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A Priori Knowledge

1. INTRODUCTION

e prominence of the a priori within traditional epistemology is largely due to the in uence of Immanuel Kant. In the Introduction to the *Critique of Pure Reason*,[1] he introduces a conceptual framework that involves three distinctions: (1) the *epistemic* distinction between a priori and empirical knowledge; (2) the *metaphysical* distinction between necessary and contingent propositions; and (3) the *semantic* distinction between analytic and synthetic propositions. Within this framework, Kant poses four questions:

1. What is a priori knowledge?
2. Is there a priori knowledge?
3. What is the relationship between the a priori and the necessary?
4. Is there synthetic a priori knowledge?

ese questions remain at the center of the contemporary debate.

Kant maintains that a priori knowledge is "absolutely independent of all experience."[2] is characterization is not fully perspicuous since he allows that such knowledge can depend on experience in *some* respects. For example, according to Kant, we know a priori that every alteration has its cause despite

the fact that the concept of alteration is derived from experience. Yet he is not explicit about the respect in which such knowledge must be independent of experience.

Since Kant does not o er a fully articulated analysis of the concept of a priori knowledge, he is not in a position to argue *directly* for its existence by showing that some knowledge satis es the conditions in his analysis. Instead, he approaches the second question *indirectly* by seeking *criteria* of the a priori. Criteria provide su cient conditions for a priori knowledge that are not included in the analysis of the concept. Kant o ers two such criteria, necessity and strict universality, which he claims are inseparable from one another. Kant's primary arguments for the a priori appeal to the rst. For example, he argues that since mathematical propositions are necessary and we know some mathematical propositions, it follows that we have a priori knowledge.

Kant's claim that necessity is a criterion of the a priori commits him to the following thesis about the relationship between the a priori and the necessary:

(K1) All knowledge of necessary propositions is a priori.

He also appears to endorse

(K2) All propositions known a priori are necessary.

Although Kant is o en portrayed as holding that the categories of the a priori and the necessary are coextensive, the conjunction of (K1) and (K2) does not support that attribution, since it does not entail that all necessary propositions are known or knowable a priori. (K1) connects the third question with the second since it provides the key premise of Kant's only argument for the existence of a priori knowledge. Neither (K1) nor (K2) bears directly on the rst question, since Kant does not claim that necessity is a constituent of the concept of a priori knowledge.

Kant maintains that all propositions of the form "All A are B" are either analytic or synthetic: analytic if the predicate is contained in the subject, synthetic if it is not. Utilizing this distinction, he argues that

(A1) All knowledge of analytic propositions is a priori, and
(A2) Some propositions known a priori are synthetic.

In support of (A2), Kant once again appeals to mathematics, arguing that the predicate terms of "7 + 5 = 12" and " e straight line between two points is the shortest" are not covertly contained in their respective subjects. Neither (A1) nor (A2) has a direct bearing on the rst two questions since Kant does not claim

that analyticity is a constituent of the concept of a priori knowledge and does not invoke either as a premise in his arguments for the existence of a priori knowledge. Kant regards (A2) as signi cant because it sets the stage for his primary epistemic project, which is to explain how such knowledge is possible. e project, however, presupposes that a priori knowledge of analytic propositions and a priori knowledge of synthetic propositions are fundamentally di erent, a presupposition Kant does not explicitly defend.

e contemporary discussion of the a priori revolves around Kant's four questions. Philip Kitcher o ers an articulation of Kant's characterization of a priori knowledge.[3] He maintains that a belief is justi ed independently of experience only if it is indefeasible by experiential evidence. Building on the work of W. V. Quine[4] and Hilary Putnam,[5] who argue that no belief is immune to revision in light of recalcitrant experience, Kitcher concludes that mathematical knowledge is not a priori. In response, a number of theorists reject Kitcher's claim that the concept of a priori knowledge involves an indefeasibility condition and o er alternative proposals.[6]

Paul Benacerraf challenges Kant's strategy for arguing that there is a priori knowledge.[7] Benacerraf maintains that one knows a statement only if one is causally related to the entities referred to by its truth conditions and that the truth conditions of mathematical statements make reference to abstract entities. Since abstract entities cannot stand in causal relations, one cannot know mathematical statements. e tradition, however, maintains that the truth conditions of all necessary truths make reference to abstract entities.[8] Hence, Benacerraf's argument, if cogent, establishes that knowledge of necessary truths is not possible. e argument sparked a series of investigations into the general question of knowledge of abstract entities and the more speci c question of the proper role of causal conditions in a plausible theory of knowledge.[9]

Saul Kripke's metaphysical and semantic results have renewed interest in Kant's account of the relationship between the a priori and the necessary.[10] Kripke forcefully argues that the concept of a priori knowledge is epistemic but the concept of necessary truth is metaphysical and, hence, one cannot assume without argument that they are coextensive. Furthermore, he maintains that there are necessary propositions known a posteriori and contingent propositions known a priori. Kripke's contentions generated a large literature addressing his particular examples as well as the more general question of the relationship between the a priori and the necessary.[11]

Kant's claim that there is synthetic a priori knowledge dominated discussion of the a priori over the past y years. e controversy is fueled by two related reactions to (A2). e rst is due to proponents of logical empiricism who argue that only analytic propositions are knowable a priori.[12] e second is due to W. V. Quine who rejects this central tenet of logical empiricism by denying the cogency

of the analytic-synthetic distinction.[13] Although Quine's conclusion is semantic, it is widely regarded as having broader implications for the existence of a priori knowledge. eorists are reassessing both the cogency of Quine's arguments against the distinction and, more importantly, the bearing, if any, of Quine's rejection of the distinction on the question of whether there is a priori knowledge.[14]

e range of issues raised by Kant's four questions is enormous, covering most of the central areas of contemporary philosophical investigation. e focus of this essay is more limited. My goal is to address the question of whether a priori knowledge exists. Since one cannot determine whether such knowledge exists without knowing what such knowledge is, I begin by providing an analysis of the concept a priori knowledge. I utilize that analysis to show that the traditional arguments, both for and against, the a priori are not convincing. I conclude by o ering an alternative strategy for defending the existence of a priori knowledge. Although the questions about the relationship between the a priori and the nonepistemic concepts of necessity and analyticity are not my primary targets, I address them insofar as they are relevant to analyzing the concept of a priori knowledge or to determining whether such knowledge exists.

2. THE CONCEPT OF A PRIORI KNOWLEDGE

ere are two approaches to analyzing the concept of a priori knowledge. e rst, which is *reductive*, analyzes it in terms of the concept of a priori justi cation. According to this approach, S knows a priori that p just in case (a) S's belief that p is justi ed a priori and (b) the other conditions for knowledge are satis ed. e primary target of analysis is the concept of a priori *justification*. e second, which is *nonreductive*, provides an analysis of the concept that does not include conditions involving the concept of the a priori. e primary target of analysis is the concept of a priori *knowledge*.

e conditions on a priori knowledge proposed by contemporary epistemologists draw their inspiration from Kant. ey fall into two broad categories: *epistemic* and *nonepistemic*. ere are three types of epistemic conditions. e rst imposes conditions regarding the *source* of justi cation, the second imposes conditions regarding the *defeasibility* of justi cation, and the third appeals to the *strength* of justi cation. Source and defeasibility conditions are inspired by Kant's characterization of a priori knowledge as independent of all experience. Strength conditions derive from Kant's frequent association of *certainty* with the a priori.[15] Two nonepistemic conditions have played a prominent role in analyses of the a priori. Some theorists include *necessity*, which Kant endorsed as a criterion of a priori knowledge, in the analysis of the concept. Others, reacting against Kant,

deny that synthetic a priori knowledge is possible, and include *analyticity* in the analysis of the concept.

Analyses of the concept of a priori knowledge fall into three categories. Pure epistemic analyses include only epistemic conditions. Impure epistemic analyses include, in addition, some nonepistemic condition. Nonepistemic analyses consist of only nonepistemic conditions. We turn first to nonepistemic analyses.[16]

2.1. Nonepistemic Analyses

Nonepistemic analyses maintain that either necessity or analyticity provides both necessary and sufficient conditions for a priori knowledge. There is a general reason for regarding them with suspicion. The analysandum in question is epistemic. It is a type of justification. An informative analysis, however, should highlight what is distinctive about such justification. An analysis in terms of necessity or analyticity highlights what is distinctive about the propositions so justified rather than the justification itself. Hence, it will fail to be informative.

