could not constitute any part of the original justification for the logic; finding logical principles to be reliable in empirical application can only reinforce a commitment to them already made. Experience thus should be

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[83] This leaves open the possibility that some alternative logics could be assumed and the results of assuming one logic as opposed to another could be compared. But this would require the use of some background logic to make the comparisons, so even if such a comparative experiment could be carried out, not all of logic could be tested in this way because some principles would be needed in the background logic that is used to assess the relative strengths and weaknesses of the logical principles tested.

understood to offer a circular *corroboration*, rather than independent confirmation, of logical principles.[84] Experience corroborates logical principles only in the sense that our finding logical principles to be reliable in empirical application shows them to be self supporting. For experience to play a role in the justification of logical principles, logical principles would have to be such that they could at least be abrogated, if not revised, in light of data that was properly understood to be in conflict with them. It is just this possibility that I am claiming cannot be made sense of for all of logic. Second-order empiricism does not give a satisfactory empirical account of logic because empirical confirmation is not conferred by our finding them to be reliable in experience if we could not find them to be otherwise.

If experience could be understood to provide a circular corroboration of logic, what, if anything, would this tell us? First, the inextricable role of logic in successful scientific theories counts against any view that take logic to be non-factual, unless a thorough-going skepticism is assumed. If logic is essential to truth-evaluable theories, then, even though logic is assumed and not tested by those theories, logic cannot be understood as vacuous or arbitrary. Second, I think that the corroboration of logic by experience illustrates why skepticism about logic is a skepticism of a very deep kind. If we were to doubt our elementary logical beliefs (I am here ignoring problems about needing to rely on some principles of reasoning to raise the doubt), the consequences would be far reaching: doubt about elementary logical principles would undermine the justification of all beliefs except those that were unmediated by any form of deductive reasoning, such as beliefs about our immediate sensory experience. While the successes of science cannot provide an independent certification of logical principles, they do remind us of the cost of skepticism about logic.

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[84] Thanks to Steve Ross for suggesting the term (circular) 'corroboration' for what I am suggesting would have to be the relation of experience to logic on the second-order empiricist view.

V. Summary and Conclusions

In summary, I have argued that logical principles could not be empirical. They could not be straightforward inductions because it is crucially unclear what evidence should be taken to count against them, and the evaluation of evidence presupposes at least some logical principles. Nor could they be high-level empirical theories that are indirectly confirmed for similar reasons. Logical principles, at root, are not empirical hypotheses to be tested by empirical methods. I considered a version of empiricism that concedes that logical principles are not established empirically in the same sense as ordinary empirical hypotheses, but instead takes experience to demonstrate the reliability of our logical beliefs, while acknowledging that we have some a priori reasons for adhering to those beliefs. But I have argued that this picture is misleading: we could not fail to find at least some logical principles reliable because we must rely on them to make assessments of reliability. To the extent that we antecedently rely on deductive principles to ascertain empirical evidence in favor of logic, the observations we make cannot constitute evidence for those principles antecedently employed.

If logic cannot be shown to be empirical, the empiricist can maintain his position that all knowledge is empirical only if it can be shown that knowledge of logic does not constitute real, substantive knowledge. If logic could be understood to be non-factual or if our knowledge of logic could be fully accounted for in terms of our understanding the meanings of logical terms, logic would pose no threat to empiricism because knowledge of logic would be vacuous. I will call strategies that attempt to show that knowledge of logic is vacuous "deflationary" accounts of a priori justification because they deny that there is anything of substance to explain, and I will consider them in the next two chapters.

CHAPTER FOUR

SEMANTIC ACCOUNTS OF THE A PRIORITY OF LOGIC

PART I: ANALYTICITY

I. Introduction

An empiricist may accommodate a priori justification within an overarching empiricist framework if he can show that a priori claims do not constitute substantive knowledge. If a priori claims can be shown to be mere by-products of meanings or linguistic practices, a priori justification would be unproblematic because it would not apply to anything that is not of our own invention; a priori knowledge would be, at root, trivial. To say that a priori propositions have their genesis in meanings is to say that they are, in some sense to be explained, analytic or that some feature of language or the concepts that we employ can otherwise explain their a priori status. For an account of a priori propositions as analytic or meaning-based to establish the triviality of a priori knowledge, the account would have to show how their a priori status is explained by meanings in such a way that no tacit appeal is made to any facts or considerations beyond what is generated solely by linguistic practices or the analysis of concepts.

The next two chapters are devoted to the evaluation of attempts to show that the a priority of logic is to be explained by meanings. The present chapter discusses some historical approaches to demonstrate the analyticity of logic. Chapter Five addresses some more contemporary solutions that utilize the resources of conceptual-role semantics. I argue that no proposal on offer to provide a semantic ground for the a priority of logic is satisfactory, nor is there reason to think that this line of explanation will succeed.

On what is perhaps the most general construal of 'analyticity', an analytic statement is one that is true in virtue of meaning. But without further refinement, this

notion of analyticity cannot reduce a priori knowledge to knowledge of meanings because it does not specify *how* meanings are to account for the a priori status of a statement. It is commonplace to encounter the claim that logical principles are true in virtue of the meanings of their constituent logical constants. For example, the statement 'Either it is raining or it is not raining' may be said to be true in virtue of the meanings of 'or' and 'not'. But if that is so, it is because 'or' and 'not' are defined, at least in part, by their role in deductive inference, and the inferential roles of 'or' and 'not' correspond to the logical functions of disjunction and negation, respectively. So we accept the statement 'Either it is raining or it is not raining' because we accept statements of the form of 'p v ~p'. But what explains our acceptance of statements of the form 'p v ~p'? This, too, must somehow be explained in terms of meaning. For analyticity to fully explain a priori justification, the explanation must show how a priori justification depends on meanings in such a way that no further explanation of how we might have knowledge of the proposition in question is required. The challenge for the empiricist is to give an account of analyticity that meets this condition.

One account of analyticity that, despite its ambiguities, at least provides an explanation along the right lines is the Kantian notion that an analytic judgment is one in which the predicate is (covertly) contained in the subject.[85] Judgments such as 'All bodies are extended' or 'All squares are rectangles' are analytic on this construal because the concept expressed by the predicate term does not "add" anything to the concept expressed by the subject term; rather the predicate may be obtained through the analysis of the subject term. The truth of analytic statements on this account is explained by the containment relation that holds between the subject and predicate. All that is required for a cognitive agent to know the truth of a statement that is analytic, in this Kantian sense, is for him to recognize the predicate term as analyzing the subject term into its constituent concepts. But while this notion of analyticity, if it could be made precise, might explain

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[85] Kant (1781/87), A 6-7, B10-11.

the a priority of certain statements of the subject-predicate form, it obviously cannot be utilized as an explanation of the analyticity of logic because the meanings of the logical constants and other elementary logical concepts cannot plausibly be understood to be obtained via the conceptual analysis of other more basic concepts.

A more perspicuous and widely-accepted notion of analyticity is due to Frege. A statement is Fregean analytic if and only if it is either a logical truth or transformable into a logical truth by the substitution of synonyms for synonyms. On the assumption that two words can be determined to be synonymous, the a priority of a statement making a synonymy claim is certified as a priori, so long as logic itself also is understood to be a priori. But, of course, Fregean analyticity does not explain how logic itself might be understood to be analytic because Fregean analyticity is partly defined in terms of logic.

It has been observed that any account of analyticity that relies on the principle of non-contradiction to demarcate the analytic/synthetic distinction, whereby an analytic statement is one that cannot be denied without contradiction, would also presuppose logic.[86] For one thing, the principle of non-contradiction itself is not explained but is used to mark the distinction. And if a contradiction that results from the denial of an analytic proposition is supposed to be explicit, logical principles will be needed in the derivation of that contradiction. On the other hand, if the contradiction is not understood to be explicit, some other understanding of 'contradiction' is needed. One suggestion for what might be intended when a contradiction is taken to be non-explicit is that a contradiction is any necessarily false proposition.[87] But this is unhelpful from an epistemological standpoint because the means by which we know that a proposition is necessarily false is not specified, not to mention that the class of necessary proposition cannot be assumed to be equivalent to the class of analytic propositions. So this account of analyticity is not a candidate for an explanation of a priori justification.

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[86] Cf. Bonjour (1998). The definition of analytic statement as one that cannot be denied without contradiction is also found in Kant. (See Kant (1783), p. 12.)

[87] Bonjour (1998), p. 45-46.

Obviously for the empiricist to give an explanation of logic itself as analytic, logic cannot be part of the *definiens* for the term 'analytic'. As a result, some of the more familiar and, perhaps, more widely-accepted conceptions of analyticity will be immediately disqualified for the purposes at hand.

In order to explain the a priority of logic in terms of analyticity, a notion of analyticity that is not based on the idea of one concept being explicitly definable in terms of another and that does not presuppose the certification of logic will be needed. Historically, the leading candidate for such a notion has been based on the idea that analytic statements are either themselves conventions with respect to the use of words or, once the conventions have been established, are consequences of the conventions. On this view, axiomatic logical principles are linguistic conventions that are constitutors of meaning for the logical constants. According to the conventionalist thesis, an analytic statement is reflective of nothing more that the way in which we use language; whatever truth it may be said to express is solely the result of choices, either explicit or implict, pertaining to grammatical rules and linguistic expressions. Analytic statements are, therefore, true in virtue of meaning *alone*. An alternative form of the conventionalist thesis can be developed without a commitment to *truth* by convention. This version of conventionalism takes logical principles to be non-factual in the sense that they do not express anything truth evaluable. Logical principles, on the non-factualist construal, are merely (arbitrary) rules that govern the use of logical-constant expressions, and as such, they are not genuinely true or valid.

Conventionalism about logic, in its various forms, was advocated by positivists such as Ayer, Carnap and Hahn, and in the early 1930's, Wittgenstein. The view has been largely discredited for reasons that I will discuss. Most of the alternative notions of analyticity subsequently put forth to explain the a priority of logic were not worked out in any kind of detail. The exception is C.I. Lewis (1946), but I argue that his account clearly falls short of providing an explanation of elementary logical principles. However,

the idea that logic is somehow analytic seems to have persisted despite the lack of a plausible candidate notion of analyticity.

In the discussion to follow, I outline what I take to be the most prominent version of conventionalism, the linguistic doctrine of truth, and review some of the reasons why it has been deemed inadequate, including Quine's famous attack on the view in his "Truth by Convention."[88] I suggest that the linguistic doctrine of logical truth is plausible only when interpreted narrowly as a view about how formal systems of logic might be established within a framework that presupposes an understanding of logic in the metalanguage. As such, it provides only a system-relative account of "logical truth" that leaves the resources of the metalanguage unexplained, and hence, the basic foundational issues unaddressed. I then evaluate the non-factual version of conventionalism, which I conclude is no more plausible than the linguistic doctrine of truth. Finally, I consider some alternative and post-positivist conceptions of analyticity. I argue that these conceptions trade on ambiguities in the concept of analyticity that, once understood, eliminate their prospects for providing a reduction of the a priori justification of logic.

II. Conventionalism

Logic, according to conventionalism, is parasitic on language. The basic premise of conventionalism is that logical principles are derived from conventionally-adopted, axiomatic rules that determine the meanings of the logical constants. By adopting these rules, our language is constructed in such a way as to ensure the validity of certain logical principles. To say that something is adopted by convention is to imply that there are alternatives that could have been chosen. While there may be pragmatic reasons that guide our choice of conventions, on a conventionalist view, these pragmatic reasons must be understood to be non-epistemic – otherwise the explanation of logical truth in terms of conventions would be undermined. Logic, on the conventionalist view, is not fully

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[88] Quine (1935), reprinted in Quine (1966/76).

objective, i.e., it does not tell us about truth in anything other than a convention-dependent sense, because our endorsement of axiomatic logical rules is a matter of freely adopting a particular set of conventions. Knowledge of logic is then unproblematic because it reflects nothing more than our intentions to use words in certain ways; logical truth is an artifact of our linguistic conventions.

As I indicated, the conventionalist view has been developed along two different, general lines. The line that is associated with the positivists and is perhaps most widely thought of as conventionalism is the view that logic is *true* by convention. This view is often referred to as the *linguistic doctrine of logical truth*. According to the linguistic doctrine of logical truth (henceforth "LDLT"), we stipulate the truth of certain sentences that are to determine the meaning of the logical constants, with the result that they, along with the logical principles that may be derived from them, are true by convention. The alternative account claims that logical rules are like rules of grammar in that they are procedures by which we fix meaning, and like rules of grammar, logical rules are *non-factual* in that they are not truth-evaluable. Non-factualist conventionalism is associated with the writings of Wittgenstein's middle period, and for the view to be fully conventionalist, the basis for the choice of logical rules must be non-epistemic. While both LDLT and non-factualist conventionalism explain logic in terms of conventions, LDLT is a factualist view, according to which the truth of logic is stipulated by us; whereas on the non-factualist view, the set of prescriptive rules governing of use of logical primitives do not express any truth-evaluable claims.

The plausibility of conventionalism perhaps lies in the fact that, unlike empirical claims, logical propositions seem to concern the use of terms and their corresponding modes of classification rather than things in the world. If logic pertains to discourse, it might seem natural to locate the source of logical truth in the meanings of the terms employed. Unlike nouns and predicates employed in statements with empirical content, there is no component of the meanings of the logical constants that requires analysis in terms of what things or properties they denote. Thus it might appear that logical

statements either owe their truth to meaning alone or are rules about language usage because there is no worldly component upon which their truth depends. As one proponent, Hans Hahn, put the point:

> Logic does not by any means treat of the totality of things, it does not treat of objects at all but *only of our way of speaking about objects*; logic is first generated by language. The certainty and universal validity, or better, the irrefutability of a proposition of logic derives just from the fact that it says nothing about objects of any kind. (Hahn, 1933, p. 152)

If either form of conventionalism were correct, it would provide the right kind of explanation of a priori justification in terms of analyticity because the conception of analyticity employed does explain how meanings could generate logical principles in a way that is solely dependent on humanly-instituted practices, and so our knowledge (or acceptance) of logical principles would be unproblematic. In the case of LDLT, the truth of logical propositions is explained by our intentions to adopt as true certain rules that confer meaning on the logical constants. Likewise, the non-factualist version of conventionalism explains the a priori status of logic in terms of conventions, although it denies that we have knowledge of logical principles because logical principles make no factual claims. But neither version of conventionalism can be sustained, and I will argue that the view has been rejected for good reason.

A. The Linguistic Doctrine of Logical Truth

In order to understand and evaluate the linguistic doctrine of logical truth, it will be useful to concentrate on the doctrine as it was formulated by one of its leading proponents, Carnap, and as Carnap's theory was further articulated and subsequently criticized by Quine.[89]

i) Implicit Definition

As I stated earlier, the linguistic doctrine of logical truth aims to reduce a priori knowledge to knowledge of definitions, which in turn, are claimed to be conventional.

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[89] Carnap (1937/59). For Quine's presentation of Carnap's views, see Quine/Carnap (1990), ed., Richard Creath. For Quine's criticism, see Quine (1935) and (1954).

Central to Carnap's theory, as well as other forms of conventionalism, is the notion of implicit definition. Implicit definition and the way in which it may be employed to generate truth is explained by Quine in his "Lectures on Carnap" (Quine, 1934, pp. 48-49). Quine contrasts implicit definition with explicit definition as follows: An *explicit* definition is merely a convention of notational abbreviation. In an explicit definition, an arbitrary expression is introduced to stand for a complex expression. So, for example, the term 'momentum' may be introduced as an abbreviation for the complex expression 'mass times velocity'. But the convention of introducing an expression in this way does not generate truth; explicit definition is available only for transforming truth. By contrast, a convention that generates truth as opposed to merely transforming it may be found in a particular employment of implicit definition. An *implicit* definition of a notion K is "a set of one or more rules specifying that all sentences containing the word K in such and such a way are to be accepted, *by convention*, as true; their truth constitutes the meaning of K." (Italics mine.) If the defining rules are adopted by fiat, then the rules, together with any sentences that are consequences of the rules, will allegedly owe their truth to the initial stipulation.

Implicit definition, understood simply as a means of defining a new term by a set of statements that include the term, is a broader notion than the one that Quine defines. Quine's notion of implicit definition, which includes the requirement that the defining rules be stipulated as true, is one subtype of this broader notion, but it is a subtype that is often identified with implicit definition itself. Call this subtype *conventionalist* implicit definition. Conventionalist implicit definition is the notion that, traditionally, has been utilized in attempts to explain a priori knowledge by implicit definition.

It is critical to the claims being advanced by LDLT that the defining rules, i.e., postulates, for the implicit definition of a new term be stipulative. Without this condition, implicit definition neither distinguishes a priori from a posteriori statements nor generates truth in the requisite manner. Implicit definition, in its most basic and broad sense, does not distinguish a priori from a posteriori statements because both kinds

of statements could play the role of a defining postulate. And if the defining postulates are adopted for reasons (a priori or otherwise) in their favor rather being accepted as a matter of fiat, their truth and the truth of any sentences that may be derived from them is not solely dependent upon convention.

Further to this last point, it is not sufficient for the conventionalist thesis that the assignment of a particular word to name the object, concept, or function being defined is conventional. The defining postulates themselves must be conventional. The status of a sentence as a logical truth depends on the meanings of its component terms, and the assignment of a meaning to a particular term is a matter of convention, so there is a sense in which the truth of a logical sentence depends on convention. But as Quine (1954, p. 108) has emphasized, all of language is conventional in this trivial sense: Even so factual a statement as 'Brutus killed Caesar' owes its truth not only to the killing but equally to our using the words the way we do. If 'killed' meant 'begat', the sentence would be false, and it is a matter of convention that the word 'killed' means what it does. For the conventionalist thesis to succeed in explaining knowledge of logic as knowledge of conventions, the adoption of the logical principles themselves must be a matter of convention. Otherwise the doctrine says nothing more than our choice of words is conventional.

The commitments of conventionalist stipulative implicit definition can be illustrated by considering a model for implicit definition that is applicable to scientific terms. In the tradition of Russell, Ramsey, Carnap and Lewis,[90] a theoretical term may be introduced in order to describe the cause of some aspect of a body of experimental or observational phenomena, and the theoretical term denotes what (if anything) plays that causal role.[91] The implicit definition of a scientific term may be divided into two components: one is the acceptance of the substantive empirical theory, and the second is

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[90] Russell (1927), Carnap (1928), Ramsey (1931), and D. Lewis (1970).

[91] This characterization of what the theoretical term denotes is due to Clark Glymour in Salmon, Earman, et. al. (1992), pp. 123-124.

the assignment of some particular term to name the entity or property in question, the existence of which is being asserted by the theory. The choice of a particular term to denote the entity or property in question is a matter of convention, but the commitment to the scientific theory is not. The implicit definition of a scientific term may be formulated as follows: Consider a theory T that may be formulated by one or more postulates in which new theoretic terms, $\tau_1....\tau_n$, occur. The empirical content of a scientific theory can be expressed by its *Ramsey sentence,* which is a statement of the form '$\exists x_1...x_n T[x_1...x_n]$', where '$T[x_1...x_n]$' is to be read as the realization formula of theory T in which each of the theoretical terms of the theory are replaced by free variables of an appropriate type. The Ramsey sentence says that T is realized. The second component of the formulation is the assignment of theoretical terms to denote the *n*-tuple of entities, the existence of which is being asserted by the theory. This assignment may be represented by a conditional of the form '$\exists x_1...x_n T[x_1...x_n] \supset T[\tau_1....\tau_n]$', which is called the *Carnap sentence* of T.[92] The Carnap sentence establish the meaning for newly-introduced theoretical terms, but it is neutral with respect to whether the theory as expressed by '$\exists x_1...x_n T[x_1...x_n]$' is realized.

To consider the case for a single theoretical term '*f*', let the set of postulates of the theory in which '*f*' is to occur be represented by '#*f*'. Then the empirical content of the theory with respect to '*f*' is exhaustively captured by the Ramsey sentence '$\exists x(\#x)$', where 'x' replaces '*f*' throughout the theory. To accept the theory of *f*-ness is to accept the Ramsey sentence that says there is a property that has the characteristics that satisfy '#_' as specified by the theory. The Carnap sentence (or Carnap conditional) is a sentence of the form '$\exists x(\#x) \rightarrow \#f$' that assigns some '*f*' to denote whatever satisfies '#_'.

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[92] Carnap proposed taking the Ramsey sentence as the synthetic postulate of T and the Carnap sentence, which stipulates that if T is realized, then the n-tuple of entities named by $\tau_1...\tau_n$ is one realization of T, as the analytic postulate. (See, for example, "Replies and Systematic Expositions," in Schilpp (1963), Section 24D.)

Acceptance of the Carnap conditional is a convention for fixing the meaning for the new theoretical term '*f*'.[93]

This bipartite form of implicit definition for scientific terms provides a model for how the meanings of theoretical terms could be fixed by the defining postulates of a theory while preserving the empirical character of the theory itself. Subsequent evidence against the theory of *f*-ness would be evidence to the effect that $\neg\exists x(\#x)$. In the event '$\exists x(\#x)$' turns out to be false, the term '*f*' may still mean '#_', but '*f*' may fail to denote any entity or property.[94] The Ramsey-Carnap model shows how scientific terms can be implicitly defined while allowing for the revision of the scientific theories in which those terms occur. If this is right, then the implicit definers need not be true in order to establish a meaning for a definiendum, although in the case of the introduction of a scientific term, they would either be assumed to be true or taken as hypotheses to subsequently be confirmed or disconfirmed.[95]

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[93] This particular formulation of the Ramsey and Carnap sentences for an individual term is developed in Horwich (1998) in his discussion of implicit definition. Horwich calls the conditional '$\exists x(\#x) \rightarrow \#f$' the Carnap conditional, and I will follow suit. The formulation is adopted by Hale and Wright (2000) in their discussion of the implicit definition of scientific terms. Hale and Wright also observe that the implicit definition of a theoretical term might proceed via what they call the "converse-Carnap conditional," which is a sentence of the form '$\forall x(x = f \rightarrow \#x)$'. In this imagined case, what is meant by a term '*f*' might be explained along the lines of saying that if there are *f*'s, then they satisfy the conditions specified by #x. This variation seems plausible, and so might be admitted as a form of a Carnap sentence.

[94] So, for example, phlogiston theory is no longer held to be true, but the meaning of 'phlogiston' is still determined by the role it was thought to play in a (now defunct) theory, even though 'phlogiston' fails to refer. If a scientific theory is revised, a theoretical term might also change its meaning so that it is defined by a different set of claims than it was originally. In the case of a change of meaning, the original term may be discovered to be referentially indeterminate, that is to say, it is indeterminate what (if anything) the original term denoted. A theoretical term would be referentially indeterminate if at least some of its original defining postulates have been overturned such that its original set of defining postulates is inconsistent. (See Field (1973) for discussion of the referential indeterminacy of scientific terms.)

[95] This point about the possible falsity of implicit definers will be important in the next chapter in that it bears on claims made by Boghossian and Peacocke.

On the Ramsey-Carnap model, the postulates of a theory are equivalent to the theory's Ramsey sentence in conjunction with its Carnap sentence. The Ramsey sentence is not stipulated but is supported by empirical evidence, that is to say, '$\exists x_1...x_n T[x_1...x_n]$' is understood to express a set of empirical hypotheses. The related Carnap conditional, '$\exists x_1...x_n T[x_1...x_n] \supset T[\tau_1....\tau_n]$', or for the case of a singular term '$\exists x(\#x) \dashv \#f$', is stipulative, but the knowledge thereby gained is trivial. Statements that are consequences of the definition for a given '*f*' (with the exception of statements of explicit definition making synonymy claims) cannot be understood as true by stipulation because their truth depends on the truth of the substantive part of the theory as expressed by '$\exists x(\#x)$'.

For implicit definition to explain a priori justification in the way that the conventionalist intends, the postulates that articulate the substantive part of the theory, as well as the assignment of a particular word to name the concept being defined, would need to be stipulated. In other words, some analog of the Ramsey sentence '$\exists x_1...x_n T[x_1...x_n]$' would need to be stipulative in character.

As a model for conventional implicit definition, the Ramsey-Carnap model is problematic because, for one thing, the Ramsey sentence entails existential commitment. This would make the model ill suited to a conventionalist treatment of arithmetic, for example, because the Ramsey sentences assumes a referent for the concept being defined, but one could not stipulate the existence of numbers. This problem is discussed by Hale and Wright (2000) who argue that the numerical operator can be implicitly defined by what they take to be the legitimate stipulation of Hume's Principle, $\forall F \forall G(NxFx = NxGx \dashv F\ 1\text{-}1G)$. Hale and Wright argue that the stipulation of the truth of any given sentence would be "arrogant" if its truth cannot be justifiably affirmed without collateral (a posteriori) epistemic work. So the stipulation of the existence of a referent would be arrogant. For example, 'Jack the Ripper' may be stipulatively defined as the perpetrator of certain crimes, but the success of the stipulative definition depends upon there being a single individual who committed the crimes. If no single individual committed the murders or if the disfigured corpses resulted from a series of bizarre accidents, the term

'Jack the Ripper' would fail to refer. And if 'Jack the Ripper' fails to refer, the sentence, 'Jack the Ripper is the perpetrator of these crimes' cannot be stipulated to be true. For a stipulation to be acceptable, it must not be hostage to existence of a referent for the definiendum.