Nonepistemic analyses typically involve the expression "a priori truth" or "a priori proposition." This introduces a complication since these expressions do not have a fixed meaning. Many writers introduce them as shorthand for "truth (proposition) that can be known a priori."[17] On this usage "a priori" remains an epistemic predicate, one whose primary application is to knowledge or justification rather than truth. Some, however, use the expression to apply primarily to truths. So, for example, Anthony Quinton maintains that

> *'A priori'* means either, widely, 'non-empirical' or, narrowly, following Kant, 'necessary'.[18]

Quinton's use of the term "non-empirical" suggests that, on his view, the primary application of "a priori" is epistemic since "empirical" is typically an epistemic predicate, one whose primary application is to items of knowledge or justification. But Quinton's use of "non-empirical" is also misleading. He explicitly maintains that it is *not* an epistemic predicate:

> The idea of the empirical is a development of the contingent. It aims to explain how a statement can owe its truth to something else, what conditions the something else must satisfy if it is to confer truth on a statement.[19]

For Quinton, "empirical" has its primary application to truth conditions or the source of truth. Although he characterizes his initial goal as a defense of the

thesis that all a priori statements are analytic, he goes on to maintain that "the essential content of the thesis is that all *necessary* truths are analytic."[20] For Quinton, the narrow sense of "a priori," "necessary," and "analytic" are identical in meaning.

e upshot is that the term "a priori" is ambiguous. It is a predicate whose primary application is to either types of justi cation or grounds of truth. Hence, a nonepistemic analysis of the a priori can have either as its target. If its target is the latter, then the analysis is not open to my initial argument because it is not directed toward the epistemic concept. It is directed toward a metaphysical concept pertaining to truth conditions. Our concern, however, is with the analysis of the epistemic concept.

Are there nonepistemic analyses of the epistemic concept? R. G. Swinburne defends both of the following theses:

(S1) A proposition is a priori if and only if it is necessary and can be known to be necessary.
(S2) A proposition is a priori if and only if it is analytic and can be known to be analytic.[21]

Unlike Quinton, Swinburne maintains that the term "a priori" has its primary application to knowledge. An a priori proposition is one that can be known a priori. Hence, it appears that he is proposing nonepistemic analyses for an epistemic concept.

Closer examination reveals that Swinburne is not proposing either (S1) or (S2) as an analysis of the concept of a priori knowledge. Instead, he endorses Kant's analysis of a priori knowledge as absolutely independent of all experience, maintaining that Kant meant by this "knowledge which comes to us through experience but is not contributed by experience."[22] Swinburne's concern, however, is with the question of how we *recognize* such knowledge. He proposes (S1) as capturing Kant's answer to this question.

e upshot here is that not every biconditional of the form:

(AP) A proposition is a priori if and only if . . . ,

where "a priori" is an epistemic predicate, is an analysis of the epistemic concept designated by that term. Biconditionals of this form may be proposed in response to di erent questions. Swinburne's question

(Q1) How do we identify the items satisfying some analysis of a priori knowledge?

is di erent from the question

(Q2) What is the analysis of a priori knowledge?

An answer to (Q1) presupposes, rather than provides, an answer to (Q2).

Apparent nonepistemic analyses of the a priori must be scrutinized along two dimensions. What is the target of the analysis? What question is being asked of the target? My target is the concept of a priori justi cation as opposed to the concept of a priori truth. My contention is that a nonepistemic analysis of the former cannot succeed. Since the concept is fundamentally epistemic, any satisfactory analysis must identify the salient *epistemic* feature of such justi cation. is contention does not entail that there are no nonepistemic features common to all and only propositions justi able a priori. It only entails that it is not by virtue of having those features that such propositions are justi able a priori.

e contention that an adequate analysis of the concept of a priori justi cation must include an epistemic condition leaves open the possibility that it also includes some nonepistemic condition. We now turn to the question of whether some nonepistemic condition is necessary for a priori justi cation. My focus is on conditions involving the concept of necessity since they are the most common.

2.2. Impure Epistemic Analyses

Analyses of the concept of a priori justi cation that include the concept of necessity fall into two categories. Some include necessity as a component of an epistemic condition. Others include it as an independent condition. Laurence BonJour o ers the following version of the traditional rationalist conception of the a priori:

> a proposition is justi ed *a priori* when and only when the believer is able, either directly or via some series of individually evident steps, to intuitively "see" or apprehend that its truth is an invariant feature of all possible worlds, that there is no possible world in which it is false.[23]

e conception consists of a single condition with two components: the source of a priori justi cation, intuitive apprehension, and the content of such apprehensions, necessary truths.

Assessing the implications of the analysis is tricky since it involves a metaphorical use of the term "see." Taken literally, the locution "S sees that p" (for example, that there is a rabbit in the garden) entails "S believes that p."[24] Assuming that the metaphorical use of "see" preserves the logical features of the literal, "S intuitively

'sees' that p is true in all possible worlds" entails "S believes that p is true in all possible worlds." Hence, on the traditional rationalist conception, "S's belief that p is justified a priori" entails "S believes that necessarily p."

The conception faces three objections. The first is due to *conceptual deficiency*. Many, including some mathematicians, are not conversant with the metaphysical distinction between necessary and contingent propositions. Consider a mathematician, S, who believes a theorem T on the basis of a generally accepted proof. S's belief that T is justified. Suppose that S lacks the concept of necessity and, as a consequence, does not believe that necessarily T. It is implausible to maintain that S's belief that T is not justified a priori merely because S lacks a concept that is not even a constituent of the content of S's belief.

The first objection can be avoided by weakening the conception to require that S believe that necessarily p *provided that* S possesses the concept of necessity. Two objections remain. The first is due to *modal scepticism*. Among philosophers conversant with the concept of necessary truth, some deny (let us suppose, erroneously) its cogency. As a consequence, they avoid modal beliefs, such as that necessarily 2 + 2 = 4. But it is implausible to maintain that none of their mathematical beliefs are justified a priori solely on the grounds that they have an erroneous metaphysical belief. Second, the conception is open to a *regress*. Suppose that S believes that necessarily p. Must S's belief that necessarily p be justified or not? If not, then it is hard to see why it is a necessary condition for the a priori justification of S's belief that p. If so, then presumably its justification must be a priori. But, in order for its justification to be a priori, S must see that necessarily p is true in all possible worlds which, in turn, requires believing that necessarily necessarily p. But now a regress threatens since we can once again ask the question: Must S's belief that necessarily necessarily p be justified or not?

R. M. Chisholm provides an analysis of the a priori in which necessity is offered as an independent necessary condition. Consider the following definitions:

D1 h is an axiom = Df h is necessarily such [that] (i) it is true and (ii) for every S, if S accepts h, then h is certain for S.[25]
D2 h is *axiomatic* for S = Df (i) h is an axiom and (ii) S accepts h.[26]
D3 *h* is known *a priori* by S = Df There is an *e* such that (i) *e* is axiomatic for S, (ii) the proposition, *e* implies *h*, is axiomatic for S, and (iii) S accepts *h*.[27]

A priori knowledge is restricted to axioms and their axiomatic consequences. In order to be an axiom, a proposition must satisfy two *independent* conditions: it must be necessarily true and certain for everyone who accepts it. These conditions are independent for neither entails the other. Since axioms are necessary truths and axiomatic consequences of axioms follow necessarily from axioms, all a priori knowledge is of necessary truths.

What support does Chisholm o er for his analysis? He opens his discussion of the a priori with the following remarks:

> ere are propositions that are necessarily true and such that, once one understands them, one *sees* that they are true. Such propositions have traditionally been called *a priori*. Leibniz remarks, "You will nd a hundred places in which the scholastic philosophers have said that these propositions are evident, from their terms, as soon as they are understood."[28]

is passage involves two claims: (1) some propositions have both the metaphysical property of being necessarily true and the epistemic property of being such that if one understands them, then one *sees* that they are true; and (2) such propositions have traditionally been called a priori. e key question, however, is not addressed. In virtue of which feature are they a priori? e quote from Leibniz, which invokes the authority of the scholastics, mentions only the second. ere is no mention of the metaphysical property. Hence, if Chisholm's case is based on historical precedent, his analysis should be in terms of the epistemic property alone.

Chisholm's inclusion of the metaphysical condition in the analysis is not only unmotivated but also has undesirable consequences. First, either the analysis is incomplete or precludes the possibility of *false* a priori justi ed beliefs. D3 provides an analysis of a priori knowledge. If Chisholm's conditions on a priori *knowledge* are also conditions on a priori *justification*, then a priori justi cation guarantees truth. If they are not, then his account of the a priori is incomplete. Second, the analysis rules out by stipulation the possibility of a priori knowledge of contingent truths. Yet Kripke and Kitcher maintain that there is such knowledge.[29] ird, the analysis precludes the possibility of a posteriori knowledge of axioms. Suppose that S accepts axiom A on the basis of testimony. Either A is certain for S or it is not. If it is, then A is axiomatic for S and S knows a priori that A. If it is not, then A is not an axiom for it fails to satisfy condition (ii) in D1.

Chisholm's analysis of axiomatic, or noninferential, a priori knowledge also includes an epistemic condition: certainty.[30] is condition leads to the implausible consequence that it is impossible that (1) S know axiomatically that 1 + 1 = 2; (2) S know axiomatically that 7 + 5 = 12; and (3) the former belief is *more* justi ed than the latter. Yet Chisholm o ers no rationale for excluding the possibility of di ering degrees of noninferential a priori justi cation. Moreover, it also entails that if S knows axiomatically that p and S knows a posteriori that q, then the former belief is *more* justi ed than the latter. It is not obvious, however, that one's belief that 7 + 5 = 12 is more justi ed than one's belief that one exists.

2.3. Pure Epistemic Analyses

e most common pure epistemic analyses of a priori justi cation are in terms of the *source* of justi cation. e major divide is between negative and positive analyses.

e former specify sources *incompatible* with a priori justi cation, the latter specify sources which *provide* such justi cation. e most familiar negative analysis is

(N1) S's belief that p is justi ed a priori if and only if S's justi cation for the belief that p does not depend on experience.

Critics of negative analyses maintain that they are not su ciently informative.[31] At best, they specify what a priori justi cation is *not* rather than what it *is*. e problem can be circumvented by opting for a positive analysis having the form

(P1) S's belief that p is justi ed a priori if and only if S's belief that p is justi ed by Φ,

where "Φ" designates some speci c source of justi cation. For example, according to Panayot Butchvarov, it designates nding the falsehood of a belief unthinkable in any circumstances.[32] But, according to Laurence BonJour, it designates apparent rational insight into the necessary features of reality.[33]

An analysis of the concept of a priori justi cation that enumerates the sources of such justi cation is too theory dependent. One cannot reject the *source* of a priori justi cation pro ered by such an analysis without rejecting the *existence* of a priori justi cation. For example, given Butchvarov's analysis, one cannot reject (as BonJour does) the claim that nding the falsehood of a belief unthinkable in any circumstances is the source of a priori justi cation without rejecting the existence of the a priori. On this analysis, a priori justi cation *is* justi cation based on such ndings. It should, however, be possible for proponents of the a priori to disagree over the source of a priori justi cation without thereby disagreeing over the existence of such justi cation. Moreover, even if some particular version of the positive analysis is extensionally adequate, the analysis is uninformative. It tells us that Φ *is* an a priori source of justi cation but gives no indication of *why* Φ is an a priori source. It does not highlight the features by virtue of which Φ quali es as an a priori source.

ere is a *general* positive analysis of the a priori that avoids the problem of theory dependence:

(P2) *S's* belief that p is justi ed a priori if and only if S's belief that p is justi ed by *some* nonexperiential source.

(P2)allows proponents of the a priori to agree that there is a priori justi cation despite disagreeing about its source. Furthermore, it identi es the feature of sources of justi cation by virtue of which they qualify as a priori.

ere are also two versions of the negative analysis. (N1) conceals a critical ambiguity. e condition

(C1) S's justi cation for the belief that p does not depend on experience

does not specify the *respect* in which S's justi cation must be independent of experience. ere are, however, two possibilities: the source of *justification* for S's belief that p and the source of potential *defeaters* for S's justi cation. Some maintain that (C1) is equivalent to

(C2) S's belief that p is nonexperientially justi ed.

Others maintain that it is equivalent to the conjunction of (C2) and

(C3) S's justi ed belief that p cannot be defeated by experience.

Patently, if S's belief that p is experientially justi ed then S's justi cation depends on experience. What can be said on behalf of (C3)? Philip Kitcher argues that

> if alternative experiences could undermine one's knowledge then there are features of one's current experience which are relevant to the knowledge, namely those features whose *absence* would change the current experience into the subversive experience.[34]

According to Kitcher, if experiential evidence can defeat S's justi cation for the belief that p, then S's justi cation depends on the *absence* of that experiential evidence.

Kitcher's contention that a priori justi cation is incompatible with potential experiential defeaters should be distinguished from the closely related, but stronger, condition espoused by Hilary Putnam:

> Are there *a priori* truths? In other words, are there true statements which (1) it is rational to accept . . . , and (2) which it would never subsequently be rational to reject no matter how the world turns out (epistemically) to be? More simply, are there statements whose truth we would not be justi ed in denying in any *epistemically* possible world?[35]

According to Putnam, S's belief that p is justi ed a priori only if

(C4) S's belief that p cannot be defeated by *any* evidence.

(C4), however, is not a plausible condition on a priori justification since it entails that if S's belief that p is defeasible solely by *nonexperiential* evidence then it is *not* justified a priori. Yet, if S's belief that p is justified solely by nonexperiential evidence and is defeasible solely by nonexperiential evidence then it does not in any way depend on experience. Hence, (C4) divorces the concept of a priori justification from the core idea that such justification is independent of experience.

Since Kitcher ties (C3) to (C1), it cannot be dismissed as readily as (C4). Instead, we must distinguish two different versions of the negative analysis:

(N2) S's belief that p is justified a priori if and only if S's belief that p is nonexperientially justified; and
(N3) S's belief that p is justified a priori if and only if S's belief that p is nonexperientially justified and cannot be defeated by experience.[36]

Since (C2) is equivalent to

(C5) S's belief that p is justified by *some* nonexperiential source,

(N2) and (P2) are equivalent. Therefore, we are left with two analyses of a priori justification. My final goal is to argue that (N2) is the superior analysis.

2.4. An Argument For (N2)

(N3), but not (N2), is incompatible with a widely endorsed criterion of adequacy. Saul Kripke puts the point as follows:

> Something may belong in the realm of such statements that *can* be known *a priori* but still may be known by particular people on the basis of experience.[37]

Kitcher, echoing this point, maintains that

> A clearheaded apriorist should admit that people can have empirical knowledge of propositions which can be known a priori.[38]

According to the criterion of adequacy, an analysis of the concept of a priori justification should allow for the following possibility:

(CA) S knows empirically that p and S can know a priori that p.

(N3), however, precludes this possibility.

Prior to presenting the argument, one point needs to be stressed. (N3) does *not* involve a strength condition. It does not require of a priori knowledge a degree of justi cation greater than that minimally required for knowledge in general. Another way of putting the same point is that (N3) does not require of a priori knowledge a degree of justi cation greater than that required for a posteriori knowledge. Let us state this point explicitly as the *Equality of Strength esis*:

(ES) e degree of justi cation minimally su cient for a priori knowledge equals the degree of justi cation minimally su cient for knowledge in general.

In order to keep the point explicit in the course of the argument, let us call a belief justi ed to the degree minimally su cient for knowledge, a *justified*$_k$ belief.

We now turn to the argument. Let us begin by assuming

(A) S knows empirically some mathematical proposition that p and S can know a priori that p.

From the le conjunct of (A), it follows that

(1) S's belief that p is justi ed$_k$ empirically.

A number of empirical sources have been alleged to justify mathematical propositions: (a) counting collections of objects, (b) reading textbooks, (c) consulting mathematicians, and (d) computer results. Let us grant that each can justify S's mathematical belief that p. Each of these sources is fallible in an important respect. e justi cation each confers on a belief that p is defeasible by an empirically justi ed *overriding* defeater: that is, by an empirically justi ed belief that not-p. Suppose that S's belief that p is justi ed by counting a collection of objects and arriving at a particular result. It is possible that S recounts the collection and arrives at a di erent result. If S were to do so, S's original justi cation would be defeated by an empirically justi ed overriding defeater. Suppose that S's belief that p is justi ed by a textbook (mathematician, computer result) that states that p. It is possible that S encounters a di erent textbook (mathematician, computer result) that states that not-p. In each case, if S were to do so, S's original justi cation would be defeated by an empirically

justi ed overriding defeater. Hence, given the fallible character of empirical justi cation, it follows that

(2) S's empirical justi cation$_k$ for the belief that p is defeasible by an empirically justi ed belief that not-p,

where "justi cation$_k$" abbreviates "justi cation to the degree minimally su cient for knowledge."