In order to avoid this problem, Hale and Wright (p. 299-300) suggest that, in general, implicit definition should take the following conditional form: Let S(*f*) be a sentence embedding a definiendum '*f*'. Stipulation of the truth of S(*f*) may be arrogant, but there should be no arrogance in the stipulation that the truth of some other sentence(s), S_I, is sufficient for the truth of S(*f*). On the assumption that the stipulations, taken as a whole, are conservative, there will likewise should be no arrogance in the stipulation that S(*f*) suffices for the truth of certain other sentences(s), S_E. Implicit definition can then take the form of the stipulation of the truth of the following schematic pair of conditionals:

I: $S_I \rightarrow S(f)$
E: $S(f) \rightarrow SE$

The conditional form of stipulative implicit definition handles the 'Jack the Ripper' case because it would be perfectly legitimate to stipulate 'If anyone singly perpetrated all these killings, it was Jack the Ripper'.[96]

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[96] Hale and Wright do not ban outright the introduction of new ontological commitments in the consequent, but instead require a stipulation to be conservative in the sense that it cannot introduce fresh ontological commitments which are (i) expressible in the language as it was prior to the introduction of its definiendum and (ii) which concern the previously recognized ontology of concepts, objects, and functions, etc. Clause (ii) is needed because without it, the stipulation of Hume's Principle would not be conservative: the Principle entails that the domain of objects is infinite, which is a claim that could be expressed in the antecedent language and to which there may have been no commitment. But because the entailment of the infinity of the domain is sustained solely by the objects for which the Principle introduces a means of reference, the Principle is conservative in their sense. (p. 302)

According to Hale and Wright, the assertion of the holding of a one-one correlation is sufficient for the truth of the corresponding identity statement between numerical concepts in Hume's Principle. Although this might appear to be a direct stipulation of the existence of numbers, Hale and Wright contend that it isn't. While the antecedent in

While a conditional form of implicit definition (with appropriate restrictions on ontological commitment) might solve the problem of collateral existential commitment, without further refinement, this form of definition obscures the distinction between the stipulation of the truth of the principles that are to define a concept and the stipulative assignment of a particular word to designate the concept being defined. Since there has been some confusion regarding the sense in which an implicit definition is stipulative, it would be desirable to maintain this distinction. After giving their schematic conditional form for implicit definition, Hale and Wright go on to cite the introductory and eliminative stipulations for material conjunction as an example that satisfies their conditions for stipulative definition: the truth of A, together with the truth of B, suffices for that of 'A and B' (this is the introductory conditional), and the truth of 'A and B' suffices for that of A, and likewise for that of B (these are eliminative conditionals). But clearly this example is not some variant of the Carnap conditional, which merely assigns a word to name a concept being defined, because the example involves the joint stipulation that the defining inference rules are truth preserving and that the connective being defined will be called 'and'. While a Carnap conditional is clearly available for outright stipulation, there is no reason to think that the truth of a substantive theory can be stipulated merely by virtue of its being stated in conditional form. Failure to distinguish between the stipulation of a substantive theory and the assignment of a word to name a particular concept being defined is likely to lead to confusion about what is claimed to be stipulative in character and why.[97]

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the introductory component of Hume's Principle, 'F 1-1 G', appears to be free of ontological commitment to numbers, Hale and Wright claim that it is *not* innocent of this ontological commitment. They argue that the stipulation of Hume's Principle is, in effect, a resolution to *reconceive* the subject matter of its introductory components as being committed to the existence of numbers. (p. 317-19) But it is hard to see how such a resolution would not itself be arrogant because the gerrymandering of the introductory contexts of Hume's Principle to include an ontological commitment to numbers would be tantamount to a stipulation of their existence.

[97] The trivial sense in which implicit definition is conventional is sometimes exploited in an attempt to make the claim that logic is true in virtue of meaning, but not true by

For the case of logical constants, the issue of the success of an implicit definition being contingent, in some cases, on the priori existence of a referent does not arise because logical constants do not refer. In the event that a logical connective or functional expression is conceived of as having a referent, one automatically confers a referent upon it by settling its meaning. The problem with the Ramsey-Carnap model vis-a-vis logic is the difficulty of formulating the analog of the Ramsey sentence. The existential quantifier in the Ramsey sentence asserts the existence of an entity that is being implicitly defined, which seems inappropriate for the case of logical constants. But whatever form a conventionalist implicit definition would take for the case of logic, there is a difference in a commitment to a substantive theory and the linguistic decision to express that commitment in a particular way.[98] Whether, on any model of implicit definition, a substantive theory can be stipulated as true to give a conventionalist account of logic is, I will argue, highly questionable.

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convention. For example, Boghossian (1996) argues that the assignment of the value 'true' to a sentence that serves as an implicit definer is arbitrary in that, prior to the assignment, the sentence did not have a complete meaning because one of its ingredient terms did not have a meaning. The assignment of the value 'true' to the sentence fixes its meaning; had the sentence been assigned the value 'false', it would have had a different meaning. Conventionalism does not follow because the assignment of truth to a sentence determines what claim that sentence expresses (if any), but it does not imply that the truth of the claim thereby expressed is conventional. (p. 376-380)

The notion of stipulation that Boghossian employs, however, is too weak to give an account of logic as analytic. On his account, successful stipulation depends upon the independent validity of the set of sentences or inference rules that implicitly define a logical constant. If a stipulation is to succeed, it must pick out a logical proposition or valid inference rule. But the validity of the logical proposition or inference rule itself is not a matter of stipulation. On Boghossian's account, knowledge of logical propositions and, likewise, our ability to determine whether a stipulated sentence has succeeded in picking one out is left unexplained.

[98] That these two factors are distinct components of the acceptance of a particular theory formulation, even if it may be difficult to articulate them in certain cases, has been forcefully argued by Horwich (1998 and 2000). In the case of logic, Horwich notes that there is a difficulty both with respect to the need to quantify into the positions of logical constants and identifying a kind of conditional commitment that can be accepted in the case where logical claims are in dispute. (Horwich 2000, p158-159)

ii) Carnap

Returning finally to the linguistic doctrine of logical truth, Carnap's claim was that the logical constants are implicitly defined via the stipulation of the axioms and rules of inference for a formal system of logic. Since the axioms and rules of inference for a system determine its class of logical truths, all logical truths so determined are allegedly true in virtue of the stipulated meanings of the logical constants, i.e., they are true by convention. Carnap describes the construction of an artificial language as proceeding by the establishment of *formation* rules that determine what is to count as a sentence in the language and *transformation* rules (postulates and rules of inference) that determine the conditions under which sentences may be inferred. The transformation rules implicitly define the logical constants because (1) the logical constants are understood to have no meaning apart from what is instilled in them by the transformation rules and (2) an adequate set of transformation rules will generate those sentences with the logical constants as constituents that are to be accepted, which, when interpreted materially, are true.[99] For any system of logic for which the completeness theorem can be proved, the transformation rules will generate all such sentences.

A sentence is analytic in an artificial language, L, if it is a tautology, that is to say, if it is logically universally true when interpreted materially. (LSL, p. 28) Whether a sentence is analytic in L will depend on the transformation rules because they determine

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[99] In The Logical Syntax of Language ("LSL"), where his conventionalist view is first developed, Carnap eschews the notion of truth, preferring to proceed in a syntactic way to the extent possible. His reasons for this are cited by Richard Creath in Quine/Carnap (1990), ed., Richard Creath, pp. 31-32. Creath notes that at the time, Carnap found the concept of truth problematic because of the semantic paradoxes. Soon thereafter, Carnap adopts and elaborates upon Tarski's results showing that a concept of truth can be defined for a formalized language.

It is sometimes thought that Carnap's syntactic nominalism amounts to an assimilation of truth to syntax, and that any such assimilation was refuted by Godel. But as Coffa (1991) points out, Carnap recognized that truth and theoremhood were two different things, and rather than being written in ignorance of Godel's work, LSL was partly inspired by appreciation of it. Coffa (pp. 287-92) discusses the parts of LSL that are devoted to the task of explicating both mathematical truth and logical consequence.

whether the sentence is a tautology in L; the analytic sentences are those sentences that are consequences of the transformation rules. Since the choice of transformation rules is conventional, whether a sentence is analytic in L allegedly depends on nothing more than our conventional definitions. Carnap took the position that 'analytic' has an exact meaning only in formal languages because he understood logical concepts to be clearly defined only for a formal system once the axioms have been arbitrarily chosen, and only in a formal system can we lay down axioms that will fully determine when two descriptive terms are equivalent.[100]

On Carnap's view, the construction of an artificial language is an arbitrary matter. The choice of transformation rules must be prior to any assignment of meanings to the logical constants because the meanings of their natural-language analogs are inexact, and to assign a meaning to the logical constants, expressible in words, prior to the choice of transformation rules would transmit the inexactness to the formal system. (LSL, p. xv) Carnap understood us to have complete liberty with respect to choice of both the formation and transformation rules for a system such that any axioms and rules of inference may be chosen arbitrarily. This view is expressed by his Principle of Tolerance: *It is not our business to set up prohibitions, but to arrive at conventions.* Carnap goes on to say, "*In logic, there are no morals.* Everyone is at liberty to build up his own logic, i.e., his own form of language, as he wishes." (LSL, p. 51-52). If the transformation rules for an artificial language can be freely chosen, the question of justification with respect to their truth does not arise. No artificial language constructed in this way is "correct," so there can be no conflict between divergent logical systems. Toward the end of *The Logical Syntax of Language*, Carnap indicates that a linguistic framework may be evaluated with respect to its utility, and it may be found to be more or less applicable. If it is found to be inapplicable, we could change the meanings of the logical constants employed in the system. But if this is to be consistent with Carnap's

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[100] See Carnap's "Quine on Analyticity" (1952) in Quine/Carnap (1999), ed. R. Creath, pp. 427-432.

conventionalism, the emended language, while it might be more applicable, would not be more correct. The explanation for why utility would not count in favor of correctness in this case would have to be something along the line that linguistic frameworks are not subject to judgments of correctness because they are not the kind of thing that can be either true or false.[101]

Does Carnap's account of the construction of a formal system show logic to be true by convention? There are certain partial and epistemologically insignificant ways in which the construction of a formal system is conventional. For one thing, the choice of which constants are primitive is arbitrary, so long as the other constants that are intended to be included in the system can be derived from the primitives. And given that the constants may be defined in a range of equivalent ways, there is some latitude with respect to choice of the form of the definition. But these are choices only with respect to notation. Another way in which the construction of formal system might be understood to be conventional is if there is a question about which set of axioms or rules of inference best characterize the ordinary usage of a natural language expression that is to be treated as a logical constant, and one set is chosen arbitrarily over another – perhaps for the purpose of exploring the consequences of a particular choice. But stipulations of this sort do not make the defining axioms and rules of inference thoroughly conventional, unless the natural language expressions that they are understood to represent are likewise established by convention.

There are two different interpretations of Carnap's account that would amount to an epistemologically significant construal of logic as conventional. One is to take logic itself to be nothing more than a system of axioms (and arbitrary rules of inference).

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[101] In the final section of LSL (pp. 315-333), Carnap speaks as if logic is answerable to experience along with scientific hypotheses. But this type of empirical accountability is incompatible with the overall view advanced in the text. The interpretation of the sense in which logic may be answerable to experience must be that a linguistic framework can be found to be more or less applicable, but its pragmatic value does not indicate truth. This aspect of Carnap's thought is discussed in Coffa (1991), pp. 348-353.

Given Carnap's expressed view that everyone is free to invent their own logic, coupled with his view that the concept of analyticity has an exact definition only in a language system, he might be understood as taking the position that logic is any and all systems that may be constructed from a multifarious, open set of axioms and inference rules. On such a view, logical principles exist only for an artificial language because only in an artificial language can they be expressed with the requisite precision; natural languages are too vague to permit their identification. If logic were thus understood, there would be no logic apart from a formal system of axioms because there is no legitimate notion of an unformalized deductive principle that a formal system can be understood to explicate. Carnap's Principle of Tolerance would then be uncontroversial: we are free to invent various formal systems of logic just as we are free to invent various geometries. Some sense could also be made of Carnap's position that logics have varying degrees of utility, but there is no notion of correctness for a logic, because while various logics may be applicable in different contexts, there would be no background logic implicit in the metalanguage by which they are evaluated.

In one sense of 'logic', namely that of a logic being a particular formal system, this suggestion has a degree of plausibility. A logic may be constructed solely for the purposes of evaluating the consequences of a particular set of axioms and rules of inference or to study a particular concept through formalization. But logic cannot be construed merely as a system of arbitrary axioms and rules. For one thing, as I will be discussing shortly, some logical concepts and principles are required to determine what follows from the axioms chosen for any given system. Moreover, the claim of a formal system to be a logic, as opposed to some other type of formal system, resides in the notion that it in some way canonizes the deductive principles that we use in ordinary reasoning. Formal systems that in no way purport to represent natural language expressions as logical constants or canonize deductive arguments as they may be employed in ordinary reasoning are not of any epistemological concern. If what is being proposed is that the term 'logic' be used to mean a formal system that makes no claim to

represent the (perhaps partial) meanings words such as 'and', 'not', 'or' and 'If...then' in the metalanguage, then the conventionalist has changed the subject. Granted formalization is required to identify and make rigorous logical principles, but if logical principles, once rigorously expressed, may be appealed to in ordinary reasoning, it is because the formalization adequately captures a rule that is licensed prior to the formalization. Obviously the epistemological concern is not with logic insofar as it may be understood to be merely a system of axioms, but as a system that is interpreted as, at least partially, representing the meanings of the natural-language expressions (which, on a conventionalist view, may likewise be understood to be established by convention).

If the idea that logic is nothing more than a system of axioms is rejected, the Carnapian model for stipulative definition may be interpreted as representing the way in which epistemologically-basic a priori claims are conventionally-adopted, implicit definitions of the terms that they contain. Epistemically-basic a priori claims are arbitrary in the sense that alternative claims could have been chosen, and there is no epistemic basis for choosing one set of definitions over another; to choose differently would simply be to choose to speak a different language. LDLT would thus be construed broadly as the thesis that the meanings of the expressions in the metalanguage that figure as logical constants in formal systems are conventionally established. This interpretation is consonant with Carnap's and the positivist's overarching view that all a priori statements are definitions, as are the axioms of the theory of knowledge itself, and it is how LDLT is generally understood. The following passage from Ayer (1946, p. 59) illustrates this broader thesis:

> "A material thing cannot be in two places at once" is not an empirical proposition because it simply records the fact that, *as the result of certain verbal conventions*, the proposition that two sense-contents occur in the same visual or tactual sense field is incompatible with the proposition that they belong to the same material thing.

But this view is untenable, as many have argued. LDLT amounts to the claim that logical principles originate in the arbitrary adoption of conventions: we invent logical

truth. It is hard to see how such a view could have been remotely attractive, yet this is how the positivist thesis must be understood if it is to address the foundational issues in the way it purports.

iii) Objections to the Linguistic Doctrine of Logical Truth

The linguistic doctrine of logical truth has been criticized on several grounds. Some of the objections that may be or have been raised against the view are as follows:

(1) LDLT is not well motivated. The adoption of a principle as a matter of convention is an agreement to accept it, but there is no reason to think that a principle so adopted is true – unless the process of adoption itself guarantees its truth. For the case of theoretical empirical terms, the only component of an implicit definition for which the process of adoption guarantees truth is a some variant of the Carnap sentence, '$\exists x(\#x) \rightarrow f$', because, assuming that the antecedent of the Carnap conditional meets the conditions for specifying a meaning (whatever those conditions are taken to be), our effecting a decision to assign a certain meaning to a word would be enough to ensure that it does, in fact, have the meaning so assigned. But the truth thereby created is trivial in that it concerns only the way in which we use our words. By contrast, our deciding to accept the antecedent of a Carnap conditional, which expresses the substantive part of a theory of *f*-ness, does not guarantee the truth of the antecedent; its truth is an empirical matter. There is no reason to think that the case is different for a priori subject matters because it is enough to assign a meaning to a particular term by something akin to the Carnap conditional such that *if* one were to accept a particular set of defining statements (again, on the assumption that the antecedent of the Carnap conditional meets the conditions for specifying a meaning), the term, *f*, will name the concept, function or object being defined. The acceptance of the defining statements in the antecedent of the Carnap conditional is an additional commitment that is not required for *f* to mean what it does.[102] An advocate of a non-classical logic may coherently deny the validity of some subset of

[102] This point is emphasized by Horwich (2000), pp. 157-59.

the principles of classical logic, but he or she is not thereby precluded from understanding the meanings of the classical logical connectives. While the non-classical logician will want to deny that we should reason classically, except, perhaps, under special circumstances, classical terms do not need to be construed as meaningless if the inference rules that are taken to define them are declared invalid.

(2) Even if stipulation could serve as a source of substantive truth, logical principles do not satisfy the conditions for being unrestricted conventions. A convention is an agreement to follow a certain practice that is arbitrary in the sense that some alternative practice could have been chosen or perhaps no practice need have been implemented at all. Conventions such as driving on the right-hand side of the street or placing a fork to the left of the plate for a place setting are arbitrary in that we could easily have chosen otherwise. Likewise, a linguistic convention is a decision of some sort about language to which there is an alternative. This would lead one to expect that logic within a community would change over time, as do fashions or socially-instituted rules. But, while advancements have been made in mathematical logic, and there has been a proliferation of new, non-classical systems of logic, the fundamental logical concepts and principles employed in the metalanguage used to construct these systems have remained stable. Likewise, we would expect logics to vary from culture to culture, as do other conventions, but there is no good evidence that this is the case.[103]

Perhaps there are genetic reasons that humans adopt the same conventions with respect to logic, which explains the lack of variance. But in order to understand logic as conventional, there would have to be alternative choices that we could have made, even if there is conformity with respect to the choices that we actually did (and do) make. If

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[103] There is ample discussion within anthropology as to whether different cultures are equally "rational," and differences in logics between different cultures have been proposed to explain cases of apparent irrationality. (See, for example, Stich 1990.) However, it is far from clear that apparent irrationality is not due to difficulties in translation or that it can't be explained in ways that do not require positing differences in basic logic. For discussion of this issue, see Sperber (1982/94).

logic is purely conventional, our choices should be unrestricted. But while we might have constructed our language using a logic that is weaker than classical logic, we could not have chosen to construct our language in such a way as to make a principle that is (classically) invalid valid or to make an inconsistent set of principles consistent. If we reasoned according to principles that were invalid, e.g., affirming the consequent and denying the antecedent, we would quickly bump up against reality and discover that the principle, which we had legislated as being valid, had produced error. I don't think that evolutionary arguments do much to establish that our existing logic is optimal, but they do count against radical conventionalist views, according to which a choice of logic is purely conventional, because reasoning in ways that are systematically wrong would not be "fitness enhancing,"and so these way of reasoning do not represent stable choices that we could make. Consistency likewise constrains our choice of logic because it is highly questionable whether we could construct our language using an inconsistent set of principles, and even if we could, we could not legislate what is and what is not consistent. Our commitment to logical principles is thus not easily understood as purely conventional.

(3) The division between stipulative and reality-based truth to which LDLT appears to be committed is incoherent. As Quine has emphasized, "legislative postulation contributes truths which become integral to the corpus of truths; the artificiality of their origin does not linger as a localized quality, but suffuses the corpus."[104] If logic is held to be conventional, any allegedly reality-based scientific claims would also have to be taken to be conventional because they are derived with the help of and in accordance with logical principles. With the possible exception of claims about direct sensory experience, our entire corpus of beliefs then would be infected by the conventionalism of logic.

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[104] Quine, "Carnap and Logical Truth, (1956/66), p. 119-20.

(4) Because of (3) above, adopting a conventionalist view about logic would lead to an extreme form of idealism. Not only would logical truth be truth of our own invention, but substantive claims derived with the help of those same logical principles would likewise owe their truth to our having adopted certain conventions. This would make what is true of the world dependent upon our conventions in an implausible way.

(5) There are a number of well-known semantic objections that apply to both the stipulative and the broader notion of implicit definition. One is that implicit definition may fail to pick out a unique concept in that there may be more than one concept that falls under the constraints imposed by the implicit definers.[105] Another problem, made salient by Quine's attack on the analytic/synthetic distinction, is the problem of identifying the implicit definers for the definiendum: which of the many sentences containing a particular term that one might accept should serve as implicit definers for that term?

Since my concern is with epistemological objections to LDLT, and the aforementioned objections are semantic in nature, I mention them only to set them aside. It also should be noted that the second is a problem for any form of definition, so it does not represent a special problem for implicit definition. Hale and Wright (2000, pp. 304-05) have recently identified some additional constraints on implicit definition that are likewise semantic in nature or applicable to other forms of definition, which I propose to ignore as well.[106]

There is one well-known objection to implicit definition, the solution to which does bear directly on the epistemological issues. A set of defining rules or sentences may

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[105] This objection was originally made by Belnap (1962).

[106] One constraint discussed by Hale and Wright is Gareth Evans' *Generality Constraint* (Evans 1982, sect. 4.4) The Generality Constraint says that a stipulation must put a recipient in the position of being able to understand any well-formed sentence '....*f*....', whose matrix '....----....' is intelligible. Hale and Wright also identify a constraint of Harmony that is particular to implicit definition which requires, very loosely speaking, that the network of implicit definers collectively make sense.

be such that they are impossible to satisfy in a way that allows that the definiendum to participate as an element in successful communicative practice.[107] This point was made famous by Prior who proposed the introduction of the connective 'tonk' by implicit definition.[108] The introduction and elimination rules, respectively, for tonk are:

$$\text{I:}\quad \frac{A}{A \text{ tonk } B} \qquad\qquad \text{E:}\quad \frac{A \text{ tonk } B}{B}$$

Acceptance of these rules as implicit definers for 'tonk' licenses the inference of any statement from any other, and so one moral of the story is that the rules fail to establish a non-trivial meaning for 'tonk' because they collectively fail to establish a coherent pattern of use, *ergo*, implicit definition may fail.

Prior's introduction of the spurious connective 'tonk' was intended to show that logical connectives could not be implicitly defined. But Belnap's equally well-known reply[109] is that rather than rejecting implicit definition, the moral to be drawn from 'tonk' is that an implicit definition must be consistent with our antecedent assumptions about deducibility. Logical constants are defined within a framework of understanding of deducibility relations, and any acceptable definition of a logical constant must be consistent with this framework. This requirement of consistency can be met if the introduction of a logical constant is deductively *conservative*, which is to say that any new deducibility statements resulting from its addition to a stock of rules and axioms that characterize antecedent deducibility relations will involve only the newly-introduced constant.

But if these conditions are admitted, as it seems they must be in order for implicit definition succeed, then implicit definition can't be purely stipulative as required by

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[107] This phrasing is due to Hale/Wright (2000, p. 291), who endorse a use-theoretic account of meaning. On a truth-theoretic account of meaning, the charge would be that an implicitly defined term may fail to have any meaning.

[108] Prior (1960).

[109] Belnap (1962).

LDLT. First of all, the prospect of providing an account of all logical concepts as fully conventional is blocked if there are antecendently-held commitments to deducibility relations that restrict stipulation. To sustain the view that logic is conventional, the framework of deducibility relations would have to be understood to be stipulative. But then the prohibition of connectives like 'tonk' isn't guaranteed. Second, consistency is itself a logical concept. The evaluation of a newly-stipulated logical constant for consistency with antecedently-held beliefs would thus presuppose at least the logical concept of consistency.

(6) The decisive blow to LDLT is often thought to have been dealt by Quine who, in addition to arguing against the overall plausibility of the view, showed it to be incoherent by his regress argument in "Truth by Convention." Quine's regress argument shows that even if logical truths are established by convention along the lines that Carnap proposed, an appeal to logic must be made in order to employ the conventions. Quine begins by granting the conventionalist his starting points, that is, he allows for the axiomatic rules from which all logical statements in the propositional calculus may be derived to be established by convention. Because the number of logical truths is infinite, the rules must be stated in general terms. The conventions that Quine utilizes correspond to Lukasiewicz's postulates and rules of inference for the propositional calculus. They are as follows:

I. Let all results for putting statements for 'p', 'q' and 'r' in '(p → q) → [(q → r) → (p → r)]' be true.

II. Let any expression be true which yields a truth when put for 'q' in the result of putting a truth for 'p' in 'p → q'.

III. Let all results of putting a statement for 'p' and a statement for 'q', in 'p → (~p → q)' or '(~p → p) → p' be true.

Quine then proposes to derive an instance of the principle of identity, 'If time is money, then time is money', from the postulates I-III. However, it will be shown that the attempt to derive a specific statement from the general conventions involves us in an

infinite regress. (I have numbered the statements that follow to correspond to Quine's discussion.) Where A = 'If time is money', from Convention III we get

(3) $A \rightarrow (\sim A \rightarrow A)$

(4) $(\sim A \rightarrow A) \rightarrow A$

From Convention I, substituting A for 'p', $(\sim A \rightarrow A)$ for 'q', and A for 'r', we get

(5) $[A \rightarrow (\sim A \rightarrow A)] \rightarrow \{[(\sim A \rightarrow A) \rightarrow A] \rightarrow (A \rightarrow A)\}$

Inferring from Convention II, (3) and (5) give us

(6) $[(\sim A \rightarrow A) \rightarrow A] \rightarrow (A \rightarrow A)$

And again *inferring* from Convention II, (6) and (4) gives us

(2) $A \rightarrow A$ Q.E.D.

An examination of the inference reveals the regress:

We want to infer the following:

(7) (6) is true.

For the purposes of the derivation, Convention II may be rewritten as

II'. $\forall x \forall y \forall z$[If x and z are true statements and z is the result of substituting x for 'p' and y for 'q' in 'p → q', then y is true.]

We will take (II'), (3) and (5) as premises. In addition, we may grant it known that (5) is the result of substituting (3) for 'p' and (6) for 'q' in 'p → q'. We then have

(8) Both (3) and (5) are true, and (5) is the result of substituting (3) for 'p' and (6) for 'q' in 'p → q'.

Assuming a convention has been defined enabling us to infer specific instances from the *every*-idiom, from (II') we have

(9) If (3) and (5) are true, and (5) is the result of substituting (3) for 'p' and (6) for 'q' in 'p → q', then (6) is true.

But to infer (7) from (8) and (9) we need to appeal again to (II'), and a Lewis Carroll-style regress is underway.[110]

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[110] Carroll (1895).

Quine's argument shows that a principle like (II') is required to perform the derivation, and so it can't be a convention. If logic is to proceed *mediately* from the conventions, logic is needed to infer logic from the conventions. In other words, logic is needed in the metalanguage in order to apply the general conventions to individual cases.

Alternatively, Quine says that the problem can be framed as turning upon the "self-presupposition of primitives." It is supposed by the argument that the words being defined as primitives have no meaning until we adopt the conventions, yet these same words are needed in order to communicate the conventions, and so an understanding of them is presupposed. (p. 104)

Can the conventionalist respond to the challenge posed by Quine's argument? One suggestion as to how the regress might be avoided, in part, and in a way that preserves some form of conventionalism, is made by Akiba (1994). Akiba observes that the general principle needed to derive 'q' from 'p. p → q' is just the principle of modus ponens as it can be given syntactically, rather than the semantic version of the rule given by Quine. What Quine's argument shows is that the syntactic derivation rules for logic cannot be determined by convention. However, according to Akiba, one can ask whether the syntactic derivation rules are truth preserving, and Quine's argument leaves open the possibility that the derivation rule for the *truth predicate* could be determined by convention. If so, whether the derivation rules for logic are truth preserving still could be a matter of convention, and so logic might *true* by convention.