A di cult question arises at this juncture. What are the conditions under which S's justi ed belief that p is defeated by S's justi ed belief that not-p? For our present purposes, it is su cient to note that the conditions under which S's justi ed belief that not-p defeats S's justi cation for the belief that p is a function of the relative degree of justi cation each enjoys. We need not adjudicate between competing accounts of the minimal degree of justi cation that S's belief that not-p must enjoy in order to defeat S's justi ed$_k$ belief that p. Let us introduce "d" to stand for that degree of justi cation, whatever it is, and call a belief justi ed to degree d, a *justified*$_d$ belief. We can now introduce the neutral principle:

(D*) S's justi ed belief that not-p defeats (can defeat) S's justi ed$_k$ belief that p if and only if S's belief that not-p is at least justi ed$_d$ (justi able$_d$),

where "justi ed$_d$" and "justi able$_d$" abbreviate, respectively, "justi ed to degree d" and "justi able to degree d."

Returning now to the argument, the conjunction of (D*) and (2) entails

(3) S's belief that not-p is at least justi able$_d$ empirically.

Furthermore, the conjunction of (N3) and the right conjunct of (A) entails

(4) It is not the case that S's nonexperiential justi cation$_k$ for the belief that p is defeasible by S's empirically justi ed belief that not-p.[39]

e conjunction of (4) and (D*) entails

(5) It is not the case that S's belief that not-p is at least justi able$_d$ empirically.

e conjunction of (3) and (5) is a contradiction. Hence, (N3) does not satisfy the proposed criterion of adequacy. (N2), on the other hand, does satisfy the cri-

terion since it does not preclude the possibility of defeaters of any kind. I conclude that (N2) provides the superior analysis.

My argument against (N3) highlights an important di erence between overriding and undermining defeaters.[40] It is not in general true that if S's justi ed belief that q defeats the justi cation conferred on S's belief that p by source A, it also defeats the justi cation conferred on S's belief that p by source B. For example, although S's justi ed belief that he su ers from double vision defeats the justi cation conferred on his belief that 2 + 2 = 4 by the process of counting objects, it does not a ect the justi cation conferred on that belief by intuition or testimony. More generally, undermining defeaters for S's justi ed belief that p are *source-sensitive*. Overriding defeaters, however, are *source-neutral*. If S's justi ed_d belief that not-p defeats the justi $cation_k$ conferred on S's belief that p by source A, then it also defeats the justi $cation_k$ conferred on S's belief that p by *any other* source. For example, suppose that S's belief that the shopping list is on the co ee table is justi ed_k by memory but a subsequent perceptual experience, which justi es_d her belief that the list is not on the co ee table, defeats her original justi cation. Had S's belief that the shopping list is on the co ee table been originally justi ed_k by testimony, S's perceptually justi ed_d belief that it is not on the co ee table would still have defeated her original justi cation.

3. ARGUMENTS SUPPORTING THE EXISTENCE OF A PRIORI KNOWLEDGE

ere are three approaches to arguing in support of the a priori. e rst is to o er an analysis of the concept of a priori knowledge and to argue that some knowledge satis es the conditions in the analysis. e second is to identify criteria of the a priori and to show that some knowledge satis es the criteria. e third is to argue that radical empiricist theories of knowledge are de cient in some respect and that the only remedy for the de ciency is to embrace the a priori.[41]

3.1. Conceptual Arguments

Hilary Putnam adopts the rst strategy. He endorses a conception of a priori justi cation that involves an indefeasibility condition. We argued in Section 2.3 that neither (C3) nor (C4) is *necessary* for a priori justi cation. Nevertheless, if his proposed condition is *su cient* for such justi cation, it can be utilized in defense of the existence of the a priori. Hence, two questions must be addressed. Does the conception provide a set of conditions su cient for a priori justi cation? Do any beliefs satisfy the proposed conditions? My primary concern is with the rst question.

Putnam maintains that an a priori statement is one "we would never be *rational* to give up."[42] He goes on to argue that the Minimal Principle of Contradiction (MPC): Not every statement is both true and false, is rationally unrevisable. His argument is directed against his own earlier contentions that no statements are rationally unrevisable.[43] According to his earlier view, traditional proponents of the a priori confused the property of being a priori with the related, but di erent, property of being *contextually* a priori. e source of the confusion is a failure to recognize two types of grounds for rational revision. *Direct* grounds for rationally revising some belief that p consist in some observation whose content justi es the belief that not-p. *eoretical* grounds consist in a set of observations that is better explained by a theory that does not contain the statement that p than by any theory that does contain the statement that p. A statement is contextually a priori just in case it is rationally unrevisable on direct grounds but rationally revisable on theoretical grounds. A statement is a priori just in case it is rationally unrevisable on any grounds. Traditional proponents of the a priori identi ed statements that are not rationally revisable on direct grounds and believed that they are not rationally revisable on any grounds. Putnam, however, argues that the purported a priori statements are rationally revisable on theoretical grounds.

e crux of his present argument is that there are no possible theoretical grounds for rationally revising MPC. How can we rule out the possibility that some future physical theory, perhaps one that we cannot now conceive, might imply the denial of MPC but nevertheless be accepted because it explains a diverse range of phenomena, yields surprising predictions that are subsequently veri ed, and enhances our understanding of the world? We can do so, according to Putnam, because we know at present that such a theory will have to consist of every statement and its negation. But a theory that excludes nothing is no theory at all. Hence, there are no circumstances under which it would be rational to accept it.

Putnam's proposal is unclear in one crucial respect. He is not explicit on the question of whether a priori justi ed belief in logical principles, such as MPC, requires supporting evidence and, if so, the nature of that evidence. ere are at least three possible readings of his proposed condition on a priori justi cation:

(A) p is rationally unrevisable and S believes that p;
(B) p is rationally unrevisable and S is justi ed in believing that p;
(C) p is rationally unrevisable and S is justi ed in believing that p is rationally unrevisable.

(A) is not su cient for a priori justi cation; it is compatible with S's having *no* justi cation for the belief that p. According to (A), anyone who believed that MPC for whatever reason, however whimsical, would thereby be a priori justi ed in believing that p (assuming that MPC is indeed rationally unrevisable). But, as

we argued earlier, a priori justi cation for the belief that p requires nonexperiential justi cation for that belief.

(B) is also insu cient for a priori justi cation since it is compatible with S's having *experiential* justi cation for the belief that p. For example, suppose that Hilary looks at his hand, notes the number of ngers and, on that basis, comes to believe that the statement "My hand has ve ngers" is true and that the statement is not false. Hilary is justi ed, on a posteriori grounds, in believing that some statement is not both true and false.

Putnam, however, rejects this contention on the following grounds:

> It might turn out that there are not ve ngers on my hand. For example, my hand may have been amputated and what I'm looking at may be a plastic substitute. . . . But even if it turned out that I don't have a hand, or that my hand has only four ngers, or seven ngers, or whatever, discovering that I was wrong about the observation report would not at all shake my faith in my belief that that observation report is not both true and false.[44]

is argument is not germane. Suppose, for example, that Hilary believes on the basis of looking at his hand that the statement "My hand has ve ngers" is true but, when he looks again, he discovers that his hand has only four ngers. e subsequent observation that his hand has only four ngers justi es him in believing that the statement "My hand has ve ngers" is false and that the statement is not true. Hence, his faith in the belief that the original observation report is not both true and false should remain unshaken since the subsequent observation also justi es that belief. Putnam's point here may be that his recognition that no epistemically possible situation would shake his faith that MPC is true justi es his belief that MPC is true. is reading of his argument leads to (C).

(C) is not su cient for S's belief that p to be justi ed a priori since (C) is compatible with S's having *experiential* justi cation for believing that p is rationally unrevisable. For example, a student may believe that MPC is rationally unrevisable solely on the testimony of a philosophy instructor. But, if the student's justi cation for believing that MPC is true is based on the justi ed belief that MPC is rationally unrevisable then, if the latter belief is justi ed a posteriori, the former is also justi ed a posteriori. Moreover, even if S believes that MPC is rationally unrevisable on the basis of determining the consequences of denying MPC and nding some of those consequences unacceptable, it still does not follow that S's belief that MPC is rationally unrevisable is justi ed a priori. ere are two related problems. First, in determining the consequences of denying MPC one must employ *other* principles of logic. But, in order to be justi ed a priori in believing that MPC is rationally unrevisable, one must be justi ed a priori in believing the logical principles one utilizes in deriving the

consequences of denying MPC. Putnam, however, cannot appeal to (C) to establish that the logical principles used to derive the consequences of denying MPC are themselves a priori. Such an appeal invites a regress since one must consider the consequences of denying those principles, which will require further principles of logic. Second, in order to be justi ed a priori in believing that MPC is rationally unrevisable, one must be justi ed a priori in believing a theory that excludes nothing is not a genuine theory. Putnam, however, does not address whether *methodological*, as opposed to logical, principles are justi- ed a priori.

3.2. Criterial Arguments: Necessity

Criterial arguments have a common structure. ey identify some feature of propositions that we purportedly know and allege that we cannot know a posteriori propositions having that feature, from which it follows that knowledge of such propositions must be a priori. Criterial arguments di er from conceptual arguments since they do not claim that the feature alleged to be su cient for a priori knowledge is included in the analysis of the concept of a priori knowledge.

Kant provides the best known and most in uential criterial argument. He maintains that necessity is a *criterion* of the a priori: "if we have a proposition which in being thought is thought as *necessary*, it is an a priori judgment."[45] is claim is based on the observation that "Experience teaches us that a thing is so and so, but not that it cannot be otherwise."[46] Kant goes on to argue that "mathematical propositions, strictly so called, are always judgments a priori, not empirical; because they carry with them necessity, which cannot be derived from experience."[47] Hence, he concludes, knowledge of mathematical propositions is a priori.

Kant's argument, the *Argument om Necessity*, can be presented as follows:

(1) Mathematical propositions are necessary.
(2) One cannot know a necessary proposition on the basis of experience.
(3) erefore, one cannot know mathematical propositions on the basis of experience.

e rst premise is controversial. Some question the cogency of the concept of necessary truth. Others maintain that modal sentences do not express truths or falsehoods. For our purposes, I propose to grant that (1) expresses a truth in order to address the epistemic issues that it raises.

e phrase "know a necessary proposition" in (2) is ambiguous. Let us introduce the following distinctions:

(A) S knows the *general modal status* of p just in case S knows that p is a necessary proposition or S knows that p is a contingent proposition.
(B) S knows the *truth value* of p just in case S knows that p is true or S knows that p is false.
(C) S knows the *specific modal status* of p just in case S knows that p is necessarily true or S knows that p is necessarily false or S knows that p is contingently true or S knows that p is contingently false.

(A) and (B) are logically independent. One can know that p is a mathematical proposition and that all mathematical propositions are necessary but not know whether p is true or false. Goldbach's Conjecture provides an example. Alternatively, one can know that some mathematical proposition is true but not know whether it is a necessary or contingent truth. (C), however, is not independent of (A) and (B). One cannot know the speci c modal status of a proposition unless one knows both its general modal status and its truth value.

Utilizing these distinctions, we can now see that the Argument from Necessity breaks down into two distinct arguments. e rst, the *Kantian Argument*, goes as follows:

(1) Mathematical propositions are necessary.
(2*) One cannot know the *general modal status* of a necessary proposition on the basis of experience.
(3*) erefore, one cannot know the *truth value* of mathematical propositions on the basis of experience.

Kant argues in this fashion. He admits that experience can provide evidence that a thing *is* so and so, or, more perspicuously, that it is the case. What he denies is that experience can provide evidence that something *must* be the case, or, more perspicuously, that it is necessary. (2*) articulates this reading. Kant concludes, on this basis, that knowledge that 7 + 5 = 12 (*not* knowledge that "7 + 5 = 12" is *necessary*) is a priori.

e Kantian Argument involves the following assumption:

(4) If the general modal status of p is knowable only a priori, then the truth value of p is knowable only a priori.

(4), however, is false. Consider a contingent proposition such as that this cup is white. If one can know only a priori that a proposition is necessary, then one can know only a priori that a proposition is contingent. e evidence relevant to determining the latter is the same as that relevant to determining the former. For

example, if I determine that "2 + 2 = 4" is necessary by trying to conceive of its falsehood and failing, I determine that " is cup is white" is contingent by trying to conceive of its falsehood and succeeding. But if my knowledge that " is cup is white" is contingent is a priori, it does not follow that my knowledge that this cup is white is a priori. On the contrary, it is a posteriori. Hence, (4) must be rejected.

Proponents of the argument might retreat at this point to a weaker version of (4):

(4*) If p is a necessary proposition and if the general modal status of p is knowable only a priori, then the truth value of p is knowable only a priori.

ere are, however, plausible counterexamples to (4*). If Kripke is correct about the semantics of proper names, then true identity statements involving di erent proper names are necessary truths.[48] Knowledge that such propositions are necessary is based on thought experiments: the inability to conceive that some object is di erent from itself. But knowledge that they are true is based on experience, astronomical observations in the case of Hesperus and Phosphorus. Another familiar example arises when one comes to believe, and apparently know, mathematical propositions on the basis of the testimony of a teacher or the authority of a textbook.[49]

e second version of the Argument from Necessity, the *Modal Argument*, proceeds as follows:

(1) Mathematical propositions are necessary.
(2*) One cannot know the *general modal status* of a necessary proposition on the basis of experience.
(3**) erefore, one cannot know the *general modal status* of mathematical propositions on the basis of experience.

e Modal Argument is less ambitious than the Kantian Argument and, as a consequence, is not open to the objections raised against the latter. On the other hand, it is too weak to establish that mathematical knowledge di ers from scienti c knowledge. If sound, it establishes that knowledge of the general modal status of both mathematical and scienti c propositions is a priori and is compatible with the view that knowledge of the truth value of both is a posteriori.

Nevertheless, since it is incompatible with the more general thesis that *all* knowledge is a posteriori, the Modal Argument merits careful scrutiny. What can

be said in support of (2*)? The standard move is to invoke the Kantian claim that experience can teach us only what *is* the case or its Leibnizian counterpart to the effect that experience can provide knowledge of only the *actual* world but not of other possible worlds.[50] If this claim is granted, then (2*) is plausible. But a good deal of our ordinary practical knowledge and the bulk of our scientific knowledge provide clear counterexamples to the claim. My knowledge that my pen will fall if I drop it does not provide me with information about what *is* the case, for the antecedent is contrary-to-fact. It provides me with information about some possible worlds other than the actual world. Scientific laws are not mere descriptions of the actual world. They support counterfactual conditionals and, hence, provide information beyond what is true of the actual world. In the absence of further support for premise (2*), the Modal Argument should also be rejected.

3.3. Criterial Arguments: Irrefutability

In defending the existence of a priori knowledge, Kant draws attention to the alleged necessity of mathematical propositions. Proponents of logical empiricism, who were reacting against John Stuart Mill's contention that we know mathematical propositions, such as that 3 + 2 = 5, on the basis of inductive generalization from observed cases, draw attention to a different feature of mathematical propositions: their alleged irrefutability by experience. Carl Hempel puts the point as follows:

> consider now a simple "hypothesis" from arithmetic: 3 + 2 = 5. If this is actually an empirical generalization of past experiences, then it must be possible to state what kind of evidence would oblige us to concede the hypothesis was not generally true after all. If any disconfirming evidence for the given proposition can be thought of, the following illustration might well be typical of it: We place some microbes on a slide, putting down first three of them and then another two. Afterwards we count all the microbes to test whether in this instance 3 and 2 actually added up to 5. Suppose now that we counted 6 microbes altogether. Would we consider this as an empirical disconfirmation of the given proposition, or at least as a proof that it does not apply to microbes? Clearly not; rather, we would assume we had made a mistake in counting or that one of the microbes had split in two between the first and the second count.[51]

Since Hempel maintains that we would not regard any experiential evidence as disconfirming a mathematical proposition, he concludes that such propositions are not confirmed by experience.

Hempel's argument, the *Irrefutability Argument*, can be stated as follows:

(1) No experiential evidence can discon rm mathematical propositions.
(2) If experiential evidence cannot discon rm mathematical propositions, then it cannot con rm such propositions.
(3) erefore, experiential evidence cannot con rm mathematical propositions.

is argument is valid and the second premise is uncontroversial. Premise (1), however, is not obviously true. Moreover, Hempel's defense of (1) is not very strong. He considers only the weakest possible case of potential experiential discon rming evidence.

In order to bring out this point more clearly, let us rst note two familiar features of inductive practice: (a) our assessments of the degree to which a particular case con rms or discon rms a generalization is a function of the total available evidence; and (b) apparent discon rming cases of a generalization can always be explained away in a fashion which leaves the original hypothesis una ected. Hempel's defense of (1) is weak in several respects. First, it does not take into account the number of apparent con rming instances of the proposition in question. Second, it involves only a single discon rming instance of the proposition. ird, the hypotheses which are invoked to explain away the apparent discon rming instance are not subjected to independent empirical test. In such a situation, given a background of supporting evidence for the generalization, it is reasonable to discount the discon rming instances as apparent and to explain them away on whatever empirical grounds are most plausible.

e case against premise (1) can be considerably strengthened by revising Hempel's scenario as follows: (a) the number of discon rming instances of the proposition is increased so that it is large relative to the number of con rming instances; and (b) the hypotheses invoked to explain away the apparent discon- rming instances are subjected to independent investigation and found to be unsupported. Let us now suppose that we have experienced a very large number of apparent discon rming instances of the proposition that $3 + 2 = 5$ and, furthermore, that empirical investigations of the hypotheses invoked to explain away these discon rming instances produce very little, if any, support for the hypotheses. Given these revisions, the proponent of the Irrefutability Argument can continue to endorse premise (1) only at the expense of either divorcing mathematics from its empirical applications or holding empirical beliefs which are at odds with the available evidence.

is point can be brought out more clearly by considering the following set of propositions:

(a) e mathematical proposition that $3 + 2 = 5$ is applicable to microbes;

(b) The empirical procedure of counting microbes provides *only apparent* disconfirming evidence for the proposition that 3 + 2 = 5;

(c) The results of independent empirical investigation do not support the auxiliary hypotheses introduced to explain away the disconfirming evidence as only apparent.