But while this move would preserve a form of conventionalism that is immune to the regress argument, it does so at great cost. If the rules for the truth predicate itself are a matter of convention, then the truth of all statements must be conventional. Even if one were to accept a broad-based anti-realism, presumably one would want to distinguish between statements that are well founded and those that are not; the predicate 'true'– perhaps understood only to indicate verification or pragmatic value – might be applied to the former but not the latter. But if the rules for the truth predicate are really arbitrary, there would appear to be no means of distinguishing well-founded statements from ill-

founded ones. This form of conventionalism would be more radical and no more plausible than the view under consideration.

Toward the end of "Truth by Convention," Quine entertains the possibility that the regress argument might be circumvented if the conventions governing the logical constants were to be adopted through behavior rather than formulated explicitly. According to Quine, if the conventions were implicitly adopted through behavior, inference from the general conventions would not be needed initially but would only take place at a "subsequent, sophisticated stage where we frame general statements of the conventions and show how various specific conventional truths, used all along, fit into the general conventions as thus formulated." (pp. 105-106) Quine rejects this possibility, however, on the grounds that it is unclear wherein an adoption of a convention prior to its formulation lies. He thinks that without both the deliberateness and explicitness of formulation, a convention is stripped of its explanatory force in the conventionalist's argument.

David Lewis (1969) sketches an account of convention that does not require conventions to have an explicit formulation prior to their adoption. His basic idea is that a convention may be established in a community of individuals by an exchange of manifestations of a propensity to conform to a regularity of behavior in a recurrent situation. Such a regularity may be established when there is a "coordination problem" that needs to be solved among members of a community. A manifestation of a propensity to conform to a regularity of behavior might be made by verbal agreement, a precedence of action, or a signal of some kind. The manifestations need not be explicitly formulated – they do not even need to be verbal – all that is required is that they be understood as an indication to conform to a regularity of behavior. On Lewis's account, the element of deliberateness is characteristic of a convention because conforming to a regularity, in the relevant sense, is an act of volition. But conventions need not be explicitly formulated prior to their adoption.

It would seem that if logic were to be established by convention, it would have to be established in the way Lewis describes because of the "self-presupposition" problem that Quine identifies. If words such as "not," "and" and "If.. then" are needed to establish conventions of logic, then we must have some understanding of these words prior to explicitly formulating the conventions, and understanding these words includes *inter alia* understanding their role in deductive inference. So it looks like it would be impossible to formulate explicitly all the needed conventions prior to their adoption, not to mention that the idea that of establishing the meanings of locutions such as 'and', 'not', etc. by explicit decree is implausible. A more likely explanation of how these words acquire their meaning is that they are established through regularities of use that precede their explicit formulation. Lewis provides a model for how a regularity that precedes an explicit formulation could be a convention.

Quine locates the conventionality of the adoption of a rule, in part, in the explicit verbal expression of the rule, and so rejects the possibility of a non-verbal or non-explicit convention. But if Lewis is right, conventions need not be adopted by verbal agreement. Quine suggests that eliminating the requirement of explicit formulation for a convention prior to it adoption would circumvent his regress argument. But I think that this is not quite accurate because, while various specific conventional truths might be adopted through behavior and without inference from general conventions, as Quine says, deductive inference rules would be needed to determine what follows from the specific conventional truths. The fact that a rule like modus ponens might be accepted prior to its being made explicit does not exonerate it from the charge that it might also need to be presupposed in order to ascertain what it and other conventionally-adopted logical truths imply. And this is what we should expect – it would be peculiar if the status of a rule as a convention depended solely on whether the rule in question had been made explicit, unless, of course, explicitness is taken to be a defining characteristic of a convention.

Furthermore, Quine is right to point out that dropping the attributes of deliberateness and explicitness from the notion of linguistic convention risk depriving the notion of convention from its explanatory force in the current context. While Lewis may have shown how conventions need not be explicit, it is unclear how one would establish the conventionality of logic without this feature. (It should be mentioned that it was not Lewis's intention to establish the conventionality of logic in formulating his conception of a convention.) For our logic to be conventional, it must be understood to represent one choice, based on pragmatic but non-epistemic reasons, from any number of alternative choices that we can or could have made. Without so much as articulating the choice prior to its adoption, and in the absence of any clear alternative choices, there is no basis for characterizing our acceptance of logical principles as the adoption of conventions.

As Quine's regress argument and the earlier-cited considerations show, the account of the logical principles that establish the meanings of the logical constants as being conventionally established is both implausible and incoherent. Logic could not be true by convention, and so the linguistic doctrine of truth fails to give an account of logic as analytic.

B. Non-Factual Conventionalism

A conventionalist alternative to LDLT would be to take logical principles to be conventional but non-factual, where "non-factual' is understood to mean not truth-evaluable. This view is most often associated with the writings of Wittgenstein in the early 1930's, although it is somewhat unclear how committed he was during this time period to the view that logical principles are purely conventional.

In the Tractatus, Wittgenstein spoke of logical sentences as having the appearance of propositions, although they are propositions of a peculiar sort because they have no content:

> The propositions of logic are tautologies. The propositions of logic, therefore, say nothing. (They are the analytic propositions.)... Theories which make a

> proposition of logic appear substantial are always false. (Sects. 6.1 -6.111, C.K. Ogden translation)

The role of logical propositions, as Wittgenstein understood them in the Tractatus, is to constitute meanings rather than to state anything true. But on his view there expressed, the choice of logical propositions is not arbitrary: the propositions of logic demonstrate the logical properties of propositions. (Sect. 6.121) In so doing, they reflect an independent reality. And while we cannot *say* that grammar should have the form of reality, because a language used to make the claim would presuppose logic, the propositions of logic allegedly *show* that it does. (Sects. 4.12- 4.1212)

While some of Wittgenstein's writings after the Tractatus suggest that he maintained the view that choice of logical principles is bound by reality, other passages suggest that he had moved to a more conventionalist view whereby such choices are arbitrary.[111] In Lectures (1930-32) he says

> Grammatical rules are arbitrary, but their application is *not*. There cannot therefore be discussion about whether this set of rules or another are the correct rules for the word "not"; for unless the grammatical rules are given, "not" has no meaning at all. When you change the grammatical rules, you change the meaning of the word. You cannot describe negation in terms of negation because that presupposes that you already know what the meaning of negation is. (Lecture B XV, Sect. 1, p. 58)

In Lectures (1932-35) he expounds on the view that logical principles are analogous to arbitrary grammatical rules, appearing to endorse a thorough-going conventionalism:

> The laws of logic, e.g., excluded middle and contradiction, are arbitrary. This statement is a bit repulsive but nevertheless true.
>
> ... The law of contradiction can, but need not, be used as a law of our expression. Contradiction can be dealt with in mathematics either as something forbidden or as something allowed. 2 + 2 = 4 and 2 + 2 = 5 together might be useless but not false. Together they would give a new mathematics. (Sect. 18, pp. 71-78)

According to the non-factualist conventionalist view, principles of logic are arbitrary in that we may choose to endorse them or not when constructing our language;

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[111] The various competing strains of Wittgenstein's thought during this period are identified and discussed in Coffa (1991), esp. Chapter 14, pp. 268-71.

however, once the principles are established, there can be no discussion about whether the adopted rules are correct because the rules are such that they give meaning to the logical constants. But the rules are "correct" only in the sense that a grammatical rule is correct; like grammatical rules, logical principles do not express anything true. While there may be no stable view of Wittgenstein's according to which he regarded choice of logical principles as arbitrary in this way, his overall view that the role of logical propositions is to constitute meaning rather than express anything true, coupled with conventionalism about the choice of logical principles that he at times endorsed, generates a conventionalist alternative to LDLT.

One obvious merit of this form of conventionalism is that it dispenses with the implausible idea that we invent logical truth. On the other hand, the view has the disadvantage that it leads directly to an extreme form of skepticism because of the role elementary logical rules play in our thought. While the view correctly identifies the fundamental role logical principles play in the constitution of meaning and recognizes that language must respect the adopted rules in order for communication to be possible, it denies that logical propositions are truth-evaluable. But if logical propositions are really non-factual, so are any statements arrived at with their assistance, and consequently, the non-factualism will not be confined to logic but will permeate our entire system of beliefs. As LDLT would make most factual claims true by convention, non-factual conventionalism would deny them truth-evaluable status.

With the exception of the objections to stipulated truth *per se*, non-factualist conventionalism is vulnerable to the same objections as LDLT. The problem of justification for the logical principles and the implausibility of the logical principles being conventional both apply. If logical rules are arbitrary, what justifies us in adhering to them? There is no reason, according to the non-factualist view, that we could not chose alternative rules, thereby creating new meanings for the logical constants. And if logical principles are arbitrary conventions, we should have complete freedom with respect to their implementation. But as Prior's example of 'tonk' shows, meaning-

constituting rules are constrained by considerations of consistency. So logical principles can't be purely conventional. Non-factual conventionalism is also subject to Quine's regress argument: even if logical principles are understood to be non-factual linguistic conventions, logic would still be needed to apply the conventions, which counts against the prospects for construing logic as being conventional in character. The fact that the conventions are taken to be non-factual does not affect the structure of Quine's argument.[112] A non-factual conventionalism is no more tenable than the linguistic doctrine of truth.

III. Alternative Conceptions of Analyticity

Although conventionalism is widely understood to have been refuted, some philosophers have retained the hope that a priori justification can be explained by some alternative notion of analyticity. I will look at some characterizations of analyticity to which philosophers have appealed in order to explain how logic is "true in virtue of meaning" that do not rely on conventionalism. I will argue that none of these accounts of analyticity are satisfactory, which suggests that the idea that logic could be analytic has persisted largely because the notion of analyticity employed is unexamined.

A. Epistemological Non-Starters

One strategy to precisify the sense in which logic could be true in virtue of meaning that can't be of any epistemological value is to, in some way, equate analyticity with the concept of the a priori itself.[113] It is not uncommon to find statements to the effect that a proposition is analytic when we can know it to be true solely in virtue of *understanding* the meanings of the terms that it contains. So, for example, Carnap in "Quine on Logical Truth" offers the following characterization of analyticity: an analytic

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[112] Boghossian (2000) make this point against non-factualist views about logic, generally.

[113] Bonjour (1998) discusses this problem in his section entitled "Obfuscating Notions of Analyticity" in Chapter Two.

sentence is one where to understand it is a sufficient basis for the determination of its truth.[114] (This definition is offered by Carnap by way of explanation of the sense in which logic should be understood as analytic after renouncing the conventionalism that he advocated earlier in his career.)

But the problem with attempting to explain a priori justification in terms of an account of analyticity that appeals to our understanding of the terms contained in an analytic proposition is that, without further explanation as to how the meanings of the terms are to account for our understanding, the concept of analyticity employed fails to distinguish an analytic proposition from an a priori-justified proposition. In his discussion of this particular issue, Bonjour (1998, p. 37) notes that the traditional definition of an a priori-justified proposition is sometimes given as one that need only be understood to see that it is true.[115] An a priorist would no doubt claim that if you possessed the concepts of *green* and *red*, you would understand that something cannot be simultaneously red and green all over – no appeal to empirical evidence is needed. So understanding the constituent terms is sufficient to see that the claim must be true. But this statement leaves our recognition of the incompatibility of the claim that something is green and red at the same time and in the same respects unexplained. The challenge for an empiricist who wants to reduce knowledge of a priori propositions to knowledge of meanings is to say *how* meanings are to account for our understanding of such propositions. As Bonjour goes on to point out, if the appeal to analyticity is to have any epistemological significance, it must give an articulated account of how justification is supposed to result solely from meanings.

Another sense of 'analytic' that would be equivalent to the a priori concept that it is intended to explain is a characterization of analytic propositions as non-factual, where 'non-factual' just means non-empirical. This sense of non-factual is to be distinguished

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[114] Carnap (1963) in Schilpp (1963), p. 916.

[115] Bonjour here cites Chisholm (1977), p. 40.

from the sense of non-factual as being not truth-evaluable, which was discussed earlier. Ayer (1936/52) invokes a proposition's being non-factual in the sense of non-empirical when he contrasts an analytic proposition as one whose validity depends solely on the definitions of the symbols it contains with a synthetic proposition whose validity is determined by the facts of experience. Ayer employs other characterizations of 'analytic' as well, but the idea that an analytic statement may be defined in terms of its non-empirical status is expressed in the following passages:

> ...the proposition "Either some ants are parasitic or none are" is an analytic proposition. For one need not resort to observation to discover that there either are or are not ants which are parasitic....
>
> It is to be noticed that the proposition "Either some ants are parasitic or none are" provides no information whatsoever about the behavior of ants, or, indeed, about any matter of fact. And this applies to all analytic propositions...they are devoid of factual content. (78-79)

If by having factual content, Ayer means "to be evaluated empirically," then in contrasting analytical with empirical propositions, he is conflating analyticity with a priority. Any account of analyticity that is indistinguishable from the concept it is trying to explain obviously will fail to elucidate our understanding of the a priori.[116]

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[116] Bonjour, ibid., (p. 44-45) also discusses the strategy of equating analyticity with necessity – perhaps by identifying analyticity with truth in all possible worlds or the property of being tautological. But a priori justification is in no way explained by this maneuver: the question of how we know a proposition a priori is merely relocated as the question of how we know that some propositions are necessary. Moreover, such an account would have the further weakness that it may not pick out all and only the a priori propositions. There may some a priori-justified propositions that are contingent, such as propositions that fix the reference of a term, as well as necessary propositions that are a posteriori, such as basic physical laws.

Bonjour notes that the claim that an analytic proposition is true in all possible worlds could either identify analyticity with necessity or be a further thesis about analytic propositions, and it is not always clear in which of the two ways a writer may intend the claim to be understood. But it is clear that as a definition of analyticity, the thesis is unenlightening from an epistemological standpoint.

B. C. I. Lewis

A more developed account of analyticity is to be found in the work of C.I. Lewis (1946) who identifies the meaning of a term with everything that follows by necessity from its application. For Lewis, our knowledge of the meanings of the logical constants gives us knowledge of logical principles because the latter is included in the former: statements of logic are analytic because they are capable of being certified from the definitive meanings of their component logical constants and their syntactic relations. On Lewis's view, statements of logic are a subset of analytic statements. Logical statements are marked off as a class from other analytic statements only by having "a certain kind of generality that makes them specially useful for the critique of inference." (p. 97) But there is no principled way to distinguish between logic and other analytic statements because many statements that meet the generality condition are not commonly understood as belonging to logic, and differences in the degree of usefulness for the evaluation of consistency and validity are insufficient to ground an absolute distinction. What statements constitute the subset that is logic is a matter of convention or pragmatic decision. (p.124-25)

For Lewis, an analytic statement is "one that can be certified by reference exclusively to defined or definable meanings." (p. 35) The explanation of how meanings are to provide the basis for certification is developed along the lines of the Kantian idea that, for an analytic statement, the meaning of the predicate is contained in the subject term. Lewis emphasizes that the meanings to which we appeal in understanding an analytic statement are intensional. A statement is analytic if what it asserts can be explained by one term being contained in the intension of another. Intensional meaning is to be identified with the "criterion in mind" by which it is determined whether the term in question applies or fails to apply in any particular instances. Formally considered, the intension of a term is to be identified with the conjunction of all other terms that must be applicable to anything to which the given term would be correctly applicable. If by reference to our criterion in mind, 'A' will apply to a thing only if some other term 'B'

also applies, then 'A' connotes 'B' and 'B' is contained in the connotation or intension of 'A'. (pp. 39-44). For the case of the logical constants, their intension will be identified with their entailment relations.

According to Lewis, intensional meaning can be specified either as *linguistic* meaning, which is constituted by the pattern of definitive and other analytic relationships holding between linguistic expressions, or as *sense* meaning, which is constituted by the criterion in mind by which what is meant is to be recognized. Lewis characterizes sense meaning as a *schema*, i.e., a rule or criterion that determines the applicability for an expression by way of sense-presentable characters. So, for example, we may not be able to imagine a chiliagon (a one-thousand-sided polygon), but we do have a schema for a chiliagon in that can imagine counting the sides of a polygon and getting one thousand as the result. On Lewis's view, sense meanings are the more basic notion because they are the fundamental cognitive phenomena, whereas linguistic meanings are relative to a language, and so are a derivative phenomenon that is parasitic on sense meaning.

Lewis does not explain how logical terms might be understood to have sense meaning, and it is hard to see how his account of sense meaning could be extended to the logical constants. Lewis does note that one may doubt whether terms of universal applicability such as logical principles have sense meaning; however, he claims that it would be dogmatic to assert that logic deals only with relations of linguistic expressions (although he does acknowledge that formal systems do not require more than linguistic meaning). (p. 142)

Given that intensional meaning, whether it is specified as linguistic or sense meaning, is identified with all that it connoted by a term, the truth of logical principles is to be explained in terms of the intensional meanings of the logical constants. By way of illustration, Lewis discusses the validity of the "AAA" syllogism:

> ...the two statements, (1) "If all M is P and all S is M, then all S is P," and (2) "The relation of X to Y expressed by 'All X is Y' is transitive," are merely two ways of saying the same thing. And how should one know the fact so stated? Obviously, by knowing what 'all' and 'is' mean, and under-standing the syntax of expression in the form, "All _____ is _____." One who understands English to

> that extent, will know that the relation so expressed is transitive. In other words, we know the truth of "If all A is B and all B is C, then all A is C" by knowing the meaning of the *constants* in this statement and understanding it syntactically. (p. 118)

According to Lewis, to know the meaning of a logical constant is to know its connotation. Consequently, logical principles may be understood to be analytic because understanding the intensional meanings of the logical constants is sufficient to certify their truth.

Lewis's account of meaning runs afoul of some well-known objections. One is the difficulty of providing a unique set of conditions that determine the meaning of a term. Another is the question of which entailment relations of a term should be understood to be constitutive of its meaning; the claim that all of them are is, to say the least, controversial. But, setting aside the semantic worries once again, the epistemological objection to Lewis's account of meaning is that the logical principles in need of explanation – the axiomatic principles from which other principles may be deduced – are *included* in the very meanings that are supposed to explain them. While it is no doubt true that to understand the meaning of 'all', one would need to understand it entailment relations, this appeal to meaning can't be used to give an account of logic as analytic because our knowledge of the entailment relations are what is to be explained. In effect, what Lewis has done is to expand meanings to include logic. It is then trivial to claim that knowledge of the meaning of logical constants gives us knowledge of logic. An explanation of logic as analytic by virtue of understanding the meanings of the logical constants, where that understanding already includes an understanding of their entailment relations, and hence, of logic itself, cannot be used to explain our knowledge of logic because it is flagrantly circular.

IV. Conclusions

No account of analyticity has been given that provides a satisfactory explanation of a priori justification. Conventionalism at least has the merit of providing a concept of

analyticity that is suitable to the task, but in addition its overall implausibility, the view is incoherent because logic is needed to apply the conventions. No alternative notion of analyticity has been proposed that could explain how logic is analytic, and there is no reason to believe that workable notion can be produced. I will next consider efforts to locate the origins of the a priori knowledge of logic in semantics without attempting to show that logic itself is, strictly speaking, analytic.

CHAPTER FIVE

SEMANTIC ACCOUNTS OF THE A PRIORITY OF LOGIC

PART II: ALTERNATIVES TO ANALYTICITY

I. Introduction

An approach that locates the genesis of knowledge of logic in meanings without taking logic to be straightforwardly analytic can be found in recent work of Paul Boghossian and Christopher Peacocke. On their views, the logical constants are defined by their role in deductive inference, and our recognition of these inferential roles as being meaning constituting provides the basis for our a priori knowledge of logical principles. Defining a word in terms of its inferential role is a form of implicit definition, but for the accounts being advanced here, the validity of the rules that function as implicit definers is not understood to be stipulative.[117] If the validity of the defining rules is not stipulated, some alternative account of how we have knowledge of their validity will need to be provided. The challenge for this deflationary strategy is to say how we have knowledge of the validity of the rules that may function as implicit definers in such a way that our knowledge is fully explained by meanings.

II. Conceptual Role Semantics and the Meaning Constitutiveness of Logical Principles

Both Peacocke and Boghossian endorse some version of a conceptual role theory of meaning for the logical constants to which they appeal in order to provide the grounds

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[117] Peacocke (1993, pp. 182-86) explicitly contrasts his view with conventionalism. In an earlier paper, "Analyticity Reconsidered" (1996), Boghossian does characterize implicit definition as stipulative, but not in a strong sense that leads to conventionalism. (See footnote thirteen in Chapter Four, pp. 16-17). His characterization of implicit definition as stipulative is dropped in the more recent paper that I will be discussing here.

for the justification of logical principles. A conceptual role theory of meaning specifies the role of a concept within an individual thinker's cognitive economy, and as such. it provides a theory of meaning for mental representations. Conceptual role theories have been extended by some philosophers (not uncontroversially) to provide a semantics for public-language expressions that is suited to scientific linguistics.[118] Such a theory will specify the meaning of an expression, at least in part, in terms of role it plays in a thinker's cognitive economy. The full meaning of an expression may be understood to be given by a relation between the expression and the external world, in conjunction with its conceptual role, as is the case for "two-factor" conceptual role theories. The external relation component of meaning is designed to account for its reference-determining features.

The conceptual role of words such as 'not', 'and', 'or' and 'If... then', includes their role in deductive inferences. Insofar as these expressions function as logical constants, their meaning is individuated by their participation in some deductive inferences and not others. Some subset of the inferences in which a logical constant participates may be understood to be constitutive of its meaning. It is a challenge for a conceptual role theory of meaning to specify which subsets should be understood to be meaning constituting; however, the meaning of a logical constant is understood to be fully determined by its inferential role because a logical constant does not denote anything in the world. On a conceptual role theory, there is no additional component of meaning, apart from the specification that the meaning-constituting inferences are valid, that is required to determine the semantic value of a logical constant. The semantic value of a logical constant will just be that assignment of truth values that makes its make its meaning-constituting inferences valid.

Characterizing the meaning of expressions in a public language in terms of their conceptual role is controversial *inter alia* because the role that a particular expression

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[118] See, for example, Harman (1972) and Sellars (1974).

plays within a thinker's total cognitive economy may not be the same for any two individuals. However, to the extent that the meaning of an expression can be specified by a canonical inferential role – as would appear to be the case for the logical constants – the extension of a conceptual role semantics to public language expressions should not be objectionable. The meanings for the logical constants could then be understood to be given by their inferential roles for members of a linguistic community. Peacocke clearly intends his approach to apply to public language expressions because his notion of a concept, for which his version of conceptual role semantics is developed, takes concepts to be objective, abstract entities -- akin to Fregean senses. For Peacocke, concepts are to be individuated by their "possession conditions," which are canonical conceptual roles that specify the meaning of the concept.[119] Likewise, Boghossian speaks of the meanings of our logical expressions as being given by their conceptual role, which suggests that his analysis is not intended to be restricted to their meanings in an individual thinker's system of mental representation.

What are the epistemological implications of a conceptual role semantics for the logical constants? For one thing, defining the logical constants in terms of their inferential role might appear to preclude revision of the defining inference rules on empirical grounds. The rules that define the logical constants may be thought to be immune to empirical revision because further discoveries could not bring about a change of meaning for a logical constant based on a change in its denotation or extension. By contrast, the conditions that govern the application of a scientific term may change in light of further empirical discoveries.[120] A definition of a logical constant would not be subject to revision in the same sort of way because a definition in terms of rules does not involve reference to entities in the world. On the other hand, without imposing further

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[119] See Peacocke (1992), pp. 111-112.

[120] An example that is often cited is the change in meaning of the term 'mass' subsequent to the development of relativity theory. The classical and relativistic concepts of mass are very different, and arguably, 'mass' as understood classically does not denote the same physical quantity as 'mass' does today (see Feyerabend (1963) and Field (1973)).

conditions, the possibility of discovering a counterexample to a rule of inference or finding the rule to be inapplicable is not similarly blocked by features of meaning. So a definition of a logical concept in terms of its inferential role does not, in and of itself, preclude it from being empirically undermined in any way.

The epistemological implication that Boghossian and Peacocke want to claim for conceptual role semantics is that if a rule of inference is meaning constituting, the rule must be valid, and so a priori knowledge of logical principles is ultimately to be explained by knowledge of meanings. Whatever plausibility this claim may have resides in the thought that if rules are meaning constituting for certain of a thinker's fundamental concepts, the thinker is at least prima facie entitled to accept them. Both Boghossian and Peacocke go on to argue for the justification of our acceptance of logical principles based onthe fact that certain inferential rules are meaning-constituting for the logical constants.

i) Peacocke

Peacocke (1992, 1993, 1998a, 2000) draws from his analysis of concepts to argue for the a priority of logical principles. The concepts that form the subject matter of Peacocke's theory are objective, abstract entities that are analogous to Fregean senses, and they are individuated by considerations of cognitive significance. Peacocke's notion of a concept is to be distinguished from the use of the term 'concept' to mean mental representation; on his account, the two are not equivalent. It is possible for a concept, in Peacocke's sense, to receive different mental representations in different individuals. However, there is nothing more to the nature of a concept than what is determined by a correct account of the capacity of a thinker to grasp the concept. (1992, pp. 1-5)

In his 1992 and 1993 work, Peacocke argues that a concept is to be individuated by its possession condition, which is a correct, non-circular statement of what has to be true of a thinker for him to possess the concept. The possession condition for a given concept *F* may be stated in the following schematic form: the concept *F* is that concept *C* to possess which a thinker must meet the condition *A(C)*, where it is required that the concept *F* not be mentioned as such within the scope of the thinker's propositional

attitudes described in the condition *A(C)*. The condition *A(C)* specifies a conceptual role in the thinker's cognitive economy that is constitutive of the target concept. The conceptual role is here specified at the "personal" as opposed to the "subpersonal" level. Personal-level conceptual role theories specify the role of an expression in applications such as thought, acceptance or action, whereas subpersonal theories specify its role in a cognitive system(s) that subserves thought.

Peacocke (1998a, 1998b) subsequently relinquishes his requirement that all concepts must be individuated by a non-circular statement of their possession condition in the *A(C)* form. The former notion of a possession condition is replaced by what he calls an "implicit conception." An implicit conception is a sub-personal, propositional attitude, and its content is at least partially constitutive of its associated concept.[121] Depending on the concept, its associated implicit conception may or may not be amenable to statement in the *A(C)* form. In some cases, a statement of the implicit conception will re-use the concept that is being defined in the definiens. So, for example, the concept of alternation, which is expressed by the logical constant 'or', is underlain by an implicit conception with the following content: any thought (content) of the form 'A or B' is true iff either A is true or B is true. The second occurrence of 'or' violates the non-circularity constraint of the *A(C)* form. Peacocke claims that this violation is unobjectionable in the explication of a concept because one can draw on one's mastery of a concept to assess its implications, and so a statement about what is involved in the possession of a concept that violates the *A(C)* form is not vacuous.