Although (c) does not entail not-(b), it does provide strong grounds for rejecting (b). Clearly, the proponent of the Irrefutability Argument cannot simply assert (b), for to simply assert (b) without independent support is to beg the question against the radical empiricist. But (c) establishes that the independent reasons offered in support of (b) are unfounded. Hence, (b) must be rejected. The proponent of the Irrefutability Argument, however, cannot accept both (a) and not-(b). If the disconfirming evidence provided by the procedure of counting microbes is *not* merely apparent then it is genuine. So only two alternatives remain: either (i) reject (a) and hold that mathematics is not applicable to microbes, or (ii) continue to hold (b) despite (c). Neither alternative is palatable since (i) effectively divorces mathematics from its empirical applications, while (ii) puts one in a position of holding a belief which is counter to one's available evidence. The most plausible alternative is to accept (a) and reject (b). But to reject (b) is to reject premise (1) of the Irrefutability Argument. Hence, the argument falls short of its mark.

3.4. Deficiency Arguments

Laurence BonJour offers three arguments that purport to expose deficiencies in radical empiricism. The first alleges that radical empiricism leads to scepticism. Assume that some beliefs are directly justified solely by experience. Such beliefs are "particular rather than general in their content and are confined to situations observable at specific and fairly narrowly delineated places and times."[52] Either some beliefs whose content goes beyond direct experience are justified or scepticism is true. The justification of beliefs whose content goes beyond direct experience requires inference from the directly justified beliefs. Since principles of inference are *general*, they cannot be directly justified by experience.

The next two arguments are directed toward W. V. Quine's radical empiricism. The first maintains that in order for a person to be justified in believing that p the person must be in possession of a reason for thinking that p is likely to be true. According to Quine, a system of beliefs satisfying standards such as simplicity, scope, fecundity, explanatory adequacy and conservatism is justified. But, asks BonJour,

> What reason can be o ered for thinking that a system of beliefs which is simpler, more conservative, explanatorily more adequate, etc., is thereby more likely to be true, that following such standards is at least somewhat conducive to nding the truth?[53]

ere are two options. Either such a reason is a priori or it is empirical. e former is incompatible with radical empiricism. e latter is question-begging since it must ultimately appeal to some of the standards it is attempting to justify.

e nal objection alleges that Quine's standards for belief revision do not impose any constraints on epistemic justi cation:

> A er all, any such standard, since it cannot on Quinean grounds be justi ed or shown to be epistemically relevant independently of considerations of adjustment to experience, is itself merely one more strand (or node?) in the web, and thus equally open to revision.[54]

Hence, whenever those standards appear to dictate that some belief should be revised, such revision can be avoided by revising the standards themselves. Quine cannot respond that such revision is not justi ed since such a response is based either on the standards themselves, which is circular, or on some further standard, which is itself revisable.

BonJour's arguments provide a basis for preferring his moderate rationalism over its radical empiricist competitors only if the former avoids the de ciencies alleged to plague the latter. Since, as I shall now show, moderate rationalism suffers from the same de ciencies, his arguments provide no basis for preferring it over radical empiricism. e rst objection alleges that since the content of experience is *particular*, experience cannot directly justify *general* principles. Moderate rationalism is open to the same objection unless it can show that the content of rational insight is not limited to particular objects. BonJour maintains that although we experience only particular objects, we apprehend properties of objects.[55] e term "apprehend" suggests an analogy to perception, which requires causal contact with the object perceived. Properties, however, cannot stand in causal relations. BonJour maintains that the perceptual metaphor is misleading. Hence, in order to underwrite the claim that we apprehend general features of objects, he must provide a nonmetaphorical account of this alleged cognitive capacity.

BonJour proposes to explain the apprehension of properties in terms of a more general theory of how a thought can be about, or have as its content, some particular property. A thought has as its content some particular property in

virtue of its *intrinsic* character rather than in virtue of some *relation*, quasi-perceptual or otherwise, to that property. For a thought to be about a particular property, say triangularity, that property must be a constituent of its intrinsic character:

> The key claim of such a view would be that it is a necessary, quasi-logical fact that a thought instantiating a complex universal involving the universal triangularity in the appropriate way . . . is about triangular *things*.[56]

BonJour's explanation falls short of its goal. His goal is to explain how a thought can have as its content some particular *property*, such as triangularity. He provides, instead, only the bare outline of an explanation of how a thought can have as its content *particular* triangular *objects*. Since he does not provide an explanation of how a thought can have as its content some *property*, he fails to provide an explanation of the apprehension of properties. Hence, moderate rationalism is open to BonJour's first objection.

The second objection turns on the claim that being epistemically justified in believing that p requires having a reason for thinking that p is likely to be true.

The expression "having a reason to think that p is likely to be true" is ambiguous. Let us distinguish two senses:

(B) S has a *basic* reason R to believe that p if and only if S has R and R makes it likely that p is true;
(M) S has a *meta*-reason R to believe that p if and only if S has R and S has reason to believe that R makes it likely that p is true.

Let Φ be the set of conditions that Quine maintains is sufficient for justification. Assume that belonging to a system of beliefs satisfying Φ makes it likely that p is true. If S cognitively grasps the fact that p belongs to such a system, then S has a *basic* reason to believe that p. BonJour's charge is that radical empiricism cannot offer an argument to show that such reasons are truth-conducive. Hence, the problem pertains to having a *meta*-reason to believe that p.

Does moderate rationalism fare any better on this score? Assume that having an apparent rational insight that p makes it likely that p is true. Hence, if S has an apparent rational insight that p, then S has a *basic* reason to believe that p. BonJour is now faced with the question:

> What reason can be offered for thinking that a belief based on apparent rational insight is thereby more likely to be true?

His response is that the demand for a meta-reason is question-begging because, on his account, apparent rational insight is an excellent reason, in its own right, for accepting a belief:

> [It] amounts simply and obviously to a refusal to take rational insight seriously as a basis for justi cation: a refusal for which the present objection can o er no further rationale, and which is thus question-begging.[57]

Radical empiricists, however, can o er a similar response to BonJour's second objection. ey can maintain that his demand for a meta-reason is question-begging since it refuses to take seriously that belonging to a system of beliefs satisfying Φ is an excellent reason, in its own right, for accepting a belief. Hence, radical empiricism fares *no worse* than moderate rationalism with respect to the demand for meta-reasons.

BonJour's third objection rests on two principles:

(P1) Beliefs justi ed by experience are revisable; and
(P2) e standards for revising beliefs justi ed by experience are themselves justi ed by experience.

From these two principles it follows that

(P3) e standards for revising beliefs justi ed by experience are themselves revisable.

But moderate rationalism endorses analogues of these two principles:

(P1*) Beliefs justi ed by apparent rational insight are revisable; and
(P2*) e standards for revising beliefs justi ed by apparent rational insight are themselves justi ed by apparent rational insight.

Hence, moderate rationalism is committed to

(P3*) e standards for revising beliefs justi ed by apparent rational insight are themselves revisable.

e remainder of BonJour's argument applies with equal force to moderate rationalism and radical empiricism. Any attempt to block revision of the standards for belief revision either appeals to the standards themselves, which is circular, or invokes some further standard, which is itself revisable. Hence, once again, moderate rationalism fares *no be er* than radical empiricism.

4. ARGUMENTS OPPOSING THE EXISTENCE OF A PRIORI KNOWLEDGE

Arguments against the existence of a priori knowledge fall into three broad categories. ose in the rst o er an analysis of the concept of a priori knowledge and allege that no cases of knowledge satisfy the conditions in the analysis. ose in the second o er radical empiricist accounts of knowledge of propositions alleged to be knowable only a priori. Arguments in the third category maintain that a priori knowledge is incompatible with plausible constraints on an adequate theory of knowledge.

4.1. Conceptual Arguments

Hilary Putnam and Philip Kitcher provide clear examples of the rst approach. Both hold that the concept of a priori justi cation includes an indefeasibility condition. According to Putnam, an a priori statement is one "we would never be *rational* to give up."[58] Kitcher maintains that for a process to justify beliefs a priori, it must be able to "warrant those beliefs against the background of a suitably recalcitrant experience."[59] ey go on to argue that beliefs traditionally alleged to be justi ed a priori fail to meet the requisite indefeasibility condition. We argued that the concept of a priori justi cation does not include an indefeasibility condition. Hence, the fact that a belief fails to satisfy an indefeasibility condition does not *immediately* entail that it is not justi ed a priori. ere remains, however, the possibility of a more *mediate* connection.

Let us call the general thesis that a priori justi cation entails rational unrevisability the *Unrevisability esis* (UT), and distinguish between a strong and weak version of it:

(SUT) Necessarily, if S's belief that p is justi ed a priori then S's belief that p is rationally unrevisable in light of *any* evidence; and

(WUT) Necessarily, if S's belief that p is justi ed a priori then S's belief that p is rationally unrevisable in light of any *experiential* evidence.

My goal is to argue that both (SUT) and (WUT) should be rejected.

We begin by considering an example that draws out more explicitly the consequences of (SUT). Suppose that Mary is a college student who has had some training in logic. As a result, she is able to discriminate reliably between valid and invalid elementary inferences on the basis of re ective thought. Today Mary wonders whether "p q" entails "~p ~q." She re ects upon the statements in question and on the basis of this re ection concludes that the former does indeed entail the latter. A er she assents to this conclusion, a counterexample occurs to her. e occurrence of the counterexample results

in her rejecting her former conclusion and coming to believe that "p q" entails "~q ~p." e salient features of the example are as follows: (a) Mary's initial belief is based on a nonexperiential process that is reliable but not infallible; (b) a process of the *same type* leads Mary to conclude that the initial belief is mistaken and to arrive at the correct conclusion; and (c) Mary's conclusions as stated in (b) are justi ed beliefs. Now for some more controversial claims: (d) Mary's original belief that "p q" entails "~p ~q" is also *justified*; and (e) Mary's original belief is justi ed a priori despite the subsequent revision.

What can be said in favor of (d) and (e)? (d) appears to be similar in all relevant respects to the following case. Mary sees a sheet of paper on the table and on that basis forms the belief that it is square. A second closer visual examination reveals that two of the sides are slightly longer than the other two. On this basis, Mary rejects her former belief about the shape of the paper and comes to believe that it is rectangular. Since the circumstances under which Mary perceived the page were normal and Mary is a reliable discriminator of shapes, her initial belief is justi ed. e fact that our discriminatory powers sometimes fail us does not entail that beliefs based on shape perception are not justi ed. Furthermore, if such beliefs are typically justi ed, we don't single out particular cases as unjusti ed *merely* in virtue of the fact that they are false. Some other relevant di erence must be cited such as that the perceiver was impaired or the environment was gerrymandered. Hence, the routine failure of Mary's otherwise reliable shape discriminating ability does not entail that her belief that the paper is square is unjusti ed despite the fact that it is false. Similarly, the routine failure of Mary's otherwise reliable ability to discriminate valid inferences does not entail that her belief that "p q" entails "~p ~q" is unjusti ed despite the fact that it is false.

e only remaining question is whether Mary's original belief is justi ed a priori or a posteriori. A proponent of (SUT) must maintain that the belief is justi ed a posteriori *merely* in virtue of the fact that it was revised. is point can be brought out more clearly by introducing the notion of a *self-correcting process*:

(SCP) A process Φ is self-correcting for S just in case, for any false belief that p, produced in S by Φ, Φ can also justify for S the belief that not-p.[60]

(SUT) entails

(1) If a process Φ is self-correcting and justi es for S some false belief that p then Φ does not justify a priori S's belief that p.

(1) is implausible. It is insensitive to the central question of whether the justi catory process in question is experiential or nonexperiential. Hence, to endorse (1) is to divorce the notion of a priori justi cation from the notion of independence from experiential evidence. It is more plausible to reject (1) on the grounds that Mary's original belief as well as the belief that led her to revise the original belief are based on nonexperiential evidence. Once we reject (1), (SUT) must also be rejected.

(WUT) avoids the primary problem with (SUT). It distinguishes between revisions based on experiential evidence as opposed to revisions based on nonexperiential evidence and maintains that only the former are incompatible with a priori justi cation. Nevertheless, (WUT) is also open to objection.

We again begin by considering an example. Suppose that Pat is a working logician who regularly and consistently arrives at interesting results. Pat, however, is bothered by the fact that although he is a *reliable* producer of interesting proofs, he is not an *infallible* producer of such proofs. As it turns out, he has a colleague, May, who has done pioneering work in the neurophysiological basis of cognitive processes. As a radical means to self-improvement, Pat asks May to conduct a study of his e orts at constructing proofs in order to see if she can uncover some, hopefully reversible, neurophysiological cause for his infrequent erroneous proofs. e investigation reveals that (a) a particular interference pattern is present in Pat's brain when and only when he constructs an erroneous proof; and (b) whenever Pat constructs a proof under the in uence of this pattern and the pattern is subsequently eradicated by neurophysiological intervention, he is able to see the aw in the original proof and go on to correct it. Finally, there is an accepted neurophysiological theory available which supports the hypothesis that such a pattern should cause cognitive lapses. Now suppose that Pat believes that p entails q on the basis of constructing a proof which he carefully scrutinizes and nds acceptable. Despite his careful scrutiny, the proof is awed. He later discovers in a subsequent meeting with May that (a) she had been monitoring his brain activity at the time the proof was constructed with a remote sensor; (b) the sensor indicated that the interference pattern was present; and (c) standard tests indicated that all of the equipment was functioning properly. Pat is still unable to uncover the aw in his proof but nevertheless concludes, on the basis of May's empirical ndings, that his proof is awed and withholds the belief that p entails q.

e salient features of the example are: (a) Pat's initial belief that p entails q is based on a process of re ective thought that is reliable but not infallible; (b) Pat's initial belief that p entails q is justi ed by the nonexperiential process of re ective thought; and (c) the justi cation which the process of re ective thought confers on his belief is subsequently defeated by the empirical evidence indicating that the interference pattern is present. (a) is uncontroversial. (b) is

more controversial since it involves the claim that false beliefs can be justi ed a priori. is claim was defended earlier in the discussion of the Mary example. We propose to grant (c) for purposes of assessing (WUT). Finally, consider (d) Pat's initial belief that p entails q is justi ed a priori despite the later revision in light of experiential evidence. (d) appears to be a straightforward consequence of (b). Since Pat's belief is justi ed by a nonexperiential process, it is justi ed a priori. A proponent of (WUT) can resist this conclusion only by insisting that since experiential evidence defeated the justi cation conferred on the belief by the nonexperiential process, the belief is justi ed, at least in part, by experiential evidence.

e proposed defense of (WUT) invokes the following symmetry between justifying evidence and defeating evidence:

(ST) If evidence of kind A can defeat the justi cation conferred on S's belief that p by evidence of kind B, then S's belief that p is justi ed by evidence of kind A.

(ST), however, is not very plausible. Consider, for example, introspective knowledge of one's bodily sensations such as pains and itches. Some maintain that introspective knowledge is indubitable. ere are no possible grounds for doubting the truth of an introspective belief about one's bodily sensations. is claim has been challenged by the so-called EEG argument.[61] e basic idea is that although introspection presently provides our only evidence for the presence of bodily sensations, it is possible that neurophysiology will evolve to the point where electroencephalograph readings also provide such evidence. Furthermore, in suitably chosen circumstances, the EEG readings may override our introspective evidence in support of a belief regarding the presence of a bodily sensation. Our purpose here is not to evaluate the argument. Suppose we grant

(N) Neurophysiological evidence can defeat the justi cation conferred on a belief about one's bodily sensations by introspection.

Clearly, it does not follow that my present justi ed belief that I have a mild headache is based, even in part, on neurophysiological evidence. Consequently, (ST) must be rejected. Once we reject (ST), (WUT) must also be rejected.

4.2. Empiricist Accounts

One common strategy of arguing against the existence of a priori knowledge is to consider the most prominent examples of propositions alleged to be knowable only a priori and to argue that such propositions are known empirically.