Peacocke believes that implicit conceptions are needed to explain what he calls the "Phenomenon of New Principles," which is the rational, justified acceptance of new principles involving a concept, where the explicit endorsement of the principles is not a requirement for possession of the concept. In particular, he thinks that logical concepts

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[121] The content of an implicit conception need not take the form of a definition: it could involve the structure of a prototype and similarity relation or set of similarity relations. (Peacocke 1998b, p. 140)

involved in deductive inference are underlain by implicit conceptions that explain our initial acceptance of the primitive logical principles involving those concepts. The rational acceptance of a logical principle may be accomplished via a simulation exercise in which the thinker considers various cases that are relevant to the evaluation of the principle in question. This simulation will be guided by his understanding of the principle's component connectives, and his understanding of the connectives involves (or perhaps may be identified with) his possessing implicit conceptions that partially define the concepts that the connectives express and which explain his particular patterns of semantic evaluation. (1998, pp. 43-46)

The alleged implications of Peacocke's theory of concepts for a priori knowledge is that "a correct theory of the nature of a given concept can explain why certain truths involving that concept can be known a priori." (1998, p. 131) The scope of this claim differs for his original and revised views. On the original view, the constraints on the possession conditions for logical concepts that are expressed by the logical constants allegedly ensure that the defining inference rules are known a priori. On the revised view, logical concepts are underlain by implicit conceptions, the content of which re-uses the logical concept in question to give a formulation of its contribution to truth conditions. Elementary logical principles then may be known a priori by drawing on one's understanding of the logical connectives, where this understanding consists in having an implicit conception of the appropriate type. The revised view claims to explain our rational acceptance of explicit logical axioms; it does not explain our knowledge of the validity of any logical principles used to arrive at their acceptance, nor is it committed to the possibility of their explanation. (1998, pp. 85-86)

I will discuss Peacocke's original thesis first, which I argue does not demonstrate the truth of those contents that we take to be a priori in a non-question-begging way. I will then consider the revised view, which makes more modest epistemological claims; however, it should be clear that the circularity employed in implicit conceptions on the more modest view precludes it from meeting the epistemological task at hand.

On Peacocke's original view, the possession conditions for the concepts expressed by logical constants are those principles that identify their paradigmatic inferential roles. Which principles constitute the possession conditions for these concepts may be difficult to specify, and some cases will be more difficult than others,[122] but presumably, inferential roles exhaust the possession conditions for a logical concept; no appeal to external factors is necessary. So, for example, the possession condition for conjunction will specify the following introduction and elimination rules:

$$\frac{A \quad B}{A \,\&\, B} \qquad \frac{A \,\&\, B}{A} \qquad \frac{A \,\&\, B}{B}$$

For a thinker to plausibly be said to have the concept '&', she would have to accept the above principles, which are constitutive of the meaning of '&'. Moreover, according to Peacocke, she would have to accept them because they are "primitively compelling," which is to say that they appear obvious and their obviousness is not the result of inference from more basic principles or beliefs.

A possession condition for a concept, commonly together with the way the world is, must determine the semantic value for the concept. This is the principle that sense determines reference as it is expressed in Peacocke's theory. If possession conditions did not determine the semantic value of their target concepts, the theory would not give a satisfactory account of how concepts are combinable into contents that are truth-evaluable because any such account must involve the notion of the semantic value, or reference, of a concept. Peacocke calls the correct specification of the semantic value of a concept a "determination theory."[123] The determination theory for a logical constant is

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[122] See Peacocke (1987) for discussion of the complexities that arise in specifying what the possession conditions could be for more complex logical constants, such as the existential quantifier.

[123] Peacocke (1993, p. 177). Peacocke has been criticized by Horwich (1995, p. 366) for providing an inflationary account of truth and reference that is incorrect. Horwich argues that a determination theory is unnecessary because once a concept F has been identified, it referent is specified disquotationally and trivially as the set of Fs. Peacocke proclaims neutrality on this issue, stating that his claim is only that any (appropriate) sentence can

that assignment of truth values that makes the inferences that constitute the possession condition for the logical constant in question always truth preserving.[124]

This analysis of concepts is pressed into service to give an explanation of a priori truth on the following model:

> the a priori status of a content...is fundamentally explained by the fact that the possession conditions for the concepts from which those contents are composed, together with the corresponding determination theories for those concepts, jointly guarantee that the content is true in the actual world. (1993, p. 178)

On this model, the *a priori* status of a logical proposition is guaranteed by the *way* in which the principles that constitute the possession conditions for its constituent concepts must be accepted by a thinker if he is to possess those concepts. For the case of logical constants, the relevant method of acceptance is that a thinker must find the inference rules that constitute their possession conditions "non-inferentially compelling," and must do so because of their form. The *validity* of a meaning-constituting inference rule is allegedly secured by the determination theory for its target concept because the determination theory for a logical constant says that its semantic value is that assignment of truth values that makes its defining inferences truth-preserving. (1993, pp. 178, 184, 187, 190) It is also a requirement of Peacocke's theory that there be a determination theory that determines a semantic value for every legitimate concept. A concept for which no account of its semantic value is possible, such as 'tonk', would be a spurious concept. (1992, pp. 20-21)

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be said to be true in virtue of its disquoted truth condition. (Peacocke 1993, p. 187). However, his talk of value-fixing relations that hold between a possession condition and an entity of the appropriate type that is its semantic value would suggest otherwise.

[124] This requires some refinement: for classical logic, the assignment would have to be the simplest assignment of truth values that makes the inferences necessarily truth preserving and the inferences we reject not necessarily truth preserving. (Field 2001, p. 27, Postscript to "Tarski's Theory of Truth.") Further discussion and refinement of the method of assigning truth values can be found in Peacocke (1987, 1992).

These features of concept possession are then utilized in an attempt to explain our a priori knowledge of the validity of the meaning-constituting inference rules. The possession conditions, together with their associated determination theories, purportedly ensure that the meaning-constituting inference rules are known a priori through possession of the relevant concepts because a rule of inference is meaning constituting only if it is valid: in order to be legitimate, a concept must have a semantic value, and the semantic value of a logical constant is that assignment of truth values that makes its defining inference rules truth preserving. The general claim being advanced is that if an inference rule is meaning constituting, then we are justified in accepting it.

However, in the absence of some special reason for believing meaning-constituting inference rules to be valid, the general claim that any meaning-constituting proposition must be true is implausible.[125] As was argued in the previous chapter, implicit definers may be false. To suggest otherwise would be to commit oneself to the view that whenever a defining postulate is revised, any concept that thereby comes to be revised or no longer has a referent must have been meaningless. And from an epistemological perspective, such a view about meaning would offer no advantage because it does not ensure that our current concepts will not turn out to be meaningless. There is no reason to think that, in general, the veridicality of a proposition or rule is certified by our taking it to be part of the possession condition for a concept.

But could logic be a special case? That is, do the possession conditions for logical concepts ensure the validity of their meaning-constituting rules? Peacocke's theory requires legitimate concepts to have a semantic value. If this requirement is granted, it might appear that the answer is affirmative because the semantic value of a logical constant is that assignment of truth values that makes its meaning-constituting inference rules valid. However, as I argued in the previous chapter, accepting this

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[125] This objection to Peacocke's thesis is also made by Horwich (1998, pp. 146-48; 2000, p. 165)

requirement would have deleterious consequences for an epistemological thesis that claimed that a priori knowledge is fully explained by meanings: in order to know whether a concept is legitimate, one would have to know when an assignment of truth values makes a set of inferences valid and when it doesn't, so knowledge of the validity of logical principles must be presupposed in order to determine when a concept is legitimate.

The conditions on legitimacy, in conjunction with the claim that the semantic value of a logical constant is that assignment of truth values that makes its defining inferences rule truth preserving, do provide a reason for thinking that the defining inference rules are valid. But these features of concept possession can't then be used to *explain* our knowledge of the validity of the rules because this knowledge must be presupposed in order to determine when we possess a legitimate logical-connective concept. An explanation of our a priori knowledge of logical principles by a theory of concept possession that requires us to know when a set of defining inference rules is valid, and so eligible as a possession condition for a logical concept, is obviously circular: in order to know whether a logical concept has been defined, we must first know that the inference rules that are to define it are valid. Peacocke's account fails to give an explanation of a priori knowledge of logic because it gives no non-question-begging explanation of how we know that the inference rules of the possession conditions for the logical constants are truth preserving.

Peacocke's revised view claims that our understanding of a logical connective is underlain by an implicit conception that, at least partially, defines the concept that the logical connective expresses, and a thinker's having that implicit conception explains his rational acceptance of basic logical principles involving the logical connective in question. In coming to accept an axiomatic logical principle for the first time, a thinker draws on his understanding of the connectives employed in the principle to evaluate it for validity. The thinker can come to rationally accept a primitive logical principle through a simulation exercise in which he entertains all the relevant combinations of truth values

for principle's component variables. Peacocke gives an example of a student first being introduced to the axiom (A ⊃ (A v B)). One way in which the student might come to appreciate the validity of the axiom is by entertaining the possible combinations of truth values for 'A' and 'B' in the context of the principle. In so doing, he draws on his understanding of the words 'or' and 'If, then'. Peacocke's suggestion is that the thinker's understanding of the connectives involves (or perhaps is to be identified with) his possession of defining implicit conceptions. For example, the thinker's understanding of 'or' is underlain by an implicit conception with the content that any sentence of the form 'A or B' is true iff A is true or B is true. The thinker need not have explicit knowledge of the implicit conception, but rather the implicit conception guides his patterns of semantic evaluation in the simulation. Peacocke does not intend his revised account to contradict his earlier claim that axiomatic logical principles are found primitively compelling by those who understand their constitutive terms, but rather it is an elucidation of how the acceptance of such principles might be rational. The revised view allegedly shows how the acceptance of logical axioms is grounded in the understanding of the terms they contain, and this understanding is attributable to the possession of the relevant implicit conception.

There is one logical concept for which the possession of an implicit conception that re-uses the concept in question appears not to be required on Peacocke's theory. This is the case of the connective 'and'. For this concept, the standard introduction and elimination rules provide its possession conditions in the non-circular, *A(C)* form. For a priori knowledge of the principles that define this constant, Peacocke appears to take his earlier theory to hold.[126]

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[126] See Peacocke (2000), pp. 264-65. Peacocke here maintains that the validity of the introduction and elimination rules for 'and' is guaranteed by the semantic value of 'and', and so our a priori knowledge of those rules is explained by our finding them primitively compelling.

While the simulation that Peacocke describes may be a plausible account of how a thinker comes to accept an axiomatic logical principle, the revised view does not explain knowledge of primitive logical principles because the certification of such principles is assumed by the implicit conceptions from which the explicit knowledge of logical principle is obtained. The simulation merely shows that the newly-accepted principle accords with the established use of the expressions contained in the principle. While Peacocke may be right that the thinker does not know in advance whether the principle is valid, and so in a sense, the simulation does give him knowledge, the justification for the knowledge thereby attained resides in the thinker's prior understanding of the logical connective expressions. The simulation merely makes explicit what has been implicitly accepted all along.[127] Nothing in Peacocke's account explains how the contents of the subpersonal implicit conceptions are guaranteed to be true or how we would come to know their truth. An explanation of our a priori knowledge of primitive logical principles, given that their certification is implicit in our use of logical connective expressions, is relatively unproblematic – as Peacocke's simulation example shows. What is difficult to explain is our warrant for the principles implicit in the meanings of the logical connective expressions.

While Peacocke's account may explain how we come to accept explicit statements of logical principles that are implicit our understanding of logical-connective expressions, it tells us nothing about how we know that the logical principles that govern our use of those expressions are valid. So it does not explain a priori knowledge of underived logical principles in the requisite sense because the explanation is based on implicit conceptions that must presuppose those very principles.

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[127] Rey (1998b, pp. 102-103) makes a similar point, arguing that "a 'semantic' simulation would issue in a priori knowledge only if the knowledgeable states on which it is based are themselves known a priori."

ii) Boghossian

Boghossian (2000) also argues for a semantic account of logic based on the meaning-constitutiveness of logical principles, but with a twist: our entitlement to reason in accordance with elementary deductive inference rules provides the basis for a rule-circular justification of our explicit logical beliefs, i.e., beliefs that logical principles are valid. And Boghossian argues that rule-circular arguments for deductive principles can be genuinely justificatory.

To keep matters as simple as possible, Boghossian restricts his discussion to propositional logic and supposes that we are working within a system where modus ponens is the only underived rule of inference. In order to lay the groundwork for his argument, Boghossian distinguishes between an entitlement to reason according to a rule and having a justification for a "full-blown" belief that a rule is valid. So for example, a subject S may be inclined to reason in accordance with modus ponens, but this dispositional state is to be distinguished from the state of holding the explicit belief that modus ponens is valid. Boghossian wants to distinguish between the epistemic status of a *disposition to reason in accordance with a rule* and that of a *propositional belief*. To this end, he proposes to reserve the term 'justification' for the kind of warrant that a belief may have and the term 'entitlement' for the kind of warrant that the employment of a rule in the absence of an explicit justification for it might have.[128] With these distinctions in place, we may then ask "Are we justified in believing a logical principle to be valid?" and "Are we entitled to reason in accordance with a logical rule of inference?"

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[128] Boghossian notes that this distinction bears a resemblance, but is not equivalent, to Tyler Burge's well-known distinction between 'justification' and 'entitlement', where an entitlement is an epistemic right or warrant that need not be understood by or even accessible to the subject. (Burge 1993, p. 458) Boghossian restricts his discussion of entitlements to inference *rules*, but his notion of entitlement could be extended to include an appeal to a substitution instance of a law of logic in a course of informal reasoning. For example, one might be entitled to employ an instance of the law of non-contradiction without explicitly holding the belief that the law, in its schematic form, is valid.

Boghossian argues that there must be a justification for our logical beliefs because the skeptical alternatives are unacceptable.[129] He makes the familiar observation that any demonstrative justification for a logical principle would employ some form of elementary reasoning, from which he concludes that any form of warrant for logic must be inferential. Boghossian rejects the allegedly non-inferential justification for logical principles provided by the observation that we cannot conceive of counterexamples to them on the grounds that it is really an inferential justification in disguise. He argues that 'conceiving' here is not the name for some non-inferential capacity to detect logical truth, but rather conceiving involves some form of elementary reasoning that would employ logic. Boghossian discusses two other non-inferential criteria for the acceptance of logical beliefs in the context of evaluating the thesis that a belief might be reasonable to adopt in the absence of a justification for it, i.e., the belief is "default reasonable." If some beliefs have the status of being default reasonable, then, arguably there should be some criterion by which it is determined that they have this special status. Both a principle's self-evidence and our need to presuppose logical principles in any justification have been suggested as delimiting criteria. But Boghossian finds the following two objections to be decisive against them: first, they must be relativized to individual thinkers and, second, they would permit beliefs that we would normally consider unjustified to count as justified if they were presupposed by a person's

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[129] Among the skeptical alternatives that Boghossian considers are non-factualism about logic and non-factualism about justification. As I noted in the previous chapter (fn 112, p. 124) Boghossian argues that Quine's regress argument against conventionalism would apply to any non-factual account of logic. Non-factualism about justification denies that the property of being justified is any sort of factual property; instead, justification may be conceived of as a positive appraisal based on our values or goals, or our acceptance of a system of norms. I will be discussing non-factualism about justification in some detail in Chapter Six, but I here just note that Boghossian rejects the view because he thinks that is leads to a self-undermining relativism.

epistemic system. Thus he concludes that any justification for logic must be inferential.[130]

But if justification for logic is inferential, then it would appear that no justification for logic is available that is not *rule-circular*. If modus ponens is the only underived rule of inference in a system of logic, then any inferential argument for modus ponens would either have to use modus ponens or some other rule whose justification depends on modus ponens. Boghossian argues that since it is unacceptable that our core logical principles are unwarranted and any warrant must utilize some logical principles, it follows that some warrants utilizing logical principles (i.e. rule-circular arguments) must be genuinely justificatory. (p. 253)

On this construal of the justification for logic, there are two tasks that must be met: first, to say why we are entitled to reason in accordance with a logical rule, given that an explanation of this entitlement will be needed to provide a full account of the justification of logic, and second, to explain how it is that rule-circular arguments for logical principles are genuinely justificatory. With respect to the first task, Boghossian argues that we are entitled to use a rule if the rule is *meaning constituting*. According to Boghossian, a logical constant, e.g. 'If, then', means that unique logical concept, *if any*, whose semantic value makes valid a specific set of inferences involving the logical concept.[131] Boghossian claims that the qualification "if any" is needed because a specified conceptual role may fail to determine a unique meaning for the constant in question or it may fail to determine any meaning at all.[132] The "if any" qualification is

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[130] Boghossian's claim that logical beliefs require inferential justification would be undermined if his objections to these non-inferential criteria were taken not be decisive, in which case, they might be admissible either as delimiting criteria for default reasonableness or as (perhaps partial) justifications for logical beliefs.

[131] Boghossian (2000), p. 248-249. See also Boghossian (1996), p. 376.

[132] Boghossian (p. 249, fn) notes that this formulation of conceptual-role semantics is truth-theoretic, which he prefers because he endorses the requirement that connectives like 'tonk' should not turn out to express a meaning. Boghossian also acknowledges that

intended to address these two problems that are widely acknowledged to be problems for the implicit definition of logical constants.

He then proposes the following principle:

> (L) If M is a genuinely meaning-constituting rule for S, then S is entitled to infer according to M, independently of having supplied an explicit justification for M.

The thinker need not know that a rule M is meaning constituting in order to be entitled to reason according to it; it is only necessary for M to *be* meaning constituting. Boghossian claims to find (L) intuitively plausible on the grounds that if certain inferential dispositions fix the meaning of our logical constants (in the language of thought), then these dispositions are required in order to even *have* the general belief that they are truth preserving, the justification of which is being questioned. (p. 250)

With (L) in place, Boghossian goes on to argue for the justification of logical beliefs via rule-circular derivations. He gives the following example of a rule-circular justification for modus ponens (p. 231):

1. Suppose that p is true and that p → q is also true.
2. By the truth table for 'if, then', if p is true and if p → q is true, then q is true.
3. Therefore, q must be true.

On the assumption that it is known that an argument is valid if its truth-table does not permit its premises to be true and its conclusion false, one can conclude on the basis of the above that modus ponens is valid. (Although this would involve an additional inference, by modus ponens and a rule for inferring specific instances from general claims, to the effect that, if the conclusion of an argument schema must be true when its premises are, the argument schema is valid, so modus ponens is valid.)[133] This

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a conceptual role semantics for the logical constants faces a number of obstacles, but he suggests that it is hard to see what other type of theory could explain the meanings of the logical constants.

[133] Steve Schiffer (Class Lecture, 4/20/99, NYU) suggests that Boghossian's argument would be improved if it were restated to have as its explicit conclusion that MP is valid. He offers the following emendation: (1) If the sentence matrix (p & (p → q)) → q is a

justification for modus ponens must take a step in accordance with modus ponens to derive (3) on the basis of (1) and (2). According to Boghossian, the derivation is not grossly circular because while one must use modus ponens to arrive at the conclusion, the rule of modus ponens does not appear as one of the premises of the argument. Boghossian acknowledges that a rule-circular argument will not persuade a skeptic – the skeptic doubts modus ponens and so would challenge its use in an argument that purports to demonstrate its validity – yet he argues that, under certain conditions, rule-circular arguments are genuinely justificatory.

Boghossian also acknowledges that a rule-circular argument would be objectionable if it had the vices of a grossly circular argument. One vice of a grossly circular argument is that it is question-begging. While a rule-circular argument does not take the rule that it is designed to establish as a premise, the rule is employed in order to reach the conclusion, so it would not be persuasive to anyone who doubts the rule. Since a rule-circular argument does not move a skeptic, it is a challenge to say why a rule-circular argument is genuinely justificatory. A second vice of a grossly-circular argument is that by assuming its conclusion as a premises, the argument can be used to prove anything. But in the case of a rule-circular argument, a license to use an inferential step does not automatically guarantee the success of the argument because appropriate premises from which its conclusion can be reached may not be available. However,

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tautology, then MP is valid. (2) The matrix is a tautology. (3) Therefore, MP is valid. Schiffer then points out, that one could not know the second premise without knowing that MP is valid, which undermines Boghossian's strategy of providing rule-circular justifications for logical beliefs. So, Boghossian should resist the proposed restatement. But if he does, it looks like he can't make good on his claim that the rule-circular argument delivers the conclusion that MP is valid using only one application of MP (p. 252). However, it should not matter to the overall structure of Boghossian's argument that only one application of MP be made in a rule-circular argument.

some restrictions on what rules may be acceptable to use are needed – otherwise any number of absurd rules may be "justified" by a rule-circular argument.[134]

According to Boghossian, his Principle (L) gives the needed restriction on rule-circular arguments to prevent them from certifying absurd rules: a rule-circular argument is warranting only on the condition that the rule in question is genuinely meaning constituting. Principle (L) will not allow any invalid or spurious rules to be rule-circularly justified because "if (a rule) M is genuinely meaning-constituting, as (L) insists it has to be, then it has a semantic value that makes M truth preserving." (p. 251)

Boghossian's answer to the question of warrant is that, in addition to not being trivially guaranteed to succeed, a rule-circular argument provides a demonstration of the validity of a rule without presupposing knowledge of its validity. In the example that he gives, the thinker is entitled to rely on modus ponens without possessing the explicit knowledge that modus ponens is valid. According to Boghossian, our entitlement to use an elementary deductive rule resides, not in any belief about its validity, but in the fact that it is meaning constituting for a logical constant in a language of thought. He thinks that a rule-circular argument need not persuade someone who is skeptical about the legitimacy of the rule that it purports to establish in order to be justificatory because, given that justification is required for core logical principles and any such justification will have to be circular, a requirement that a warrant be persuasive to a skeptic is too stringent a requirement.

Boghossian's account depends on the dual claims that a rule's being meaning constituting entitles us to reason according to the rule and that rule-circular justification confers warrant. As an epistemological thesis, the claim that we are entitled to infer according to a rule if the rule is meaning constituting is subject to the same objections as were leveled at Peacocke. First and foremost, the property of being meaning

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[134] Boghossian cites as examples a rule-circular argument to justify 'tonk', developed by Crispin Wright, and a rule circular argument for the spurious rule 'P, therefore all snow is white', due to Marcus Guaquinto. (pp. 247-48)

constituting can't be used to *explain* our entitlement to use the rule if the rule's being valid is a condition of it's being meaning constituting in the first place. On Boghossian's account, a logical constant will be that logical concept, *if any*, whose semantic value makes the inferences that are responsible for fixing its meaning truth preserving; if the rules or propositions that are the implicit definers are not collectively valid, then no meaning is said to be defined. But this builds knowledge of the requirement that the rules be valid into the conditions for their being meaning constituting, effectively making the explanation circular.

Second, the fact that a rule must be valid in order to be a meaning-constituting rule undermines the motivation for distinguishing between our warrant for employing inference rules and our warrant for logical belief. If the requirement that a rule be meaning constituting is admitted as a restriction on what rules may be employed in a rule-circular argument, the rule-circular argument is rendered superfluous because we must know that the rule is valid in order to determine that it is genuinely meaning constituting and so admissible for employment in the argument. For the case of a deductive rule, the rule-circular argument allegedly gives a proof of the rule's validity. But no such proof is needed if the rule must already be determined to be valid in order to be eligible for employment in a rule-circular argument, which is, in effect, what the meaning-constituting condition requires.

Turning now to the question of the value of rule-circular justification. Boghossian has argued that any justification for our logical beliefs must be rule circular. If this is correct, then we should at least hope that a rule-circular argument is genuinely justificatory. But is there any independent reason for thinking so? A justification typically provides reasons that are extrinsic to the claim being advanced and that are recognized as grounds for its acceptance. A reason need not be strong enough to eradicate all doubt about what is being claimed; it need only be recognizable as legitimately counting in favor of the claim in order to be justificatory. This is what is meant by being persuasive to the skeptic in the present context. If a non-suasive

argument is to be justificatory, one might expect that it would likewise give us reason to accept its conclusion, even though what is demonstrated by the argument is not entirely independent of the demonstration. What reason might a non-suasive argument for a deductive rule be understood to give? It appears to give us reason to accept the rule on the basis of the rule's being valid, which may be informative in the event that this information is not already known. The rule-circular argument explains why we value the rule, which is what advocates of rule-circular justification have traditionally claimed is the significance of rule-circular arguments.[135] But is this demonstration of why we value the rule justificatory or does it merely make explicit our implicit reason for valuing the rule? It will be justificatory only if knowledge of the validity of the rule is not presupposed in any way by the premises of the argument; otherwise the conclusion of the argument would merely make explicit what is assumed in the premises.

Suppose we grant that we are entitled to reason in accordance with modus ponens without knowing that it is a valid rule of inference, and suppose further that this entitlement does not involve any occult requirement that modus ponens be valid; perhaps we simply find the rule natural to employ. The proponent of rule-circular justification then claims that, since the validity of the rule is not assumed as a premise of a rule-circular argument, the argument is not viciously circular. But is it clear that knowledge of the validity of a rule, while not an explicit premise, is not presupposed by the premises of a rule-circular argument? In the example that Boghossian gives, the second premise of the argument asserts the validity of modus ponens on the basis of the truth table for 'p → q'. But, arguably, one needs to be able to reason in accordance with modus ponens to have the concept of the conditional and to know that when p is true and q is false, the conditional relation between p and q does not hold. If this is right, the construction of the truth table for 'If, then' proceeds according to the assumption that modus ponens is valid. One might not need to know *that* modus ponens is valid when constructing the truth

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[135] See, for example, Dummett (1978), pp. 295-96.

table, but its validity would appear to be an implicit assumption of the construction. Semantic proofs of the soundness of primitive inference rules that characterize the other logical constants are more obviously contingent on the implicit assumption that those same inference rules are valid: the truth tables for the logical constants just are those assignments of truth values that make the canonical inferences in which the logical constants participate valid. If, in an argument designed to show that a particular logical principle *L* is valid, an appeal is made to a truth table, the construction of which proceeds according to the (perhaps implicit) assumption that *L* is valid; then, while the validity of *L* is not an explicit premise of the argument, knowledge of *L* is presupposed by its premises. The argument then should not count as justificatory.

One might object to the foregoing argument that the construction of the truth table for 'If, then' does not involve any tacit appeal to the validity of modus ponens because inferring according to modus ponens is not a prerequisite for having the concept of the conditional. So knowledge of the validity of the rule is not presupposed by the premises of the rule-circular argument. Should the rule-circular argument then be taken to be justificatory? A plausible condition for the argument to count as justificatory in such circumstances, due to Hartry Field, is that it add to the credibility of the rule. In order to meet this condition, there must be some prima facie risk that we would not value modus ponens because we find it to be a valid rule of inference, so that the actual providing of the explanation justifies our reason for valuing modus ponens by showing that the risk isn't genuine.[136] But it is implausible that we could fail to value modus ponens for this reason, so there is no prima facie risk for the rule-circular argument to discharge. If a rule-circular argument does not add to the credibility of a rule, it is hard to see why it should be count as being genuinely justificatory.

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[136] Field (2000), p. 121. His statement of the condition there is that there must be a prima facie risk of it being impossible to explain our valuing a method (of reasoning), so that the actual providing of the explanation can justify the method by showing that the risk is not genuine. The prima facie risk must be that in using our methods, we will come to find that our methods do not have the properties we value.

In denying that rule-circular arguments are genuinely justificatory, I am not suggesting that they have no value. A rule-circular argument can show that our logical principles are mutually consistent. The demonstration of a rule's coherency with other accepted logical principles may be a precondition of its acceptance, but a demonstration of its coherence with respect to our established deductive practices does not provide a non-circular justification of those practices.

I have argued that there is no independent reason for taking rule-circular arguments to be justificatory, rather than merely explanatory. So it would be unfortunate if we had to accept them as being justificatory on the basis that they are the only available warrant for our logical principles. But we need not accept this thesis about warrant: reasoning *about* logic does employ logic, and so is circular, as Boghossian claims; however, it is does not follow that any warrant that can be given for our core logical beliefs is itself circular in character.

For one thing, Boghossian's rejection of our inability to conceive of counterexamples to logical principles as being genuinely non-inferential depends on his construal of conceiving as involving a course of deductive reasoning of a certain argumentative form. He argues that our inability to conceive of a counterexample to the claim 'If someone is a bachelor, then he is an unmarried male' involves reasoning from the initial claim plus that fact that (1) if someone is an unmarried male, then he is unmarried, to conclude that (2) any bachelor would have to be unmarried, and further, that (3) there cannot be any such thing as an unmarried bachelor. But our inability to conceive of a counterexample need not be characterized as deductive argument. It may simply be a statement of a failure to think of what a counterexample would be, i.e. nothing occurs to the thinker as being a possible counterexample. We then may demonstrate to ourselves that we can't think of a counterexample by entertaining several examples, which would involve reasoning, but the inability to think of a counterexample is just the failure to come up with one using whatever methods are available; it need not be the conclusion of a demonstrative proof.

The plausibility of Boghossian's claim that justification for logical beliefs must be inferential and, therefore, rule circular depends on (1) whether his objections to the criteria for delimiting the class of default reasonable beliefs should be taken to be decisive and (2) whether all other warranting considerations are accurately classified as inferential in a circular way. My main discussion of these considerations in favor of logic will come in the next chapter, but a few points can be made here. Boghossian's objection to appeals to a principle's self-evidence or our need to presuppose logical principles in any justification is that these criteria must be relativized to a thinker, with the result that some very implausible claims might turn out to be default reasonable for an individual thinker. With respect to the criterion of self-evidence, this danger would be mitigated if self-evidence were taken to be only a partial condition for justification or reasonableness. The complete condition might require that a principle also be evaluated for the possibility of counterexamples or coherence with other accepted principles. The idea that there is a set of mutually-supporting principles, at least some of which must be presupposed in any justification, is less vulnerable to his objection because if some principles did meet this condition, then a thinker *would* be justified in accepting them. And while this would allow for some degree of relativism, it is less worrisome than it might appear because logical principles that must be presupposed are those that we find inescapable, not those we arbitrarily adopt. They are, arguably, principles that would have to be presupposed by any cognitive agent that we can understand. The principles that have this status may not form a closed set, but the judgement that a principle should be included in the set is a collective judgment, which mitigates against the risk that very unorthodox principles will be ratified as default reasonable.

III. Summary and Conclusions

In Chapter Four, I argued that no account of analyticity has been offered that could provide a satisfactory explanation of a priori justification. Other attempts to locate the genesis of a priori justification in semantics, which were discussed in this chapter,

likewise have been found wanting, and it is hard to see how any satisfactory account of a priori justification could be developed along these lines. Logic cannot be understood to be empirical, and the empirical strategy of providing a deflationary account of a priori justification has come to nought. I now turn to what justification we have for our a priori acceptance of logical principles and how this a priori acceptance might be compatible with a broadly-naturalistic metaphysics.

CHAPTER SIX

THE A PRIORITY OF LOGIC

I. Challenges for an A Priori Account of Logic

I have argued that empiricist strategies to deny or deflate the a priori status of logical principles do not succeed, nor is their any promise of their success. Empirical accounts are inadequate because they fail to show how logic is answerable to experience and because some logical principles must be presupposed in making any allegedly empirical evaluation. Semantic-based accounts of logic fail to show how meaning can explain knowledge of logical principles in a way that is both plausible and non-question begging. So if we think that our logical principles are true or truth preserving, it looks like our grounds for these claims are somehow a priori in character. Before I examine what a priori considerations could justify logical principles, it will be useful to review to what an account of a priori justification is committed.

It is essential to the concept of a priori warrant that it is warrant not based on empirical evidence, but many of the other properties traditionally associated with the a priori are not required to draw the a priori/a posteriori distinction. The "minimal" notion of the a priori that I am interested in defending is as follows:

apj: A priori justification is justification that does not appeal to empirical evidence for its justificational force.

A priori justification so defined allows that experience may be needed to acquire the composite concepts of an a priori claim, so long as the particulars of experience do not constitute the evidence for what is claimed as known or justified. On this account, a priori warrant is not required to be infallible or rationally unrevisable, nor must a priori warrant be identified in any way with what is "metaphysically necessary."

The notion of an a priori proposition or subject matter can be derived from that of a priori justification whereby a proposition or subject matter is said to be a priori if its (ideal) justification conditions are a priori. To speak of an a priori proposition is shorthand for saying that the typical justification conditions for knowledge of the proposition in question are a priori, which means that we do not take it to be empirically established, nor would we expect empirical evidence to count against it. I defined an a priori proposition as follows:

> **app**: A proposition a priori iff (1) it can be justifiably believed without empirical evidence and (2) it is empirically indefeasible.

I also suggested that the notion of a priori justification could be extended to apply to rules, whereby a rule is a priori if and only if it can be justifiably employed in the absence of empirical evidence for it, and our justification is similarly empirically indefeasible.

The empirical infeasibility requirement in the definition precludes empirical observations from counting against an a priori proposition according to our current standards for knowledge, but it allows for the purely epistemic possibility that an a priori justified proposition might be overturned on empirical grounds in the event that further conceptual developments show it to be empirically defeasible after all. Interpreted in this way, the empirical indefeasibility requirement is consistent with an understanding of knowledge claims that allows for the defeasibility of what is claimed as known upon the expansion of our evidence. And thus understood, an empirically-indefeasible a priori proposition is a priori in an undogmatic sense. I went on to observe that, historically, some claims that were taken to be a priori justified were subsequently defeated by empirical evidence. And I suggested that an a priorist about logic will want to consider whether there are any significant asymmetries between logic and a other a priori claims that would make the former less vulnerable to empirical defeat upon expansion of evidence.

Consideration of the motivations for giving an empirical account of logic revealed two challenges for the a priorist. The first is to say how a priori justification can be understood to establish the full objectivity of logical principles. If the appeal to rational insight is set aside on the grounds that it is obscure, the defender of a priori knowledge must identify the a priori considerations that can be understood to count in favor of logical principles. While some a priori explanations of our acceptance of elementary logical principles may show that we have conclusive reasons for *adhering* to logical principles, opponents have challenged the a priorist to say why these a priori considerations should be understood to establish the objective validity of logical principles. The second challenge is to explain how a priori knowledge is compatible with a broadly-naturalistic metaphysics. Again, the traditional account of rational insight as providing direct access to a third realm of abstract, mind-independent propositions not only obscures a priori warrant but is obviously incompatible with the tenets of naturalism. But even if a Platonic metaphysics is rejected, there may be a question with respect to how a priori justification and, for that matter, justification, in general, comport with a naturalistic orientation.

The questions to be addressed, then, are as follows:

(1) What is our a priori justification for axiomatic logical principles (where the term 'logical principles' is understood to include inference rules as well as tautologies)?

(2) How can the a priori justification of logical principles be understood to establish their objectivity?

(3) Is logic empirically indefeasible?

(4) How are a priori justification and justification, generally, to be understood within a broadly-naturalistic metaphysics?

II. The A Priori Justification of Logic

There is one preliminary point that needs to be made with respect to justification before addressing the issues at hand, and that concerns the objects of ascriptions of

justification. Both a particular person's belief and a propositional claim itself can be said to be justified. In the former case, where we might speak of *S* being justified in believing that *p* or *p* being justified for *S*, the justification is relative to an individual believer in some particular set of circumstances. By contrast, when justification is ascribed to a propositional claim, i.e., when we say that *p* in general, or the belief that *p* in the abstract, is justified, the justification in question is not relative to a particular individual, but is understood to attach to the claim itself. Justification insofar as it pertains to an individual's belief that *p* can be described as "personal" or "individual-relative" in contrast to the type of justification that is predicated of a propositional claim, which can be characterized as "impersonal."[137] To say that a proposition is justified is to say that it is justified independently of whether any given individual believes it. This need not be interpreted to mean that propositions have the property of being justified independently of our thinking about them (although it is compatible with such a view), only that justification at the impersonal level reflects the reasons or evidence that can be given in favor of the claim that is said to be justified. To give the justification for a proposition is to state the considerations in its favor that, collectively, represent our best reasons for accepting it and that, at least in principle, are persuasive to other cognitive agents.

Arguably, whether an individual is justified in believing something depends, in part, on the ease or difficulty for that individual in thinking up rival hypotheses. A person may be justified in believing *p* if *p* would be a good explanation of something, and there is no equally good, alternative explanation of which he should be aware. This point is nicely illustrated by a pair of examples due to Goldman. (1986, p. 250) Consider a young child who has never paid close attention to objects immersed in water and is

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[137] This distinction is discussed by Robert Audi (1993), Ch. 7, pp. 222-23, 227-32 and Ch 10, p. 302. Audi notes that *S*'s being justified in believing that *p* does not entail *S*'s actually believing *p*, but *S*'s being justified occurs when there is something about *S*, e.g. some evidential belief or sensory state, such that his believing p would be justified if he believed it on that basis. Susan Haack, Defending Science – Within Reason, forthcoming, also distinguishes between personal and impersonal justification.

unfamiliar with laws of optical refraction. The child may see an oar that is half immersed in water and conclude from its appearing bent that it is, in fact, bent. Given the child's background information, it would be difficult for him to think of an alternative explanation for why the oar appears bent, so we might say that the child is justified in his belief. However, a person familiar with laws of optical refraction should not conclude from his visual observation that the oar is bent. A second example is provided by the case of Othello. Apparently, Othello does not construct alternatives to the unfaithfulness hypothesis to explain Iago's insinuations, Desdemona's loss of her handkerchief, etc., yet it would be easy to do so. As Goldman points out, most readers of Shakespeare find in Othello a "singular paucity of imagination." Because it is easy to construct alternative hypotheses to explain the data, Othello's beliefs are unjustified.

By contrast, judgments concerning the justifiedness of a proposition are not relative to an individual. An assessment of a proposition's justifiedness will be a collective judgment – not in the sense of majority opinion – but in the sense that it reflects our best evidence that may be brought to bear on the matter. The status of a particular proposition as justified, therefore, is not undermined by the limitations of cognitive agents who may fail to consider or comprehend the justification in question. While identification of the justification for a proposition must be made by an individual or group of individuals, the justification is impersonal in the sense that it attaches to the proposition by virtue of its being the best evidence in its favor. There may, of course, be room for disagreement about whether and how a given claim is justified, but this does not undermine the basic distinction between a personal and impersonal domain for judgments of justification.

The foregoing distinction between individual-relative and impersonal justification is not to be confused with the distinction that I made in Chapter One concerning having a justification for something that is believed vs. being justified in holding a belief in absence of a justification for its content. While impersonal justification must be understood to be content based, an individual-relative justification need not diverge from

impersonal justification in this respect. Individual-relative justification typically is justification for a proposition that is or could be believed, but the ascription of justification pertains to a belief for an individual in a particular set of circumstances.

When we ask how logic might be justified, the question is a question about justification in the impersonal sense. The distinction is important because sometimes considerations offered in favor of elementary logical principles are understood to be only individual relative, and whether they are legitimately so understood is relevant to their evaluation.

I will offer a bipartite analysis of our a priori justification for logical principles. The two components are an explanation of our first-order justification for logical principles and a metajustificatory argument that addresses skeptical worries that might be raised about the first-order grounds. The considerations that I offer will be familiar; each has figured in some form or another in discussions of the a priority of logic. What may be novel in the account that I propose is the interpretation of these considerations and the particular role assigned to them in the justification of logical principles.

A. The First-Order Justification for Logical Principles

One of the basic challenges to overcome in providing a justification for axiomatic logical principles is the circularity problem: any justification in the form of a demonstrative proof would be circular. While logical principles can be "supported" by rule-circular arguments, I have argued that these rule-circular arguments are not genuinely justificatory. If this is right, what resources are available to the a priorist? Given the constraints and goals of an a priori justification for logical principles as I have defined them, certain familiar rationalist strategies are automatically ruled out. For one thing, if a priori justification is understood to be undogmatic, then any appeal to the infallibility or unrevisability of logic principles is inadmissible. But given the history of a priori-justified claims that have been subsequently overturned, it is hard to see how this could have been a viable strategy anyway. And as I have emphasized, invoking rational insight without further explanation is both unenlightening and unacceptably occult.

It is often observed that axiomatic logical principles are self-evident, that is to say, they are evident taken by themselves without supporting proof or explanation. I will argue that the apparent self-evidence of logical principles plays an integral role in their eventual justification, but self-evidence alone is insufficient for justification at the impersonal level. The 'self' part of 'self-evident' just reiterates that what is understood to be evident is axiomatic, so the question is, "On what basis are axiomatic logical principles evident?" There appears to be no good answer to this question other than that we simply find them so. If an ordinary thinker is called upon to explain why a logical principle is justified, he or she would probably aver to its obviousness. Substitution instances of elementary logical principles typically are immediately apparent to the understanding, and, once they have been learned, these same logical principles in their schematic form (under certain idealization assumptions and excluding paradoxes generated by the formalization) seem not to require a justification because they are evident for a thinker. Although some philosophers, notably Quine, have emphasized the obviousness of logical principles, I think that it is more accurate to characterize them as evident. Finding something to be obvious suggests that it is immediately apparent, and some elementary logical principles in their schematic form may require some reflection before they are accepted as valid, in which case our apprehension of their validity is not immediate.

I think that finding logical principles evident may be sufficient for individual-relative justification – or at least an individual's entitlement to accept them. It is hard to see what positive reason could be given for our initial acceptance of logical principles other than that we find them evident or perhaps even just natural to employ. I suggested earlier that one of the determining factors in judgments about whether a subject *S* is justified in a particular belief that *p* is the ease or difficulty for *S* of thinking of alternative hypotheses to *p*. The cases that I described were cases of abduction, but the general idea can be extended to deductive principles as well: judgments about whether *S* is justified in accepting or reasoning in accordance with a deductive principle depend, in part, on

whether there are counterexamples to the principle that *S* should have considered. In the case of elementary logical beliefs, any candidates for counterexamples would be arcane examples that either exploit features of language that violate idealization assumptions or arise from sophisticated scientific or metaphysical theories. Since there *are* no obvious counterexamples to elementary logical principles, *a fortiori*, there are no counterexamples that a thinker should consider before he is at least entitled to reason according to them. A thinker, arguably, is entitled to reason in accordance with logical principles because, although she may not be aware that they don't admit of counterexamples, there are no counterexamples that she could be faulted for not considering. (Whether a thinker's finding deductive principles evident or natural to employ is sufficient for an individual-relative notion of justification as well as entitlement depends on one's views about justification generally. On a coherency theory of justification, an individual thinker would need to evaluate logical principles for coherency with each other and with other beliefs before their acceptance would be warranted.)

The fundamental problem with an appeal to self-evidence as a justification for logical principles is that it is justificatory only for the cognitive agent who makes the appeal. That *I* find something to be self-evident is not a reason for *you* to find it self-evident, if you don't, except in the sense that my telling you that I find something to be self-evident may cause you to think a little harder about whether you may have missed something. A proposition *p* may be justified for *S* if *S* finds *p* to be self-evident, and there are no alternatives to *p* that *S* should have considered. But while *p* may be justified for *S*, the appeal to self-evidence does not give a satisfactory justification for *p* itself, i.e. an impersonal justification, because what is self-evident for one person may not be self-evident for another. While it may be hard to imagine that someone would fail to see the plausibility of an elementary logical principle once it were understood, it is at least a theoretical possibility (one need only be reminded of Lewis Carroll's tortoise). But the appeal to self-evidence is really more worrisome with respect to its being too liberal, not

too restrictive. Any number of propositions that we might typically consider *unjustified* or at least in need of evidential support might be "self-evident" for a particular cognitive agent with an underlying set of beliefs that differs from ours. Examples that come to mind are claims about the existence of god and other metaphysical claims that may be part of an individual's worldview.

The problem with the appeal to self-evidence cannot be avoided by taking self-evident principles to be *self-justifying*, as is sometimes claimed. For one thing, it can't literally be true that a proposition or rule is self-justifying because the process of justifying is something that is undertaken by an agent with the capacity to reason. Sometimes all that is meant by the claim that a proposition or rule is self-justifying is that our finding it evident is sufficient for its justification. But if the claim that something is self-justifying is understood to be distinct from the claim that it is self-evident, what is often meant by the former is that it is somehow a feature of the proposition or rule itself that it has the property of being justified.[138] On this interpretation, justification is understood to be a property of some propositions taken by themselves and independently of any judgments that we might make concerning their justification. On such a view, justification is conceived of as some irreducible, non-natural property that some propositions possess, regardless of our perspective on the matter. I do not think that justification is properly understood in this way, but even if there are such self-justifying propositions and rules, we need a means of determining when a proposition or rule can be said to have this special property. An appeal to their being self-justifying would be unsatisfactory in this case for the same reasons that this appeal can't provide a basis for impersonal justification directly.

It is sometimes said of the propositions and rules that are typically classified as self-evident that they are not in need of justification. This could just be a tautological

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[138] Cf. Chisholm (1966), pp. 26-29. Chisholm speaks of states of affairs that are "self-presenting."

statement to the effect that these propositions and rules are both axiomatic and evident, or it could be the claim that axiomatic principles are reasonably believed without justification, that is to say, they are "default reasonable."[139] But the latter view is subject to the same criticism as above: some criterion would have to be identified by which we could determine when the acceptance of a principle is default reasonable, i.e, we would have to say under what conditions a proposition or rule is reasonably believed. A further problem for this approach, as applied to the case of logic, is that we don't find logical principles merely reasonable to believe, we think – perhaps with certain qualifications – that we know them to be valid.[140] The idea that logical principles are reasonably believed or reasonably employed without justification might be an apt way to describe the type of unreflective warrant that is said to characterize a thinker's entitlement to reason in accordance with deductive principles prior to their having been made explicit. But once a logical principle has been made explicit, we understand it to be universally valid (again, under certain idealization assumptions). It is hard to see how our understanding of logical principles as universally valid is adequately explained by our finding them to be default reasonable – reasonableness is just too weak a notion.

Reflection on what justifies axiomatic logical principles leads to the appeal to their self-evidence, but this appeal is subject to the objection that different people may find different propositions or rules evident. Moreover, the appeal to self-evidence does not provide a basis for justification at the impersonal level because the fact that a proposition or rule is self-evident for one person is not a persuasive reason, in the requisite sense, for another to accept it. So something else is needed.

My suggestion will be that the grounds for our first-order commitment to axiomatic logical principles reside in our inability to conceive of counterexamples to

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[139] See Field (1998 and 2000).

[140] Paul Boghossian makes a similar point against this view. See Boghossian (2000), p. 239.

them that would undermine their suitability for employment as general principles of reasoning. That is to say, we find the falsehood of logical laws and the invalidity of logical inference rules to be inconceivable in domains in which we understand these rules and principles to apply. The claim that the invalidity of logical principles is inconceivable in domains in which we understand them to apply is slightly weaker than the more familiar claim that we find the invalidity of logical principles inconceivable *tout court*, and it is designed to accommodate some of the objections that have been raised against particular logical principles by advocates of alternative logics. The operative notion of validity here is the metalogical notion that I discussed earlier, which I take it to encompass both modal and formal elements.[141] Since a sentence that is a logical truth can be characterized as a conclusion that is licensed from no premises at all, logical truth can be treated as a special case of validity. For ease of exposition, I will speak of the inconceivability of the invalidity of logical principles, where this includes both laws and inference rules, rather than making a distinction between the truth of logical laws and validity of inference rules. I will argue that the appeal to the inconceivability of counterexamples to logical principles provides a basis for the justification of logical principles at the impersonal level, and it mitigates the objections that can be raised against appeals to self-evidence.

The claim that the invalidity of elementary logical principles is inconceivable requires some interpretation, and possible objections to it will need to be addressed. It is not equivalent to the claim that logical principles are evident. If a thinker finds the falsehood of a logical principle inconceivable, he no doubt finds it evident. But going in the other direction, a thinker's finding a principle evident does not imply that he finds counterexamples to it inconceivable, if finding a counterexample inconceivable is understood to involve subjecting the principle to scrutiny.

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[141] I argued in Chapter Two that a valid argument is one where it is impossible for the premises to be true and the conclusion false, where the conclusion follows from the premises in virtue of the logical form of the sentences of the argument.

On the one hand, not being able to conceive of a counterexample might be taken to mean simply that no counterexample occurs to a thinker, which is part of why something is judged to be evident. Alternatively, the thinker might engage in a course of reasoning in an attempt to produce a counterexample. As I intend it, 'inconceivability' should be understood in the sense that involves some course of reasoning. Otherwise stating our justification for logical principles in terms of the inconceivability of their falsehood obviously would be a notational variant of the claim that they are self-evident. What I am saying is something more like logical principles are evident *on reflection*. The claim that logical principles admit no (convincing) counterexamples that show them to be unreliable in ordinary reasoning should be taken to mean that they have been subjected to scrutiny.

If an apparently self-evident proposition is subjected to scrutiny, its apparent self-evidence may be found to be misleading. Perhaps the proposition is discovered to be contingent on further assumptions for which we would require supporting evidence, or it may be seen to be false altogether. But, if, on reflection, an apparently self-evident proposition is found not to admit of counterexamples, then we would sustain the judgment that it is self-evident. The evaluation of a proposition for counterexamples guards against the possibility of being misled by its initial appearance of self-evidence.

Evaluation of a logical principle for counterexamples moves the person-relative justification that is accorded in finding the principle evident to the level of an impersonal justification for the principle itself because the discovery of a convincing counterexample provides a reason for any cognitive agent to reject the principle in question. If thinker A were to claim that it is unthinkable how a certain principle could be invalid, but thinker B produced a convincing counterexample to the principle, thinker A would likely withdraw his claim.[142] A thinker might understand a particular counterexample but fail to be

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[142] Stephen Schiffer, ibid., has argued this point in discussion of Paul Boghossian's concerns (Boghossian 2000) about the potentially irresoluble disputes that could result if logical principles were said to be justified on the basis of their self evidence alone.

persuaded by it, but this would amount to a rejection of the alleged counterexample as genuine. If a counterexample to a principle is taken to be convincing, it is likewise recognized as a reason to reject the principle. And while an individual might not relinquish a belief in light of a particular counterexample, whether he does so is a separate question from whether he should. The evaluation of a principle for counterexamples thus mitigates the risk of questionable claims counting as "justified" on the basis of some individual finding them self evident. The statement that the invalidity of a logical principle is inconceivable, made as a claim about the principle as opposed to a claim about an individual thinker, is a statement to the effect that the collective efforts of a community of thinkers have failed to produce a counterexample that is deemed to be convincing. It is an impersonal justification because what is being claimed is that the best evidence that can be brought to bear on the matter fails to undermine the principle in question.

But what about a case, such as that of the tortoise, where someone fails to find a logical principle evident? The tortoise would not find the invalidity of a logical principle inconceivable if he fails to find the logical principle intuitively plausible in the first place. I think that the absence of convincing counterexamples helps with this case as well, although in a more indirect way. Unless the tortoise can show us what is wrong with our acceptance of a logical principle, we are likely to dismiss his failure to find it evident as a cognitive shortcoming. It is incumbent upon the tortoise to say how a logical principle might fail to be valid if he is to persuade its adherents that they are mistaken in their judgment that it should be evident. Whether a claim *should* be evident for a thinker depends, in part, on the absence of evidence that would undermine the claim.

The determination that a counterexample to a logical principle is inconceivable involves a certain kind of test for its coherence with other beliefs and other logical principles. A thinker might evaluate a principle by reflecting on the possible truth values for its non-logical components to see if he can find a falsifying case. Or he might reason about possible substitution instances for the principle in an attempt to produce a

counterexample to the principle directly. The demonstration of coherence involved in the inconceivability test is not itself circular in character. While reasoning is involved in the simulation of cases and the attempt to find counterexamples, the conclusion that the principle does not admit of counterexamples is not the conclusion of a formal proof or chain of inferential reasoning that relies on the very logic that is at issue. Rather, the claim is a report that reasoning has failed to produce an intended result. The inconceivability test shows a logical principle to be coherent with other logical principles and our beliefs in that we are unable to defeat it. It thus provides a demonstration of coherence *in the negative* by way of failing to find a counterexample. The test on a logical principle is for defeasibility by incoherence with other established beliefs and principles. Any positive demonstration of a principle's coherence with other logical principles and beliefs would proceed by way of a proof, the conclusion of which would be that the principle being evaluated is valid. Such a proof would rely on logical principles, and in so relying, it could yield (at best) only a rule-circular justification for the claim that there can't be a counterexample to a logical principle. Of course such circular demonstrations of the coherence of a logical principle with other principles could be given, but they can't provide the justification for axiomatic logical principles, if genuine justification is understood to be non-circular.

It might be thought that what needs to be shown is that a counterexample is *impossible*, rather than inconceivable. The conclusion that a counterexample is impossible has the appearance of being stronger than the conclusion that a counterexample is inconceivable. However, our only reason for thinking it impossible that there could be a counterexample to an axiomatic logical principle is that we find a counterexample to be unthinkable. What we understand to be logically possible is determined by the logical principles that we accept, but in the case of axiomatic logical principles, any judgment that counterexamples are impossible rests upon our finding them inconceivable. As I pointed out in Chapter One, conceivability may not be a reliable guide to possibility – what seems inconceivable may, in fact, be possible – but

we have no way of judging what is (logically) possible vis-a-vis the case of axiomatic logical principles without ultimately appealing to what is conceivable. No further appeal to something more basic can be made.[143]

My account of our first-order a priori warrant for axiomatic logical principles can be summarized as follows: The justification for an axiomatic logical principle is the inconceivability of its invalidity in circumstances that meet the conditions for its application. This entails the following two subclaims: (a) the principle, once understood, is evident and (b) our methods of evaluation fail to demonstrate how the principle could be defeated. Subclaim (b) provides reasons that are potentially persuasive to others and thus ensures that the apparent evidentiality of the logical principle is not misleading. With subclaim (b) in place, the justification is at the impersonal level because what is claimed is that our best, collective evidence fails to undermine an accepted logical principle as a general principle of reasoning. A full analysis of our a priori justification of logical principles will need to explain why these first-order reasons should be deemed adequate, so my account is incomplete as it stands. But before I articulate the metajustificatory component of my account, I want to address some objections that might be raised against what I have argued thusfar.

B. Objections to the Account

Objection #1. The inconceivability of counterexamples to logical principles or, equivalently, our inability to understand how they could fail to be true or truth preserving, could not constitute our justification for them because we <u>are</u> able to think of counterexamples to logical principles: don't some of the counterexamples to specific logical principles that have been offered as reasons for adopting alternative logics show that we can conceive of how logical principles might fail? This objection can be met to some extent by considering the conditions on the conceivability requirement itself as well

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[143] This point is discussed at some length by Butchvarov (1970, pp. 78-79 and 83-88) who offers analysis of primary knowledge in terms of the unthinkability of mistake within the context of belief.

as the conditions for what should count as an undermining counterexample. The conceivability test that I have in mind requires that we are able to comprehend what an alleged counterexample asserts. For example, cases of self reference, such as the sentence 'This sentence is false' appear to violate the law of non-contradiction, so one might argue that they constitute counterexamples to that principle. But this type of case should not count as a counterexample if 'conceivability' is understood to mean being able to comprehend the content of what is being asserted by an alleged counterexample. We do understand the contradiction as described by the liar paradox; what we don't understand is how something can literally be both p and ~p at the same time and in the same respects. A description of a counterexample where what is described is incomprehensible does not meet the conceivability test.

One condition for a counterexample to count as genuinely undermining is that it not be appropriately explained away by considerations of scope. In Chapter Two, I noted that logical principles are understood to hold under certain idealization assumptions. In particular, the sentences that serve as substitution instances of logical principles must be understood to be bivalent in order for (classical) logic to be straightforwardly applicable to them. Consequently, some domains of discourse may properly be understood to lie outside the scope of our general-purpose logic, and they may require a special-purpose logic that is especially suited to the problems that they present. Discourse involving imaginary entities, unknowable propositions, and vague or referentially-indeterminate predicates may be said to violate the conditions for which we understand logical principles to apply. If this is correct, then the fact that reasoning according to some logical principles in these domains leads to paradox or unacceptable conclusions should not be taken to undermine the logical principles involved.

While some types of counterexamples can be handled by the correct interpretation of the conceivability requirement or issues of scope, not every counterexample that has been proposed, or perhaps that could be proposed, is satisfactorily dealt with in this manner. In these cases, there may be genuine disagreement about whether an alleged

counterexample should be taken to undermine a logical principle. The proposal to revise the distributive laws (in one direction) in light of the paradoxes of quantum mechanics is a case in point. Whether the paradoxes should be understood to undermine the distributive laws will depend on considerations such as whether apparent violations of the distributive law are best explained by faulting the logic and whether adopting a different logic would solve the problem. I am not suggesting that the claim that our logical principles are justified by the inconceivability of convincing counterexamples by itself settles the question of what is the one true logic: there may be disagreement about what counts as a convincing counterexample, and so disagreement about which principles are valid. But, to repeat, if an axiomatic principle *is* judged to be valid, my claim is that the basis for this judgment is the absence of counterexamples that would show it to be unreliable in cases where we think it ought to apply.[144]

Objection #2. Collective judgments about inconceivability do not eliminate relativism because what one community of thinkers finds inconceivable another community of thinkers might find conceivable. The objection to the appeal to self-evidence was that this form of justification is always relative to an individual thinker. The evaluation of a principle, on a collective basis, for possible counterexamples was supposed to establish a justification for it at the impersonal level because a counterexample is a reason for rejecting a claim that potentially can be acknowledged as such by any rational agent. However, while this form of justification is not relative to any particular thinker, it remains relative to some group of thinkers that might evaluate the principle in question. Hypothetically, if two communities of thinkers could differ

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[144] The Intuitionist is at something of a disadvantage with respect to my proposal for how logical principles are justified: For the Intuitionist, from the fact that we cannot falsify a principle, we are not justified in concluding that it is true; however, finding logical principles evident would likely be judged inadequate as a means of their verification because what is evident to one person may not be evident to another. Dummett's insistence that rule-circular justification is genuinely justificatory is no doubt motivated by the need to show that logical principles are verifiable in order to show that they are justified.

with respect to which principles were taken to be evident on the grounds that their invalidity was inconceivable, then each of the two communities would be justified in accepting a different set of logical principles. So it would appear that logical principles might not be universally justified, and justification is, at best, relative to sets of individuals.

How plausible is this example? It is not plausible that a community could have a fundamental logic that is *radically* wrong because reasoning in a way that systematically leads from truth to falsehood would be debilitating from the standpoint of evolutionary biology. That is, a community that reasoned in a way that systematically produced serious error would be unlikely to survive for very long.[145] But while reasoning according to a radically incorrect logic would be debilitating, we cannot conclude from the fact that our logic is good enough for the survival of our species that it is correct. What has to be imagined in the hypothetical example is the logical systems of both communities are good enough from the perspective of survival, but that one system may be more optimal than another. Given the theoretical possibility ("possibility" only in the sense of an imagined case) of two communities finding different sets of logical principles immune to counterexamples, does relativism follow on my view? I think that the view does allow for a minor degree of relativism, but this is not as disturbing as it might appear. For one thing, there is no evidence that there are any instances of the situation described, so there is no reason to think that our most basic logical principles are not universally shared.[146] If we consider the ways in which two hypothetical communities

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[145] This general point has been made by many. Quine famously points out that "...creatures inveterately wrong in their inductions have a pathetic but praiseworthy tendency to die out before reproducing their kind. (Quine 1969, p. 126) An excellent discussion of whether evolutionary considerations place any interesting constraints on irrational inference can be found in Stich (1993).

[146] The failure of anthropological evidence to establish cultural relativism with respect to fundamental concepts used in cognition is discussed by Dan Sperber (1982/94). Sperber also observes that no one has ever worked out what empirical evidence would show relativism with respect to elementary logical principles. (p. 155, fn)

could have differed with respect to what logical principles they find evident, one of the following would hold: (1) the two communities have different, incompatible logical systems for which there is no neutral ground for comparison, or (2) the logical systems of the two communities are comprehensible to each other and can be compared, or (3) one community is more logically advanced than the other and understands the less advanced community, but not vice versa, in which case the more advanced community would rightly judge their principles to be superior to those of the less advanced community.

If the two communities could understand and evaluate each other's principles, then relativism would not follow – unless the two systems were judged to be equally good – because a judgment could be made about which set of logical principles is superior. On the other hand, if the logical principles of one community were incomprehensible to the other, then there would be no agreed-upon standards by which the two sets of principles could be compared. In this scenario, each community would be justified in accepting their own set of logical principles unless they could see how the alternative system would be superior. Since, by hypothesis, there is no neutral ground from which the systems can be compared, each set of principles is justified only in its respective community, and no set of principles is justified across communities (although some subset might be). The relativism is unavoidable because if a claim is understood to have the property of being justified, this attribution depends upon considerations that can be offered by one or more agents in favor of the claim; and if two systems are incommensurable from the standpoint of evaluation, each system is justified only from the perspective of those who can understand them.

But while the relativism in this imagined case is unavoidable, it also should be unobjectionable: the idea that there are communities with differing logics such that we can't understand them is doubly hypothetical, and merely entertaining the idea that such a situation could occur does not undermine our claims to objectivity for our own logic. In order to undermine the justification of our logical principles, we would have to be presented with some kind of evidence that we understood to refute the principle or at

least cast doubt on our reasons for accepting it. If we actually encountered a community that appeared to employ logical principles that we could not understand, this might give us reason to worry about our own principles, but the mere thought that this could occur does not give us reason to doubt our logical principles because it does not present us with any real alternatives to those principles that we accept.

Objection #3. Conceivability is a psychological concept, not an epistemic one. Why is the inconceivability of counterexamples to a logical principle a genuinely epistemic reason for accepting it? The reasons that finding a counterexample inconceivable is an epistemic reason for accepting it are twofold: First, in evaluating a rule or proposition for counterexamples, we are asking whether what is being evaluated could be falsified. Arguably, a justification for a belief is epistemic – as opposed to moral or merely pragmatic – if it counts, in some way, toward the truth of what is said to be justified. A consideration of potential counterexamples is genuinely epistemic because it bears on judgments about the truth or falsity of the claim that is being evaluated. The judgment that counterexamples to a claim are inconceivable counts toward its truth because if we cannot understand how the claim under evaluation could be false, we have reason for accepting it. Second, if we cannot understand how a principle could be false or a rule invalid, then, presumably, we find the principle to be evident. It is constitutive of the notion of 'evident' that what judged is to be evident is thought to be known, so there can be no question whether something's appearing evident is a genuinely epistemic reason for accepting it. Something's appearing evident may not be *sufficient* reason to accept it, but to find something evident is to find it to be the case, so any such finding is epistemic in character.

Objection #4. Finding logical principles evident and immune to convincing counterexamples is reason to accept them, but these considerations fall short of demonstrating the objective validity of logical principles. In Chapter One, I posed a puzzle regarding the justification of our logical beliefs: An inductive justification for a deductive principle would be too weak, and a deductive justification would be circular,

so it appeared that logic could not be justified. On the other hand, we seemed to be justified in accepting logical principles because we could not conceive of how they could be false or invalid. So it looked like we had a justification for believing something in absence of a justification for what was believed. It is now time to solve this puzzle.

The puzzle arose because, when we think of justification sufficient for knowledge, we expect the justification to demonstrate the truth of what is said to be known. We require the reasons offered in favor of a knowledge claim to provide objective grounds for its acceptance. For the case of derived deductive principles, justification takes the form of a valid argument in which the conclusion is entailed by the premises. A valid argument guarantees the truth of its conclusion from the premises by previously-certified steps that make no reference to the perspective of any cognitive agent, with the result that what is proved is understood to be fully objective. But no such demonstration is available for axiomatic logical principles. On the other hand, we are no doubt justified in believing something if we find it evident and cannot see how it could be false. But we might feel that the inconceivability of falsehood fails to establish the independent truth of what is accepted for that reason, and so these considerations can't really provide a justification for the content of our logical beliefs.

I think that the concerns that give rise to this latter judgment are threefold: (1) in order for reasons to be justificatory, they must be objective, and to be objective, it might seem that they can't be inherently perspectival, (2) the suspicion that what needs to be shown is the *impossibility* of the invalidity of logical principles; inconceivability is too weak a notion, and (3) the observation that considerations of conceivability are not conclusive grounds for the establishment of anything.

With respect to the first concern, the reason that deductive proofs appear to be objective in a way that is mind independent is only because the axiomatic rules are understood to be pre-certified. Once the axiomatic rules are accepted, the proof can proceed without any reference to the perspective of a cognitive agent. But when we look at the considerations in favor of axiomatic logical principles, there is no more basic

reason for their acceptance other than we find them evident and their invalidity inconceivable. The implicit reference to the cognizer that is made by claims of conceivability or inconceivability should not be taken to vitiate their justificational force because all ascriptions of justification are perspectival in the sense that they are rooted in judgments that a cognitive agent might make. And while the reference to the agent typically drops out for justification at the impersonal level, impersonal justification only comes into being when one or more persons are able to give reasons in favor of what is said to be justified. The puzzle gets going by postulating an artificial split between objective justifications that are non-perspectival and subjective ones that are, with the result that, for the case of logical principles, the "subjective" reasons appear to be insufficient for justification.

A natural worry to have about the claim that logical principles are justified by virtue of the inconceivability of their invalidity is that their truth is not thereby entailed. So it might seem that counterexamples must be shown to be impossible, not merely inconceivable. But, as I pointed out earlier, there is no way to establish that a counterexample to an axiomatic logical principles is impossible apart from finding it inconceivable. When we find an axiomatic principle evident and its falsehood inconceivable, we have reached the limit of our ability to explain our first-order reasons for accepting it. Whether our first-order reasons are sufficient for justification is an issue I will take up in response to the next objection, but the idea that conceivability can be replaced with a stronger notion of possibility when it comes to explaining our justification for axiomatic principles is illusory.

Finally, the objector is correct to point out that what is inconceivable now may not be inconceivable in the future. So our inability to conceive of how a principle could fail to be true or truth preserving does not provide conclusive justification for it, where 'conclusive' means indefeasible. But on the account of a priori justification that I am defending, a justification does not need to be conclusive in the sense that rules out the purely epistemic possibility of the defeasance of knowledge at a future time. So the a

priorist need not be committed to providing a conclusive justification in the sense of being an indefeasible justification.

There is another sense of 'conclusive', according to which a justification is conclusive if no reasons over and above those given in the justification are understood to be required for knowledge, but knowledge claims are understood to be defeasible.[147] On this reading, justification sufficient for knowledge must be always be conclusive, but the conditions for knowledge are relaxed enough to allow for the defeasibility of knowledge upon expansion of evidence. So, for example, *S* might know that *R* will meet him tomorrow at an agreed-upon time because *R* said that he would, and *R* usually means what he says, is reliable, etc. While *S* can be said to know that *R* will meet him, *S*'s knowledge is contingent on the absence of any overriding circumstances that would prevent *R* from keeping his word. On this understanding of conclusive justification, finding the invalidity of a principle inconceivable quite plausibly *is* a conclusive justification for it. Only if the standards for knowledge are raised to a level where our first-order reasons for accepting logical principles are called into question will finding the invalidity of a principle inconceivable fail to be conclusive evidence for it. However, since we are attempting to understand how we can have a priori knowledge of logical principles, it is not inappropriate to ask why we think that our a priori standards of evaluation meet the requirements for knowledge. I turn to this question with the next objection.

C. The Metajustificatory Argument and Empirical Indefeasibility

The final objection that I will consider is one of the empiricist's core objections to a priori justification and is as follows:

Objection #5. Our finding axiomatic logical principles evident and invulnerable to counterexamples does not establish their objectivity because our finding them so may

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[147] This latter sense of 'conclusive justification' and 'conclusive reason' can be found in the work of Pollock (1974) and Adler (2002). The example that I discuss is one of Adler's.

be explicable as a mere feature of our psychology. Any knowledge that is said to accrue from considerations of what appears evident or conceivable may be nothing more than knowledge of our limitations as cognitive agents. This objection was implicit in the objection just discussed, where the adequacy of the proposed a priori justification for axiomatic principles was challenged on the basis that while it gave us reason to accept logical principles, it failed to justify the principles themselves. One might ask whether we can't conceive of the invalidity of axiomatic logical principles because they are, in fact, valid or whether our not being able to think of how they could fail merely reflects our cognitive limitations. Why think that finding the invalidity of a principle inconceivable tells us something about the principle rather than something about our own minds? In asking these questions, the challenger is demanding a metajustification for our first-order reasons for accepting logical principles that ensures both their adequacy and their evidential relation to the target principles.[148]

The challenger here is raising doubts about our claim to know logical principles on the basis of the first-order reasons given. It is worth noting that a similar demand could be made on the empiricist, whereby the empiricist would be called upon to show why our empirical methods of belief formation, which the empiricist takes to be devoid of a priori elements, are reliable. Skeptical arguments about knowledge of the external world pose just this type of challenge for empirically-justified beliefs. The difficulties in meeting skeptical challenges concerning knowledge of the external world illustrate the

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[148] In his defense of a moderate rationalism, Bonjour (1998) identifies the challenge to the rationalist to say why accepting beliefs on the basis of apparent rational insight is at least likely to lead to believing the truth as a demand for a metajustification. While Bonjour argues elsewhere (1985) that a metajustification is required to show our standards of empirical justification to be adequate, he denies that a similar metajustification is needed for a priori claims because the latter, but not the former, are self-evident. Bonjour also observes that if a metajustificatory principle is essential to the first-order justification for a priori claims, then rationalism would be automatically incoherent because any such principle either would be a priori, and so the appeal would be circular, or empirical, in which case the view would collapse. If so, there would not be even a *prima facie* coherent concept of the a priori, which he suggests would be implausible. (pp. 142-46)

stringency of the demand for a metajustification for our perceptual methods of belief formation. One might expect to encounter similar difficulties in providing a metajustification for other methodologies of belief formation. Unless the a priorist is making a special claim that a priori justification is infallible or leads to certainty, it is open to the a priorist to argue that a priori justification should not be held to a higher standard of adequacy than empirical justification. It is no mark against a priori justification if it does not measure up to standards that are equally unattainable by the empiricist.

It is sometimes claimed that logical principles are not subject to doubt because the process of entertaining skeptical hypotheses about logic relies on the very logic that is typically at issue. Thomas Nagel argues that arguments that are similar in form to arguments used to establish skepticism about the external world, i.e. arguments that set up epistemologically indistinguishable situations and then draw conclusions from them, cannot undermine any logic that they presuppose.[149] But while Nagel is correct in his observations about the form of skeptical arguments, these arguments are not the only means by which our knowledge of logical principles can be brought into question. One can put pressure on our claims to know logical principles more directly by asking how we know that our justificatory processes are, in fact, justificatory.

Can the demand for a metajustification be met? I don't think that the demand can be met in a way that dismisses the skeptical worry entirely, but I do think that something can be said in favor of why we should take a priori methods of justification for axiomatic principles to be genuinely justificatory if these methods are called into question. The answer to the challenge is implicit in a fact about logical principles that I have emphasized many times over in this dissertation, namely that elementary logical principles are presupposed in thinking about most anything. They are presupposed by virtue of their being both used and implicitly observed in our reasoning processes. In

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[149] Nagel (1997), pp. 62-64.

order to meet the demand for a metajustification, I think that one can appeal to the overall instrumentality of logic to the attainment of knowledge. Apart from knowledge of immediate sensory experience, logic is presupposed by our knowledge claims, whether they are empirical claims or claims that may to understood to be a priori. If our knowledge claims are objective, in general, so is the logic that they presuppose. Our a priori reasons for accepting logical principles are vindicated by the presupposition of logic in arriving at claims that we understand to be true and in the justifications that we might provide for these claims.

The appeal to the instrumentality of logical principles to our knowledge claims by way of a metajustification does not make logic ultimately empirically justified. Logic is instrumental to science, so logic "shares in the success of science" in the sense that scientific claims are derived by and in accordance with logical principles; however, logic is not itself empirical if it is presupposed, rather than tested by, scientific methods. The appeal to the instrumentality here is not intended to explain how logical principles are established or confirmed; the point is to highlight the fact that logical principles are essential to our knowledge claims in order to show that our a priori grounds for their acceptance can't be interpreted merely as giving us information about our limitations as cognitive agents.

What I am suggesting, in effect, is that the appropriate response to the skeptical challenge to turn it around rather than meet it head on: The challenge was to say why a priori considerations in favor of logical principles established their objectivity. But elementary logical principles are presupposed by knowledge claims that extend beyond knowledge of immediate sensory experience. So if we know anything beyond immediate sensory experience, we have reason to believe that the logical principles implicated in our knowledge claims are reliable. As it is often said, *logic is objective, if anything is.* We have reason to believe that our first-order grounds for accepting logical principles give us knowledge of the principles rather than knowledge of ourselves because our claims to knowledge, in general, require that this is how our first-order grounds be understood.

The demand for a metajustification cannot be interpreted in such a way that it requires the refutation of skepticism in a broad sense. Not only would this place an unfair burden on the a priorist, such a refutation is likely to be unattainable. As Thomas Nagel (1997, p. 72) puts the point: "There are inevitably going to be limits to the closure achievable by turning our procedures of understanding on themselves." So while the a priorist needs to address the question of why a priori justification for axiomatic principles should be taken to be genuinely justificatory, this demand cannot be understood to require a demonstration of objectivity that goes beyond any means of evaluation at our disposal.

The presupposition feature alone has sometimes been proposed as the grounds for our acceptance of logical principles. While I agree that our first-order commitment to logical principles is *demonstrated* by our need to presuppose them, this observation does not speak directly to the fact that we find logical principles to be true or truth preserving. Moreover, in the absence of skeptical worries, we do not first need to know that we presuppose logical principles in reasoning before we think that we are justified in accepting them. Logical principles strike us as evident and fully justified independently of and prior to any observation that they are presupposed in reasoning. So I am inclined to think that the feature of presupposition does not provide the first-order justification for our logical beliefs, but demonstrates why their objectivity cannot be called into question without casting doubt on knowledge claims in a very pervasive way.

The presupposition of elementary logical principles in reasoning also shows why these principles are unlikely to be undermined empirically (or otherwise) upon further conceptual advancements. Logical principles are central to reasoning in a way that other a priori principles, such as Euclid's parallel postulate and other mathematical principles, are not. Elementary logical principles are both implicitly observed and explicitly used to reason about conceptual possibilities and to evaluate new theories for consistency with our existing beliefs.

The centrality of elementary logic to reasoning and effective communication gives us reason to think that these principles will not be defeated, *a fortiori*, they will not be defeated empirically. However, the possibility that a given logical principle could come to be undermined upon further conceptual developments is not thereby precluded. If no logical principle has the status of being absolutely indefeasible, then I think that we have to allow for the purely epistemic possibility that any given logical principle could be empirically undermined. The reason being that the nature of any hypothesized conceptual development is a complete unknown, so we are not in a position to say whether the basis for the hypothetical defeat of a logical principle under these conditions would be empirical or conceptual. While the a priorist could well argue that any revision of logic would be conceptual, there are no grounds for thinking that the reasons for considering a principle to have been defeated, and, hence the primary motivation for accepting a proposed revision, would be conceptual, as opposed to empirical. Moreover, the hypothesized conceptual developments might be such that a logical principle could be seen to be defeated, but no satisfactory proposal for a revision to our logic in light of the defeat would be available to us.

However, while no given logical principle may be empirically indefeasible in an absolute sense, and if the skeptical possibility that our deductive principles are in no way justified is set aside, the need to presuppose at least some logical principles in reasoning does appear to make a priority itself about logic indefeasible. For any particular logical principle that might be held to be empirically defeasible, other logical principles would be presupposed in evaluating the principle in light of the potentially-defeating, empirical evidence and in determining how a revision to our logic should proceed. Our need to presuppose logical principles in this way shows that we have first-order commitment to them. Unless a negative coherence theory of justification can be maintained, according to which all beliefs are automatically prima facie justified, our warrant for at least some logical principles at any given point in time will have to be a priori -- if logical principles are warranted at all. So, on the assumption that logical principles are warranted, even if

the empiricist can show how any given logical principle is empirically defeasible when others are assumed, he will not have eliminated a priority about logic.

An empiricist might take the position that the presupposition of logical principles in this case does not require their a priori certification. Any given logical principle could be evaluated empirically according to other logical principles that are only taken on assumption.[150] However, even if the empiricist could come up with a plausible way to test elementary logical principles empirically, this strategy does not confer any advantage to the empiricist because the proposed evaluation would eventually result in the axiomatic logical principles forming a closed circle, whereby each principle would be certifiable on the basis of others, but no certification would be available for the set of axioms as a whole. And if our deductive system as a whole is in no way justified, but is only taken on assumption, then so are any claims arrived at via deductive inference. This would lead to an overall skepticism about knowledge claims that would not be consonant with the empiricist strategy. Moreover, while a skeptic may take the position that our a priori considerations in favor of logical principles are insufficient for knowledge, the empiricist has no rationale for denying that a priori considerations have any justificatory force whatsoever, except that the denial serves to uphold his position. The suggestion that logical principles could be merely assumed until they are empirically confirmed amounts to the adoption of a skeptical stance toward logical principles that is both question begging and self-defeating on the part of the empiricist. While I do not take myself to have refuted the possibility of skepticism about logic, this suggestion on behalf of the empiricist does not represent a non-skeptical alternative that shows how a priorism about logic could be avoided.

In summary, my full account of a priori warrant for axiomatic logical principles is as follows: (1) Our first-order, a priori justification for logical principles is the inconceivability of their invalidity in circumstances that meet the conditions for their

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[150] This empiricist strategy was suggested to me by Georges Rey.

employment, which entails that (a) a principle, once understood, is evident and that (b) our methods of evaluation fail to demonstrate how the principle could be successfully undermined. (2) The presupposition of logical principles in our knowledge claims provides a metajustification for our first-order warrant that demonstrates why our first order warrant should be understood to establish the full objectivity of logical principles. The presupposition feature also explains why our most elementary logical principles are unlikely to be defeasible, empirically or otherwise.

I have now addressed the first three of the four questions posed at the beginning of this chapter. In the next section, I turn to the remaining question, which concerns the compatibility of a priori justification and naturalism.

III. The Naturalistic Challenge

Apart from worries about objectivity, the primary objection against a priori justification is that it is incompatible with a broadly-naturalistic orientation. As I emphasized earlier, naturalism is not a single, unified position: there may be disagreement about what lies within the scope of the natural as well as what is required to be shown as reducing to natural properties, i.e. what can and should be "naturalized." One concern about a priori justification for the naturalist is that it has been associated with talk of a special "faculty of intuition" by which we have access to a realm of Platonistic propositions or abstract entities. But, as should be clear by now, the a priorist need not be committed to this metaphysical picture or its attendant notion of rational insight – at least for the case of logical principles. (A naturalistically-minded a priorist will need to give an account of other traditionally a priori subject matters, especially mathematical knowledge, in order to show that a priori knowledge, in general, can be shown to be compatible with metaphysical naturalism.) However, there may be a residual worry that a priori justification is mysterious in a way that empirical justification is not, and I will try to address this worry.

A different naturalistic worry concerns the apparently irreducible normativity of justification itself. Some epistemologists have sought to analyze the concept of justification in non-evaluative terms that invoke physical and, especially, psychological processes. The need to square an account of justification with a naturalistic metaphysics is not unique to a priori vs. other kinds of justification, so it does not pose a special problem for the a priorist. On the other hand, the account of the a priori justification of elementary logical principles that I advocate does have implications for certain views of justification, and it would be a problem for my view if it were incompatible with any and all proposals to demonstrate the compatibility of justification with metaphysical naturalism. So I will examine the implications of my view for some of the more prominent treatments of justification with respect to this issue.

A. A Priori Justification as a Psychological Process

The account of a priori justification that I have given does not appeal to rational insight, but an a priorist who wanted to retain this notion could give a naturalistic account of rational insight. A naturalistic construal of rational "insight" or "intuition" might characterize it as a (noninferential) judgment of evidentiality with no attendant claim about access to an independent realm of truths. The traditional, hypothesized faculty of intuition involved in apprehending a priori propositions need not be taken literally, but understood as only loose talk meant to describe whatever psychological processes are involved in coming to see an a priori proposition as evident.[151]

If rational insight is "naturalized" along these lines, the remaining objection to this traditional rationalist notion is that the psychological mechanisms by which it is accomplished are obscure. (This objection is made by Pollock (1986, pp. 1-13) and Kitcher (1984, pp. 26-27)). On the account that I have given, this translates into a worry about the processes that subserve deduction as well as those by which we come to see logical principles as evident. In response to this worry, the first thing to note is that

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[151] This latter point has been made by Bonjour (1998, p. 109) and Goldman (1999, p. 12).

although we may not have an adequate understanding of these processes, there is no reason to think that they are any less natural than some of the psychological processes involved in the acquisition of empirical beliefs, such as perception, that may be better understood. The apprehension of the evidentiality of a logical principle is an event of consciousness, and so it is mysterious to the extent that consciousness is mysterious, but this is obviously not a special problem for the a priorist. Likewise, the mystery of intentionality is shared by a priori and a posteriori subject matters. What would appear to demystify the a priori justification of logical principles in the desired way is an understanding of the psychological processes involved in logical cognition. In recent years, a number of different theories have been advanced to explain how logical cognition might work,[152] and while researchers may not agree on a theory of logical cognition, there is nothing to suggest that logical cognition is not on a naturalistic par with other psychological processes.

It is sometimes thought that whether logic is a priori depends on what the processes that subserve logical reasoning turn out to be. This dependence of a priori warrant on subpersonal processes follows on a certain kind of process-reliabilist view about justification. Goldman, for example, (1986, 1999) locates the source of all primary epistemic warrant in the basic psychological or computational processes by which beliefs are formed and preserved, and a belief is justified, on his view, just in case these processes are reliable. Goldman distinguishes native psychological processes and acquired methods, and he argues that processes are the more fundamental to justification

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[152] Philosophers are generally familiar with the theory that we may have natural deduction system built into our heads (e.g. Rips 1983, 1994, 1995 and Braine, Reiser and Rumain 1984) as well as the competing "mental models" theory, developed by Johnson-Laird and associates (Johnson-Laird 1983, Johnson-Laird and Byrne 1989, 1991), according to which people perform logic tasks by constructing mental models and testing for validity in the constructed model. It is sometimes thought that the mental models theory circumvents the need to posit logical principles in a cognitive subsystem, but it has been argued that some logical principles would be needed for the construction and evaluation of the models (See, for example, Goldman 1986, p. 292).

because the proper acquisition of any method will depend on the use of approved processes. (1986, pp. 93-94) Goldman suggests that the primary candidates for a priori warranters are the family of reasoning or calculational processes in our fundamental cognitive architecture that subserve deductive reasoning. (1999, p. 15-19) A learned method also might be a candidate for an a priori warranter, but only if it can be determined to be necessarily reliable by a priori means.

While some theories of logical cognition claim that we possess an innate stock of logical principles, other theories are taken by their proponents to suggest that this is not the case. In his discussion of the a priority of logic, Goldman (1999) cites two theories of conditional reasoning in support of the idea that logical skills may not be innate.[153] One approach (Holland et al. 1986, pp. 281-282), may be taken to suggest that people lack innate, domain-general competence in conditional reasoning and, instead, acquire it via an inductive learning process. Support for this view is drawn from observations that people tend to perform well on conditional reasoning tasks when the subject matter is familiar, but they perform poorly when the subject matter is arbitrary or unfamiliar. Another approach, based on findings by Cosmides and Tooby (Cosmides 1989, Cosmides and Tooby 1994), denies any innate, domain-general capacity for deductive (or inductive) reasoning, but instead hypothesizes that our genetic cognitive endowment consists of highly specialized "modules," each of which is dedicated to a narrow cognitive task that proved adaptive in our evolutionary history. On this latter view, people have innate processes that would enable them to form correct logical beliefs in some cases, but the same *processes* might lead to logical error in others. Goldman thinks that if either of these theories were correct, they would undermine the prospects for a priori warrant with respect to deductive reasoning. But *pace* Goldman, it would appear that if both his version of reliabilism and the theory inspired by the Cosmides/Tooby findings were

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[153] The theories were formulated to account for findings of the Wason selection task, a well-known test for conditional reasoning.

correct, *warrant* in the domain of deduction reasoning – not just *a priori* warrant – would be undermined because there would be no reliable belief-forming processes that subserve logical belief.

The relevance of subpersonal psychological processes to a priori warrant will depend on one's view of warrant, generally. On a reliabilist construal of justification, the origins of a belief are not distinguished from its warrant. And on Goldman's version of reliabilism, warrant is ultimately a function of psychological processes at the subpersonal level because the reliability of a method depends, in part, on the reliability of the psychological processes by which it is acquired. One problem for this view is that, not only how, but *whether* our logical beliefs are justified will depend upon what the subpersonal psychological processes that subserve them turn out to be. If we don't know in advance of empirical investigation that these processes are reliable, then the theory tells us we should suspend judgment about whether logical principles are, in fact, justified until all the evidence is in. (Another problem for the view is that it will be unable to give a non-circular account of the reliability of the subserving processes. But I will postpone discussion of that problem until later.) By contrast, on a non-reliabilist view of justification, warrant is typically understood in terms of the reasons that support a belief or claim. On this more traditional view of justification, reasons are understood to be justificatory *qua* reasons, and they may have their status as such independently of the subpersonal computational processes that produce and sustain them.

A reliabilist might be able to avoid an unwanted dependency of justification on our subpersonal cognitive architecture if he could allow that methods may be warranting independently of the subpersonal psychological processes by which they are brought about and sustained. It is not obvious that the reliability of a method must always depend upon the reliability of the processes by which the method was acquired, although it is not in the spirit of reliabilism to distinguish the reliability of a method from the causal processes that generate it in this way. The challenge for the reliabilist would then be to

come up with a method for the acceptance of axiomatic logical principles that can be understood to be suitably reliable.

B. The Compatibility of Justification with Naturalism

In this section, I will look at the implications of my account of the a priority of logic for some the more prominent treatments of justification within a naturalist framework, and I will consider how my account might be understood according to these different approaches. I will not attempt to survey all the positions that a naturalist might take with respect to justification, nor will I attempt to provide an in-depth analysis of the views that I do discuss – those are projects for another paper. Here, I will give only a quick sketch.

One observation about justification that is frequently made is that it supervenes on non-normative properties. The possibility of identifying naturalistic criteria for justified belief is thought to be secured by virtue of the supervenience relation. This weakly-naturalistic thesis appears to have been popularized by Kim (1988) who argued that beliefs cannot differ with respect to their justificatory status without differing with respect to the non-normative properties that might be cited in their favor, and so the normative property of justification is somehow determined by the relevant base properties upon which is said to supervene. The suggestion is that while justifiedness itself may not be a natural property, nor the concept of justification reducible to naturalistic concepts, justification is shown to be scientifically respectable by virtue of its supervenience on the non-normative.

One worry for this approach is whether the relevant base properties upon which justification is said to supervene will themselves always be describable in non-normative terms. Facts that might be cited as part of a subvenient base may embody normative concepts to various degrees, so it is unclear whether the supervenience relation will adequately capture the relation between justification and natural properties. One could also question whether the non-normative "facts" will fully determine assessments of justification because a particular pattern of facts might be judged as more or less

justificatory depending upon the standards of evaluation, and if standards can vary, so can the judgments concerning justification. However, it does seem relatively uncontroversial to understand justification to depend, in part, on non-normative factors.

The real problem with the supervenience thesis for the naturalist is that, without further analysis of the supervenience relation, it does little to demonstrate the compatibility of justification with naturalism. While there are naturalistic criteria in virtue of which judgments of justification are made, it is not clear either that justification can be shown to be reducible to any set of naturalistic criteria or that the supervenience relation can be articulated in such a way that furthers our understanding with respect to how normativity is compatible within a world naturally described. Consequently, most epistemologists who are interested in naturalizing justification have sought to give a stronger reduction of the concept than what is implied by the supervenience thesis.

One radical approach to accommodating justification within a naturalistic framework is Quine's proposal, expressed in "Epistemology Naturalized," to reclassify epistemology as part of psychology:

> Epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science. It studies a natural phenomenon, viz., a physical human subject. This subject is accorded a certain experimentally controlled input – certain patterns of irradiation in assorted frequencies, for instance – and in the fullness of time the subject delivers as output a description of the three-dimensional external world and its history. The relation between the meager input and the torrential output is a relation that we are prompted to study for somewhat the same reasons that always prompted epistemology; namely, in order to see how evidence relates to theory, and in what ways one's theory of nature transcends any available evidence. (Quine, 1969, pp. 82-83)

What the epistemologist studies, on this view, is just the relation between the inputs and the outputs, and he looks for lawlike dependencies that characterize these relations.

One reading of Quine, largely due the passage quoted, is that he is making the recommendation that epistemology be replaced by descriptive psychology.[154] We should

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[154] Cf. Kim (1988) and Kornblith (1985). Others, eg. Goldman (1986) and Bonjour (1998), note that this is one way to read Quine, but suggest that alternative

give up the normative notions that are characteristic of traditional epistemology and replace them with the study of how we generate theory from observation, with the result that epistemology will be a descriptive, explanatory science like any other. Thus understood, Quine is an eliminativist about justification.

Whether Quine's views in "Epistemology Naturalized" can be taken to adequately express his overall theory of what evidence and justification amount to is the subject of some debate. Richard Foley (1994) argues that Quine must be committed to some normative notions because in both *The Web of Belief*, and, later, in *Pursuit of Truth*, he identifies the norms of maximizing simplicity and minimizing mutilation as governing our process of generating new theories and revising old ones. According to Foley, Quine's view of the normative element in epistemology is that it is, ultimately, a matter of the identification of effective means to the valued end of truth, or more cautiously, accurate predictions. (p. 249) He notes that in "Reply to White,"[155] Quine expresses his view that normative epistemology is a "branch of engineering" in that it is concerned with identifying methodologies that lead to accurate predictions, and we look to the various sciences to tell us about these methodologies. Foley concludes that, therefore, it is inaccurate for Quine to say that epistemology is a branch of psychology; any science that is relevant to the technology of truth seeking is relevant to epistemology.[156]

While it is uncontroversial that science is linked with epistemology with respect to telling us what methodologies lead to accurate prediction, for epistemology to be characterized as part of science, science also will have to be understood to tell us about our fundamental epistemological norms. For Quine, the fundamental norms will be the norms of simplicity and minimal mutilation, and the norm of empiricism itself. Quine's considered view must be that these norms are, in some way, the products of science. In

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interpretations may also be warranted.

[155] Schilpp (1986), pp. 663-65.

[156] Foley notes that a similar point is made by Haack (1993).

the Quinean system, the norms will be the product of science if they can be held to be revisable, in principle, in light of experience. But since fundamental norms govern the acceptance of our theories in the first place, Foley rightly observes that Quine should hold that they are both a presupposition and a finding of science. (p. 255)

Few philosophers have been willing to accept Quine's recommendation to replace epistemology with descriptive psychology, where this is understood to jettison the notion of justification from epistemology, because it is hard to see why we should then understand the beliefs generated by psychological processes to be correct or how we could be understood to possess reflective knowledge. If, on the other hand, Quine is interpreted in the way suggested by Foley, epistemology is naturalized in the sense that our epistemic norms, including our most fundamental norms, are understood to be the products of science. There are many questions one might raise about the cogency of this view, but my concern here is strictly to evaluate Quine's views for compatibility with what I have said.

If it weren't for Quine's denial of the analytic/synthetic distinction and his identification of the a priori with both the analytic and the rationally unrevisable, some aspects of my account of our a priori acceptance of logical principles would be compatible with his naturalism on either interpretation given above (although on the eliminativist interpretation, I would be understood to have provided only a bit of descriptive psychology, not a justification for logical principles). By his own theory, Quine must allow that our fundamental epistemological norms, including any commitment to empiricism, are revisable in light of experience. If science tell us about our norms and methodologies for forming true beliefs, it could turn out that our some of our basic norms and methodologies include a priori elements. I have argued that, in fact, they do. One could then ask about the basis for our a priori acceptance of these elements. If Quine's naturalism tells us that we must look to science, then the answer would be that these elements are presupposed by scientific methods. And this is exactly what the metajustificatory component of my account of the a priority of logic says: scientific methods of evaluation presuppose logical principles. The first-order reasons that I gave

for our acceptance of logical principles would not be understood as reason-giving, on Quine's view; instead, our adherence to logical principles in absence of sensory evidence would be an observed psychological phenomenon. The justification for logical principles would be that they are presupposed by methods of inquiry that are deemed to have predictive value.

Since there is no reason to identify the a priori with what is either rationally unrevisable or analytic, Quine has no basis for rejecting all forms of a priori justification in advance of empirical investigation. That is, Quine is not entitled to reject a priori justification *a priori*. Quine has to allow that science could show empiricism not to be constitutive of scientific method. So while Quine does not think that scientific methods involve any a priori commitments, he must allow that they might, so the metajustificatory component of my account of the a priority of logic is compatible with the non-eliminativist interpretation of Quine's naturalism – at least in principle.

While many have found reason to reject Quine's naturalized epistemology, reliabilism has enjoyed greater popularity. Reliabilism provides a naturalistic reduction of the concept of justification by analyzing it terms of in terms of non-epistemic notions such as causal connections between a thinker and the world, psychological processes and actual reliability. There are different types of reliabilist theories; however, the version of reliabilism that seems to be most widely accepted analyzes justification in terms of the reliable processes or methods that causally produce and sustain belief. A simple formulation of the view is as follows: S's belief in p is justified if and only if it is caused (or causally sustained) by a reliable cognitive process, or a history of reliable processes.[157] A defining feature of reliabilism is its commitment to a thorough-going externalism: on a reliabilist view, justification is a function of some reliable link of a given belief with truth, where the believer need not have knowledge of the reliability relation.

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[157] This particular formulation is put forth in Goldman (1994, p. 309) to facilitate his discussion of the core features of the view without distracting complications.

Clearly, I have not given a reliabilist account of logical belief. The only way that my view might be understood to be compatible with reliabilism is if methods, as opposed to subpersonal psychological processes, were admissible as a priori warranters, and if I could be understood to have described a reliable method for the formation of logical beliefs. But, as I pointed out earlier, it is not consistent with the spirit of reliabilism to admit methods as warranting without requiring that the psychological processes by which the methods are acquired are reliable. Nor is it likely that my method for acquiring logical beliefs, which might be stated as "Accept those principles that you find evident and the invalidity of which is inconceivable" meets the requirements of reliability. Given the history of a priori claims that were once accepted, but subsequently discredited, my "method" would probably not be judged to be reliable. If the further condition were added (or perhaps alternatively) that principles that must be widely presupposed in reasoning about anything should be accepted in the absence of empirical evidence, the acceptance condition might meet the standard of reliability. However, it is unclear how this would amount to an employable method of belief formation.

But the real problem here for the reliabilist is going to be how to demonstrate the reliability of any method or process for the formation of logical beliefs in a non-circular way. All versions of reliabilism are vulnerable to the objection that logic would be needed to ascertain the reliability of the methods and processes by which logical beliefs are acquired and sustained. The reliabilist might protest that we do not have to know that the processes that subserve logical belief are reliable in order to have knowledge of logical principles. It is a central tenet of reliabilism that one can know something without knowing that one knows it. So we could have knowledge of logical principles without knowing *that* the processes that subserve logical belief are reliable. But this is unsatisfactory because then we can't explain why we are justified in thinking that our logic is reliable. If we accept the reliabilist thesis, the good news is we might have knowledge of logical principles, but the bad news is we can't know that we do because there is no non-circular way to establish the reliability of the processes that subserve

logical belief, *ergo*, there is no way to establish the reliability of the principles themselves beyond the appeal to brute fact. It would seem that reliabilism is at a loss to explain the justification of logic: if our logic is, as a matter of fact, reliable, we do not (and cannot) know that it is because any assessment of the reliability of either the processes or methods that generate logical belief would assume some logic. And if, unbeknownst to us, the methods and processes are unreliable, then our logical beliefs are unjustified.

If reliabilism were the best account of justification on offer, then the incompatibility of what I have said about logical belief with reliabilism might be cause for concern. But it is clear that the reliabilist is going to have difficulty explaining how it is that we are justified in accepting logical principles, regardless of the merits of my account. The problem posed to reliabilism with respect to elementary logical belief is a reason (in addition to many others raised by critics of the view) to suspect that the concept of justification cannot be analyzed in terms of reliable processes.

Whether justification can be naturalized in a way that is stronger than what is implied by its supervenience on non-normative elements is questionable. The compatibility of justification with a naturalistic orientation is better explained, I think, by abandoning the reductive strategy and considering why justification might be thought to be problematic for the naturalist in the first place. Justification is problematic if the property of being justified is understood to be a factual property, where a "factual property," very roughly, is one that something possesses or fails to possess straightforwardly in a way that is not primarily dependent on norms or other human interests. If justifiedness is a factual property in this sense, then it stands in need of explanation in terms of natural processes and events.

But, arguably, justification is not a factual concept. It is an evaluative concept, although it is constitutive of the concept of justification that it has truth as its aim. To say that a proposition or belief that p is justified, is to appraise it positively from the epistemic point of view; it is to suggest that there are considerations in favor of p, that there are reasons for thinking that p is true. The attribution of justification is a *judgment* that we

make according to our methods of evaluation. Since a justification is understood to count in some way toward truth, to claim that *p* is justified means that we consider the reasons that might be given in favor of *p* to indicate that p is more likely true than false (how much more likely to meet the requirement of justification may be debated). In addition to wanting our methods of belief formation to maximize truth and minimize falsity, the epistemic point of view is characterized by the goal of attaining knowledge. The goal of amassing a large number of true beliefs may lead us to prefer a method of belief formation that is somewhat less reliable, but more powerful, than an alternative. Thus, attributions of justification may depend on the dual considerations of power and reliability. However, a justification in some way counts toward the truth of what is said to be justified, whatever the relative weights that may be assigned to competing epistemic goals.

It might be thought that one problem for a view that takes epistemological justification to be evaluative is that it puts a strain on the fact/value distinction, with the result that nothing should count as a fact. In order to ascertain whether a method or process is justificatory, one needs to utilize factual beliefs in the evaluation, but one must have used some methods and processes to arrive at the factual beliefs in the first place. So if epistemological justification is evaluative, it might appear that the fact/value distinction is in danger of collapse. However, the fact/value distinction collapses only if the facts that we might cite in our evaluations are mistakenly understood to have their status as "facts" independently of *any* human assessment. What it does mean is that a fact is a fact according to some standard of evaluation.

If justification is understood to be an evaluative notion, the sense in which it is thereby non-factual may be controversial, depending on the degree to which evaluativism is taken to imply relativism. If justification is evaluative, but the standards by which we evaluate are understood to be objective, then justification is objective – objective but non-factual. On the other hand, if standards can vary in ways such that a single standard is not correct or best in a given set of circumstances, then it looks like evaluativism about justification implies some degree of relativism.

William Alston (1985, p. 58) takes the evaluative nature of justification to be an uncontroversial feature of the concept, which suggests that he does not understand justification to be thereby relativistic in any surprising way. On Alston's view, justification supervenes on some range of non-normative grounds upon which our judgment is based, but justification is not so purely evaluative as to leave completely open what can count as adequate grounds. (p. 76) This would imply that there should be at least some agreement with respect to criteria for adequacy of the grounds; however, for all that Alston says here, there is room for variation in the standards for justification. More controversially, Hartry Field (1998, 2000) argues that evaluativism about justification implies a modest relativism. According to Field, justification is relative to our epistemic norms, which depend on our goals with respect to belief formation and revision. While it is unlikely that cognitive agents have radically different, basic epistemological standards of evaluation, these standards probably do vary slightly among cognitive agents. Moreover, basic standards might have differed radically. So embracing evaluativism entails a modest relativism because while some standards are better than others in achieving certain goals, there are, or could have been, differences with respect to the goals. (2000, p. 140-41) I will concentrate on Field's view because Alston does not take up the question of relativism.[158]

Field describes an epistemic norm as a system of rules (or methodologies) that governs belief formation and revision. If we exclude the possibility of skepticism about our epistemological norms, Field says that some basic methodologies must be reasonable without justification, i.e., they are "default reasonable," because any justification that could be given would involve some basic methodology or other. According to Field, in calling a rule reasonable, we are evaluating it, so we must ask about what we value. We value a rule for its reliability, but we inevitably believe our basic rules to be reliable, so

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[158] In his 1985 paper, Alston is more concerned with identifying different concepts of justification and, in particular, developing alternatives to the deontological conception rather than examining the issue of relativism.

we will also favor our own rules over alternatives. In evaluating methodologies, we also presuppose our own goals for the formation and revision of belief. One methodology or set of rules may be preferable to another depending on our goals, which may vary to some extent. For example, our preferences with respect to the balance of power and reliability for a methodology may vary, with the result that whether a claim is justified depends on the standards of evaluation that are chosen. While some standards are clearly better than others with respect to objective measures such as the degree to which they yield a high ratio of true beliefs, people may disagree with respect to their *goals*, so they may differ with respect to their standards of evaluation. One can say that some standards are better than others only to the extent that the goals are shared.

Field's version of evaluativism also has implications for the interpretation of a priori justification. The question of the a priority of logic becomes a question about why we would value a methodology that allows the use of deductive rules on no empirical evidence. The question of empirical indefeasibility is likewise recast as a question about why it is preferable to treat logical rules as empirically indefeasible rather than allowing them to be defeated by empirical evidence. In both cases, the answers are to be found by considering the alternatives: since we need some deductive methodology or other, and there are no minimally decent alternatives according to which logic can be understood to be vindicated by empirical evidence, it is reasonable to accept logic on no empirical evidence. Likewise, it is reasonable to consider logic to be empirically indefeasible because it is unclear how any empirical observations should be taken to count against it.[159]

But if justification is understood to be evaluative, does relativism follow? This depends both on whether standards of evaluation could differ and, if they did differ, whether they could be compared. I think that the theoretical possibility that there are, or could be, cognitive agents with radically different methods of belief formation from our own should be conceded. But as I pointed out earlier, merely entertaining this possibility

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[159] See Field (1998), esp. Section 4.

does not undermine the objectivity of beliefs formed in accordance with our own standards. So the relativism implied by this type of case should be unobjectionable. While it seems unlikely that our most basic deductive, inductive and perceptual standards of evaluation would vary significantly, there might be more significant variation to the extent that standards of evaluation are theory-laden and/or reflect choices that we might make. For example, there might be two competing scientific theories, both well-supported, but for which a claim is justified on one theory but not the other. If so, the justification for the claim would be only theory relative. But, again, relativism in this case seems unobjectionable.

One of the more controversial aspects of Field's view is the claim that our evaluation of basic belief-forming methodologies depends on our goals, and these goals may vary. If basic standards of evaluation can differ and the reasonableness of a method is relative to goals, justification is more relativistic than one might have thought. The idea that our goals may vary in actual practice seems to fit the case of induction because, as he points out, we might recognize that certain modifications in our preferences for the relative values of power and reliability could lead us to prefer one inductive system over another. However, one might take issue with the idea that, in general, the evaluation – from the epistemic point of view – of basic methodologies of belief formation varies with respect to goals. For example, it is less clear in the case of deduction how evaluation might vary with respect to goals. In the case of deduction, we want our rules to be uncontingently reliable, and it is unclear what other goal should be taken into consideration; differences in what logical principles are accepted would seem to depend upon judgments about their reliability rather than on countervailing considerations of power. Second, while a methodology may be instrumental to a thinker's goals for belief formation, it doesn't follow that its reasonableness is relative to those goals without further qualification. As Field points out, thinkers may be motivated by non-epistemic goals, for example, the desire to feel good about themselves. However, the evaluation of a methodology from the epistemic point of view presupposes the goals of power and

reliability because the epistemic point of view is defined by the interest of amassing true beliefs while minimizing false ones. So while there may be no constraints on a thinker's goals with respect to belief formation (as Field argues), whether the methodologies employed in the service of a thinker's goals are (epistemologically) justified depends only on the epistemic components of those goals. (This does not eliminate relativism due to differences in goals, however, because preferences for relative weights of purely epistemic goals may still vary.) Finally, there may be a difference between why we think that a basic rule is justified as opposed to why we might employ the rule in question. Goals are relevant to the latter consideration. In the case of deductive rules, we might employ them because we think that they are reliable, but Field does not address *why* we think that they have this feature, apart from saying that such rules are default reasonable and self-supporting.

With respect to the a priority of logic, the difference between my proposal and Field's is that I am classifying logic as a priori based on what I take the justification conditions for knowledge of the validity of logical principles to be, whereas Field takes the a priority of logic to be a matter of judging that a methodology that treats logical principles as a priori and empirically indefeasible is better than the available alternatives. On my account, justification can be understood to be an evaluative concept because ascriptions of justification are judgments that we make, but the question of a priority is not likewise rendered evaluative: whether a claim is a priori justified depends, not a choice about what to count as evidence or about what methodology we value, but on the character of the justification conditions for knowledge of the claim.

The account of the a priori justification of logic that I have given is, in general, compatible with evaluativism about justification. There is nothing about our accepting logical principles on the basis of their being evident and invulnerable to counterexamples that prohibits an analysis of justification as an evaluative concept. On an evaluative account of justification that takes our standards of evaluation to be, for the most part, objective, logical principles employed in ordinary reasoning are part of a universal norm

for deductive reasoning. On this view, the reasons that I gave for the acceptance of logical principles would be understood to establish their objectivity. If evaluativism is understood to imply some form of relativism about logic, my account of the grounds for our acceptance of logical principles might be seen as providing a norm according to which we accept logical principles, but allowing that there might be other norms or that a community of thinkers might be persuaded by counterexamples that we find unconvincing. On the version of evaluativism developed by Field, I might be understood to have provided a condition for when a deductive methodology is default reasonable.

In summary, my account of the a priori justification of logical principles is compatible with a weakly-naturalistic view of justification, whereby justification can be naturalized only in the sense that it is understood to supervene on non-normative properties. It is also compatible to some degree with the Quinean proposal to treat justification as a branch of science and let science tell us what our norms of evaluation are – unless it is decided in advance that the methods of scientific evaluation must exclude a priori elements. My account is incompatible with reliabilism. This might be troubling if reliabilism were the only, or even the best, way to accommodate justification within a naturalistic framework. But reliabilism has been found wanting for other reasons. I suggested that a more attractive strategy would be to relinquish the idea of naturalizing justification and, instead, acknowledge that it is evaluative, as opposed to straightforwardly factual, in character. On this view, there may be a question with respect to the objectivity of justificational claims. But however that issue is decided, nothing in my account precludes an analysis of justification along these lines.

References

Adams, Ernest (1975). *The Logic of Conditionals: An Application of Probability to Deductive Logic*. Dordrecht: Reidel.

Adler, Jonathan (2002). *Beliefs' Own Ethics*. Cambridge, MA: MIT Press.

Akiba, Ken (1994). "Quine and the Linguistic Doctrine of Logical Truth," *Philosophical Studies* 78, pp. 101-123.

Akiba, Ken (1995). "Logic As Instrument: The Millian View of the Role of Logic," *History and Philosophy of Logic* 17, pp. 73-83.

Alston, William (1985). "Concepts of Epistemic Justification," *Monist* 68, pp. 57-85.

Anderson, Alan and Belnap, Nuel (1962a) "Tautological Entailments," *Philosophical Studies* 13, pp. 9-24.

Anderson, Alan and Belnap, Nuel (1962b) "The Pure Calculus of Entailment," *Journal of Symbolic Logic* 27, pp. 19-52.

Audi, Robert (1993). *The Structure of Justification*. Cambridge: Cambridge Univ. Press.

Audi, Robert (2000). "Philosophical Naturalism at the Turn of the Century," *Journal of Philosophical Research* 25, pp. 27-45.

Ayer, Alfred J. (1936/52). *Language, Truth and Logic*. New York: Dover Publications.

Ayer, Alfred J. (1959). *Logical Positivism*. New York: Free Press.

Belnap, Nuel (1962). "Tonk, Plonk and Plink," *Analysis* 22, pp. 130-134.

Benacerraf, Paul (1973). "Mathematical Truth," *Journal of Philosophy* 70, pp. 661-80.

Birkhoff, Garrett and von Neumann, John (1936). "The Logic of Quantum Mechanics," *Annals of Mathematics* 37, no. 4, pp. 365-409.

Black, Max (1958). "Self-Supporting Inductive Arguments," *Journal of Philosophy* 55, pp. 718-25.

Boghossian, Paul (1996). "Analyticity Reconsidered," *Nous* 30, pp. 360-391.

Boghossian, Paul (2000). "Knowledge of Logic." In Paul Boghossian and Christopher Peacocke, eds., (2000), pp. 229-54.

Boghossian, Paul and Peacocke, Christopher (2000). *New Essays on the A Priori*. Oxford: Oxford Univ. Press.

Bonjour, Laurence (1985). *The Structure of Empirical Justification*. Cambridge, MA: Harvard University Press.

Bonjour, Laurence (1998). *In Defense of Pure Reason*. Cambridge: Cambridge Univ. Press.

Bostock, David (1990). "Logic and Empiricism," *Mind* 99, pp. 571-82.

Braine, M. D. S, Reiser, B. J., and Rumain, B. (1984) "Some Empirical Justification for a Theory of Natural Propositional Reasoning." In *Psychology of Learning and Motivation* 18, G. H. Bower, ed., pp. 139-46. New York: Academic Press.

Brouwer, L. E. J. (1952). "Historical Background, Principles and Methods of Intuitionism," *South African Journal of Science* 49, pp. 139-146.

Burge, Tyler (1993). "Content Preservation," *Philosophical Review* 102, pp. 457-488.

Butchvarov, Panayot (1970). *The Concept of Knowledge*. Evanston, IL: Northwestern Univ. Press.

Carroll, Lewis (1895). "What the Tortoise Said to Achilles," *Mind* 104, no. 416, pp. 278-280.

Carnap, Rudolf (1928). *Der Logische Aufbau der Welt*. Berlin: Schlachtensee Weltkreis-Verlag.
Translated as *The Logical Structure of the World*.

Carnap, Rudolf (1937/59). *The Logical Syntax of Language*. New York: Harcourt Brace.

Carnap, Rudolf (1952). "Quine on Analyticity." In Schilpp (1963), pp. 427-32.

Carnap, Rudolf (1963). "W. V. Quine on Logical Truth." In Schilpp (1963).

Chisholm, Roderick (1977). *Theory of Knowledge*. Englewood, NJ: Prentice Hall.

Coffa, J. Alberto (1991). *The Semantic Tradition from Kant to Carnap*. Cambridge: Cambridge Univ. Press.

Cosmides, Leda (1989). "The Logic of Social Exchange: Has Natural Selection Shaped How Humans Reason?" *Cognition* 31, pp. 187-276.

Cosmides, Leda and Tooby, John (1994). "Origins of Domain Specificity: The Evolution of Functional Organization." In *Mapping the Mind: Domain Specificity*

in Cognition and Culture, Lawrence Hirschfield and Susan Gelman, eds. Cambridge: Cambridge Univ. Press.

DeRose, Keith (1991). "Epistemic Possibilities," *Philosophical Review* 100, pp. 581-605.

Dummett, Michael (1973). "The Justification of Deduction." Lecture. British Academy, London. Reprinted in Dummett (1978), pp. 290-318.

Dummett, Michael (1976). "Is Logic Empirical," *Contemporary British Philosophy*, 4th series, ed. H. D. Lewis, London, pp. 45-68. Reprinted in Dummett (1978), pp. 269-281.

Dummett, Michael (1977). *Elements of Intuitionism.* Oxford: Oxford Univ. Press.

Dummett, Michael (1978). *Truth and Other Enigmas.* Cambridge, MA: Harvard Univ. Press.

Dummett, Michael (1991). *The Logical Basis of Metaphysics.* Cambridge, MA: Harvard Univ. Press.

Evans, Gareth (1978). "Can There be Vague Objects?" *Analysis* 38, p. 208.

Evans, Gareth (1982). *The Varieties of Reference.* Oxford: Oxford Univ. Press.

Feldman, Richard and Conee, Earl (1985). "Evidentialism," *Philosophical Studies* 85, pp. 15-34.

Feyerabend, Paul (1963). "How to be a Good Empiricist -- A Plea for Tolerance in Matters Epistemological." In *Philosophy of Science: The Delaware Seminar.* New York: Interscience Publishers.

Field, Hartry (1973). "Theory Change and the Indeterminacy of Reference," *Journal of Philosophy* 70, pp. 462-81.

Field, Hartry (1991). "Metalogic and Modality," *Philosophical Studies* 62, pp. 1-22.

Field, Hartry (1994). "Disquotational Truth and Factually Defective Discourse," *Philosophical Review* 103, pp. 405-452.

Field, Hartry (1996). "The A Prioricity of Logic," *Proceedings of the Aristotelian Society*, June 1996, pp. 359-79.

Field, Hartry (1998). "Epistemological Nonfactualism and the A Prioricity of Logic," *Philosophical Studies*, pp. 1-24.

Field, Hartry (2000). "A Prioricity as an Evaluative Notion." In Paul Boghossian and Christopher Peacocke, eds. (2000), pp. 117-49, and Field (2001), pp. 361-90.

Field, Hartry (2001). *Truth and the Absence of Fact*. New York: Oxford Univ. Press.

Fine, Kit (1975). "Vagueness, Truth and Logic," *Synthese* 30, pp. 265-300.

Foley, Richard (1994). *Midwest Studies in Philosophy* 19, *Philosophical Naturalism.*, Peter French et al, eds., pp. 243-60. Notre Dame, IN: Univ. of Notre Dame Press.

Fogelin, Robert and Sinnott-Armstrong, Walter (1997). *Understanding Arguments*, 5th Ed., Orlando, FL: Harcourt Brace & Co.

Frege, Gottlob (1893/1903). *Grundgesetze der Arithmetik, Begriffsschriftlich Abgeleitet*, Bk. I, Jena: H. Pohle. Partially trans. by M. Furth as *The Basic Laws of Arithmetic*. Berkeley: Univ. of CA Press, 1964.

Frege, Gottlob (1884/1950, 1980). *The Foundations of Arithmetic*, 2nd Revised Ed., trans. J. L. Austin. Evanston, IL: Northwestern Univ. Press.

Friedman, Michael (1979). "Truth and Confirmation," *Journal of Philosophy* 76, pp. 361-82.

Gentzen, Gerhard (1969). *The Collected Papers of Gerhard Gentzen*, Amsterdam: North Holland Pub. Co.

Gentzen, Gerhard (1933). "On the Existence of Independent Axiom Systems for Infinite Sentence Systems." Reprinted in Gentzen (1969), pp. 29-52.

Gentzen, Gerhard (1934). "Investigations into Logical Deduction." Reprinted in Gentzen (1969), pp. 68-131.

Gibbins, Peter (1987). *Particles and Paradox: The Limits of Quantum Logic*. Cambridge: Cambridge Univ. Press.

Glymour, Clark (1980). *Theory and Evidence*. Princeton: Princeton Univ. Press

Goldman, Alvin (1979). "What Is Justified Belief?" In *Justification and Knowledge*, George Pappas, ed. Dordrecht: Reidel.

Goldman, Alvin (1986). *Epistemology and Cognition*. Cambridge, MA: Harvard Univ. Press.

Goldman, Alvin (1994). "Naturalistic Epistemology and Reliabilism." In *Midwest Studies in Philosophy* 19, Peter French et al., eds., pp. 301-20. Notre Dame, IN: Univ. of Notre Dame Press.

Goldman, Alvin (1999). "A Priori Warrant and Naturalistic Epistemology," *Philosophical Perspectives* 13, *Epistemology*, pp. 1-28.

Goodman, Nelson (1979/83). *Fact, Fiction and Forecast.* Cambridge, MA and London: Harvard Univ. Press. Originally published Indianapolis: Bobbs-Merrill, 1965.

Haack, Susan (1976). "The Justification of Deduction," *Mind* 85, pp. 112-119.

Haack, Susan (1974, 1996). *Deviant Logic, Fuzzy Logic.* Chicago: Univ. of Chicago Press.

Haack, Susan (1993). "Two Faces of Quine's Naturalism," *Synthese* 94, p. 335.

Haack, Susan (1993). *Evidence and Inquiry.* Oxford: Blackwell.

Haack, Susan (2002). *Defending Science -- Within Reason*, forthcoming.

Hacking, Ian (1967). "Possibility," *Philosophical Review* 76, no. 2, pp. 143-68.

Hahn, Hans (1933) "Logic, Mathematics and Knowledge of Nature." In Ayer (1959), pp. 147-61.

Hale, Bob and Wright, Crispin (2000). "Implicit Definition and the A Priori." In Paul Boghossian and Christopher Peacocke, eds. (2000), pp. 281-319.

Hanson, William (1997). "The Concept of Logical Consequence," *Philosophical Review* 106, pp. 365-409.

Harman, Gilbert (1972). "Conceptual Role Semantics," *Notre Dame Journal of Formal Logic* 23, pp. 242-56.

Hellman, Geoffrey (1981). "Quantum Logic and Meaning," *Philosophy of Science Association* 2, pp. 493-511.

Heyting, A. (1966). *Intuitionism.* Amsterdam: North-Holland.

Hinman, Peter G., Kim, Jaegwon and Stich, Stephen P. (1968). "Logical Truth Revisited," *Journal of Philosophy* 65, no. 5, pp. 495-500.

Holland, J. K., Holyoak, K .J., Nisbett, R .E. and Thagard, P. R. (1986). *Induction: Processes of Inference, Learning and Discovery.* Cambridge, MA: MIT Press.

Horwich, Paul. (1979). "Meaning, Use and Truth," *Mind* 104, pp. 355-68.

Horwich, Paul (1998). *Meaning.* New York: Oxford Univ. Press.

Horwich, Paul (2000). "Stipulation, Meaning and Apriority." In Paul Boghossian and Christopher Peacocke, eds. (2000), pp. 150-169.

Johnson-Laird, Philip (1983). *Mental Models.* Cambridge, MA: Harvard Univ. Press.

Johnson-Laird, Philip and Byrne, Ruth (1991). *Deduction*. Hillsdale, NJ: Lawrence Erlbaum.

Kant, Immanuel (1781/87). *Critique of Pure Reason*, trans. Norman Kemp Smith. New York: St. Martin's Press, 1929.

Kant, Immanuel (1783). *Prolegomena to Any Future Metaphysics*, a revision of the Carus translation by Lewis White Beck. Indianapolis: Bobbs-Merrill, 1950.

Kessler, G. (1980). "Frege, Mill and the Foundations of Arithmetic," *Journal of Philosophy* 77, pp. 65-79.

Kim. Jaegwon (1981). "The Role of Perception in A Priori Knowledge: Some Remarks," *Philosophical Studies* 40, pp. 339-354.

Kim, Jaegwon (1988). "What Is Naturalized Epistemology." In *Philosophical Perspectives*, 2, *Epistemology*, J. E. Tomberlin, ed., pp. 381-405. Atascadero, CA: Ridgeview Publishing Co.

Kitcher, Paul (1980). "A Priori Knowledge," *Philosophical Review* 89, pp. 3-23.

Kitcher, Paul (1984). *The Nature of Mathematical Knowledge*. Oxford: Oxford Univ. Press.

Kitcher, Paul (1979). "Arithmetic for the Millian," *Philosophical Studies* 37, pp. 215-236.

Kornblith, Hilary (1985). "Introduction: What is Naturalized Epistemology?" In *Naturalizing Epistemology*, Hilary Kornblith, ed., pp. 1-14. Cambridge, MA: Bradford Books/MIT Press.

Koslow, Arnold (1992). *A Structuralist Theory of Logic*. Cambridge: Cambridge Univ. Press.

Koslow, Arnold (2000). "Truthlike and Truthful Operators," in *Between Logic and Intuition, Essays in Honor of Charles Parsons*, G. Sher and R. Tieszen, eds., pp. 27-53. Cambridge: Cambridge University Press.

Kriesel, G. (1967). "Informal Rigour & Completeness Proofs." In *Problems in the Philosophy of Mathematics*, Imre Lakatos, ed., pp. 138-71. Amsterdam: North-Holland.

Kripke. Saul (1972/80). *Naming and Necessity*. Cambridge, MA: Harvard Univ. Press.

Lewis, C. I. (1946). *An Analysis of Knowledge and Valuation*. La Salle, IL: Open Court.

Lewis, C. I. (1923) "A Pragmatic Conception of the A Priori," *Journal of Philosophy* 20, no. 7, pp. 169-77. Reprinted in Moser (1987), pp. 15-26.

Lewis, David (1969). *Convention*. Cambridge, MA: Harvard Univ. Press.

Lewis, David (1970). "How to Define Theoretical Terms," *Journal of Philosophy* 67, no. 13, pp. 427-66.

Lewis, David (1988). "Vague Identity: Evans Misunderstood," *Analysis* 48, pp. 128-30.

Locke, John (1694-1704/1959). *An Essay Concerning Human Understanding*, ed., A. C. Fraser, 1894. Republication of First Edition. New York: Dover, 1959.

Machina, Ken (1976). "Truth, Belief, and Vagueness," *Journal of Philosophical Logic* 6, pp. 47-78).

McGee, Vann (1985). "A Counterexample to Modus Ponens," *Journal of Philosophy* 73, pp. 462-71.

Mill, John Stuart (1843/1950). *Philosophy of Scientific Method*, Ernest Nagel, ed. New York: Hafner Publishing Co.

Mill, John Stuart (1843/1973). *A System of Logic*, J. M. Robson, ed. Toronto: Univ. of Toronto Press.

Mill, John Stuart. (1865/79). *An Examination of Sir William Hamilton's Philosophy*, J. M. Robson, ed. Toronto: Univ. of Toronto Press..

Moore, G. E. (1962). *Commonplace Book*, 1919-53, H. D. Lewis, ed. London: George Allen & Unwin.

Morton, Adam (1977). *A Guide through the Theory of Knowledge*. Encino, CA: Dickenson Publishing Co.

Moser, Paul (1987). *A Priori Knowledge*. Oxford: Oxford University Press.

Nagel, Thomas (1997). *The Last Word*. New York: Oxford Univ. Press.

Nagel, Ernest (1956). *Logic Without Metaphysics*. Glencoe, IL: Free Press.

Parsons, Terence and Woodruff, Peter (1995). *Proceedings of the Aristotelian Society* 95, pp. 171-191.

Peacocke, Christopher (1987). "Understanding Logical Constants: A Realist's Account," *Proceedings of the British Academy* 73, pp. 153-200.

Peacocke, Christopher (1992). *A Study of Concepts*. MIT Press, Cambridge, MA

Peacocke, Christopher (1993). "How Are A Priori Truths Possible?" *European Journal of Philosophy* 1, no. 2, pp. 175-199.

Peacocke, Christopher (1998a). "Implicit Conceptions, Understanding and Rationality," *Philosophical Issues* 9, *Concepts*, 1998, pp. 43-87.

Peacocke, Christopher (1998b). "Implicit Conception, the A Priori, and the Identity of Concepts," *Philosophical Issues* 9, *Concepts*, 1998, pp. 121-148.

Peacocke, Christopher (2000). "Explaining the A Priori: The Programme of Moderate Rationalism." In Paul Boghossian and Christopher Peacocke, eds, (2000), pp. 255-85.

Pollock, John (1974). *Knowledge and Justification*. Princeton, NJ: Princeton Univ. Press.

Pollock, John (1986). *Contemporary Theories of Knowledge*. Totowa, NJ: Rowman & Littlefield.

Priest, Graham (1979). "The Logic of Paradox," *Journal of Philosophical Logic* 8, pp. 219-241.

Priest, Graham (1987). *In Contradiction: A Study of the Transconsistent*. Dordrecht: Kluwer.

Priest, Graham, Routley, R., Norman, J. (1989). *Paraconsistent Logic: Essays on the Inconsistent*. Munchen: Philosophia.

Priest, Graham (1998). "What Is So Bad About Contradictions?" *Journal of Philosophy* 95, pp. 410-426.

Prior, A. (1960). "The Runabout Inference Ticket," *Analysis* 21, pp. 38-39.

Putnam, Hilary (1968). "The Logic of Quantum Mechanics," first published as "Is Logic Empirical," *Boston Studies in the Philosophy of Science 5*, Dordrecht: Reidel, 1968. Reprinted in Putnam (1975), pp. 174-97.

Putnam, Hilary (1975). *Realism and Reason: Philosophical Papers, Vol. I.* Cambridge: Cambridge Univ. Press, 1975.

Putnam, Hilary (1978). "There is at Least One A Priori Truth." In Putnam (1983), pp. 98-114.

Putnam, Hilary (1983). *Mathematics, Matter and Method: Philosophical Papers, Vol. III.* Cambridge: Cambridge Univ. Press.

Putnam, Hilary (1979). "Analyticity & Apriority: Beyond Quine and Wittgenstein." *In Midwest Studies in Philosophy* 9, pp. 423-41, ed. Peter French et al. Reprinted in Putnam (1983), pp. 115-38.

Quine, Willard V. O. (1934). "Lecture I: The A Priori." In Quine/Carnap (1990), pp. 47-67.

Quine, Willard V. O. (1935). "Truth by Convention." First published in O. H. Lee, ed., *Philosophical Essays for A.N. Whitehead.* New York: Longmans, 1936. Reprinted in Quine (1966/76), pp. 77-106.

Quine, Willard V. O. (1953). "Two Dogmas of Empiricism." In Quine (1953/61/80), pp. 20-46.

Quine, Willard V. O. (1953/61/80). *From a Logical Point of View.* Cambridge, MA: Harvard Univ. Press.

Quine, Willard V. O. (1954). "Carnap on Logical Truth." Written for Schilpp (1963). Reprinted in Quine (1966/76), pp. 107-132.

Quine, Willard V. O. (1960a). *Word and Object.* Cambridge, MA: MIT Press.

Quine, Willard V. O. (1960b). "Posits and Reality." First published in *Basis of the Contemporary Philosophy* 5, S. Uyeda, ed. Tokyo: Waseda Univ. Press, 1960. Reprinted in Quine (1966/1976), pp. 246-254.

Quine, Willard V. O. (1966/76). *Ways of Paradox.* Cambridge, MA: Harvard Univ. Press.

Quine, Willard V. O. (1969a). *Ontological Relativity.* New York: Columbia Univ. Press.

Quine, Willard V. O (1969b) "Epistemology Naturalized." In Quine (1969), pp. 69-90.

Quine, Willard V. O. and Ullian, J. S. (1970a/78). *The Web of Belief*, 2nd Ed., New York: McGraw-Hill.

Quine, Willard V. O. (1970b/86). *Philosophy of Logic.* Cambridge, MA: Harvard Univ. Press.

Quine, Willard V. O./Carnap, R (1990). *Dear Carnap, Dear Van: The Quine-Carnap Correspondence and Related Work*, Richard Creath, ed. Berkeley/Los Angeles: Univ. of California Press.

Quine, Willard V. O. (1990). *Pursuit of Truth.* Cambridge, MA: Harvard University Press.

Quine, Willard V. O. (1991). "Two Dogmas in Retrospect," *Canadian Journal of Philosophy*, 21, pp. 265-74.

Ramsey, Frank (1931). "Theories." In *Foundations of Mathematics*, R. Braithwaite, ed. London: Routledge & Kegan Paul.

Reichenbach, Hans (1944). *Philosophical Foundations of Quantum Mechanics.* Berkeley/Los Angeles: Univ. of California Press.

Rey, Georges (1993). "The Unavailability of What We Mean I: A Reply to Quine, Fodor and LePore" *Grazer Philosophical Studien* 96, pp. 61-101.

Rey, Georges (1998a). "A Naturalistic A Priori," *Philosophical Studies* 92, pp. 25-43.

Rey, Georges (1998b). "What Implicit Conceptions are Unlikely to Do," *Philosophical Issues* 9, *Concepts,* 1998, pp. 92-113.

Rips, Lance (1983). "Cognitive Processes in Reasoning," *Psychological Review* 90, pp. 38-71.

Rips, Lance (1994). *The Psychology of Proof: Deductive Reasoning in Human Thinking.* Cambridge, MA: MIT Press.

Rips. Lance (1995). "Deduction and Cognition." In Edward Smith and Daniel Osherson, eds., *Thinking: An Invitation to Cognitive Science*, 2nd ed., Cambridge, MA: MIT Press.

Russell, Bertrand (1927). *The Analysis of Matter.* London: Allen & Unwin.

Ryle, Gilbert (1954). "Formal and Informal Logic" in *Dilemmas.* Cambridge: Cambridge Univ. Press.

Salmon, Wesley and Earman, John (1992/99). *Introduction to the Philosophy of Science.* Indianapolis, IN: Hackett Publishing Co.

Schilpp, Paul A. (1963). *The Philosophy of Rudolph Carnap.* La Salle, IL: Open Court.

Schilpp, Paul A. (1986). *The Philosophy of Willard V. O. Quine.* La Salle, IL: Open Court. Press.

Sellars, Wilfred (1974). "Meaning as Functional Classification," *Synthese* 27, pp. 417-437.

Sperber, Dan (1982). "Apparently Irrational Beliefs." In *Rationality and Relativism*, Hollis and Lukes, eds., Cambridge, MA: The MIT Press, 1994.

Stich, Stephen (1990). *The Fragmentation of Reason.* Cambridge, MA: MIT Press.

Stroud, Barry (1965). "Wittgenstein and Logical Necessity," *Philosophical Review* 74, pp. 504-18. Reprinted in Moser (1987), pp. 68-84.

Stroud, B. (1996). "The Charm of Naturalism." *Proceedings and Addresses of the American Philosophical Association* 70, no. 2. Newark, DE: American Philosophical. Association.

Tarski, Alfred (1936). "On the Concept of Logical Consequence" in Tarski (1956/83), pp. 409-20.

Tarski, Alfred (1956/83). *Logic, Semantics and Metamathematics*, 2nd Ed., trans. J. H. Woodger and ed. John Corcoran. Indianapolis: Hackett Publishing. First edition, Oxford: Oxford University Press.

Van Cleve, James (1984). "Reliability, Justification, and the Problem of Induction," *Midwest Studies in Philosophy* 9, pp. 555-567.

Williams, Michael (1991). *Unnatural Doubts: Epistemological Realism and the Basis of Skepticism*. Oxford: Cambridge Univ. Press.

Williamson, Timothy (1994). *Vagueness*. London: Routledge.

Wittgenstein, Ludwig (1922). *Tractatus Logico-Philosophicus*, trans. C. K. Ogden. London: Routledge.

Wittgenstein, Ludwig (1979). *Wittgenstein's Lectures, Cambridge 1932-35*, from the notes of Alice Ambrose and Margaret Macdonald. Chicago: Univ. of Chicago Press.

Wittgenstein, Ludwig (1980). *Wittgenstein's Lectures, Cambridge, 1930-32*, from the notes of John King and Desmond Lee. Totowa, NJ: Rowman & Littlefield.

Wittgenstein, Ludwig (1953). *Philosophical Investigations*, 3rd Ed. Oxford: Basil Blackwell (1967).

Yablo, Stephen (1993). "Is Conceivability a Guide to Possibility?" *Philosophy and Phenomenological Research* 53, pp. 1-42.