Let us focus on mathematical knowledge since it has received the most attention. Empiricist accounts of mathematical knowledge can be divided into two broad categories: inductive and holistic. The leading idea of inductive theories is that *epistemically basic* mathematical propositions are directly justified by observation and inductive generalization. Nonbasic mathematical propositions are indirectly justified by virtue of their logical and explanatory relationships to the basic mathematical propositions. Holistic empiricism denies that some mathematical propositions are directly justified by observation and inductive generalization. All mathematical propositions are part of a larger explanatory theory, which includes scientific and methodological principles. Only entire theories, rather than individual propositions, are confirmed or disconfirmed by experience.

John Stuart Mill is the most prominent proponent of inductivism. In the case of mathematics, his primary concern is with the first principles, the axioms and definitions, of arithmetic and geometry. His view, succinctly stated, is that these principles are justified inductively on the basis of observation. The view faces formidable obstacles. For example, definitions do not appear to require empirical justification. Moreover, the properties connoted by some mathematical terms do not appear to be exemplified by the objects of experience. Mill maintains, however, that definitions of mathematical terms assert the existence of objects exemplifying the properties connoted by the terms in the definitions and that mathematical definitions are only approximately true of the objects of experience.[62]

Very few find Mill's account to be plausible. My goal here is not to defend it. Instead, I propose to grant its cogency in order to determine whether it can be parlayed into an argument against the a priori. If Mill is correct, it follows that all epistemically basic mathematical propositions are justified on the basis of observation and inductive generalization. Moreover, all other mathematical propositions justified on the basis of these propositions are also justified on the basis of experience. Nevertheless, the success of the account does not establish that there is no a priori knowledge of those mathematical propositions. To draw such a conclusion is to overlook the possibility of *epistemic overdetermination*: the possibility that mathematical propositions are (or can be) justified both experientially and nonexperientially.

Mill is aware of this gap in his argument and appeals to a version of the principle of simplicity:

> Where then is the necessity for assuming that our recognition of these truths has a different origin from the rest of our knowledge, when its existence is perfectly accounted for by supposing its origin to be the same?

> when the causes which produce belief in all other instances, exist in this instance, and in a degree of strength as much superior to what exists in other cases, as the intensity of the belief itself is superior?[63]

Mill maintains that there is no need to hypothesize that there is a priori knowledge to account for our knowledge of mathematics. But the appeal to simplicity is misguided. The goal of an epistemological theory is not to offer the *simplest* account of our knowledge of some target set of propositions. The goal is to offer an *accurate* account of our knowledge: one that provides a complete picture of our cognitive resources with respect to the domain of truths in question. It is an open question whether, given our cognitive resources, we have more than a single source of justification for beliefs within a given domain. The assumption that, for any given domain of human knowledge, there is only a single source of justification is without foundation. The principle of simplicity rules out overdetermination of justification. Hence, Mill's empiricism, even if cogent, cannot be parlayed into an argument against the a priori in the absence of an argument against epistemic overdetermination.

Holistic empiricism faces a related difficulty. The classic presentation of the position is provided by W. V. Quine.[64] There are (at least) two ways of reading his argument. The traditional reading is that he is providing a unitary argument against the cogency of the analytic-synthetic distinction, which proceeds by examining a variety of alternative proposals for marking the distinction. The second, due to Hilary Putnam, is that Quine is providing two distinct arguments in "Two Dogmas": an (unsuccessful) argument in the first four sections, targeting the analytic-synthetic distinction, and a (successful) argument in the concluding two sections, targeting the existence of a priori knowledge.[65]

On Putnam's reading, when Quine argues that no statement is immune to revision in light of recalcitrant experience, he is targeting a priori knowledge. The target of the attack is the view that there are some statements confirmed no matter what. Putnam's claim is that the concept of a statement confirmed no matter what is not a concept of analyticity but a concept of apriority. Quine was misled into thinking that it was a concept of analyticity because of positivist assumptions about meaning. Hence, according to Putnam, if Quine's argument is sound, it establishes that there is no a priori knowledge.

My purpose here is not exegetical. I propose to grant Putnam's reading of the structure of Quine's argument. Moreover, I propose to grant that Quine has successfully established that no statement is immune to revision. My concern is whether Quine's conclusion can be parlayed into an argument against the existence of a priori knowledge, as Putnam alleges. Clearly, that conclusion, taken by itself, is not sufficient to do so. The additional premise that a priori justifica-

tion entails rational unrevisability is also necessary. But, despite Putnam's claim to the contrary, the additional premise is false.

Let us now turn to the more traditional reading of Quine's argument and, once again, concede that Quine has successfully shown that the analytic-synthetic distinction is not cogent. Does this result provide the empiricist with the resources necessary to argue that there is no a priori knowledge? Once again, this premise alone does not su ce. We argued in section 2.1 that the analysis of the concept of a priori justi cation does not include the concept of analyticity. Hence, there is no immediate or obvious connection between the two concepts. e possibility remains that there is some more mediate connection. But, if there is such a connection, some supporting argument must be o ered to show this.

4.3. Incompatibility Arguments

Paul Benacerraf provides the classic example of an argument falling into the third category.[66] He maintains that our best theory of truth provides truth conditions for mathematical statements that refer to abstract entities and our best account of knowledge requires a causal relation between knowers and the entities referred to by the truth conditions of the statements that they know. Given that abstract entities cannot stand in causal relations, there is a tension between our best account of mathematical truth and our best account of mathematical knowledge. Since it is widely held that most, if not all, a priori knowledge is of necessary truths and that the truth conditions for such statements refer to abstract entities, Benacerraf's argument raises a more general question about the possibility of a priori knowledge.

Some dismiss the argument on the grounds that its epistemic premise, which endorses a causal condition on knowledge, rests on the generally rejected causal theory of knowledge. Benacerraf's argument, however, has proved to be more resilient than the causal theory of knowledge. Proponents of the argument maintain that the causal condition endorsed by the epistemic premise of the argument draws its support from the requirements of a naturalized epistemology rather than the causal theory of knowledge.[67]

Assessing the claim that naturalism is incompatible with knowledge of abstract entities is complicated since there are many competing versions of the view. At the risk of oversimplifying, let us identify two general varieties. e rst, *scientific* naturalism, is due to W. V. Quine who rejects the traditional epistemological project of providing an a priori, philosophical, justi cation of scienti c knowledge and o ers, in its place, a vision of epistemology as a branch of science.[68] e second, *philosophical* naturalism, advocates placing naturalistic constraints on traditional philosophical projects. In the case of conceptual analysis, for example, it requires that the analysans of a concept include only naturalistically respectable

concepts. We are now faced with two questions. Does either philosophical or scienti c naturalism preclude the possibility of knowledge of abstract entities?

4.4. Philosophical Naturalism

If philosophical naturalism precludes knowledge of abstract entities, it is in virtue of the requirements of a more promising naturalized descendent of the causal theory. e most promising is process reliabilism. Alvin Goldman maintains that

(G) S's believing p at t is justi ed if and only if
  (a) S's believing p at t is permitted by a right system of J-rules, and
  (b) this permission is not undermined by S's cognitive state at t.[69]

According to (G), any belief produced by a basic reliable psychological process satis es (a). Such a belief is justi ed provided that S does not possess defeating evidence such as that the belief is false or that it is produced by an unreliable process. (G) also appears to be compatible with the possibility of justi ed beliefs about abstract entities since neither (a) nor (b) involves any causal conditions. (G), however, is open to objection.

Suppose that Maud belongs to an organization whose leaders believe, on imsy grounds, that clairvoyance is a reliable source of knowledge.[70] Furthermore, suppose that extensive empirical work has been done investigating this phenomenon, the results have been negative, and this information is *present* in Maud's epistemic community. Others are aware of the information. Newspapers, magazines, books and television widely report the information. Moreover, Maud has *ready access* to this information. Others with whom she interacts have this information and would share it if asked. e newspapers and magazines that she sometimes reads report the information. Books and periodicals owned by the library that she frequently visits document the information. Television programs broadcast on channels that she views present the information. e leaders of the organization are aware of the negative evidence, the fact that it is widely publicized, and the fact that many of their followers have ready access to the information. As a consequence, they continually urge their followers to ignore information from outside sources on the subject. Maud adheres to their wishes and succeeds in forming very few beliefs regarding clairvoyance other than those promulgated within the organization. Now suppose that she is in fact clairvoyant, the process is reliable, and Maud forms the true belief that p via this process. Maud's belief is not justi ed since the evidence she has in support of the reliability of clairvoyance is imsy and she chooses to ignore copious evidence to the contrary. Yet her belief satis es both

(a) and (b) in (G). (b) is satisfied because Maud is not justified in believing that clairvoyance is not a reliable belief forming process. Her belief system is too impoverished to justify that belief despite the fact that she has ready access to evidence that would support it.

(G) is vulnerable to the case of Maud because it assumes that only evidence *one possesses* is relevant to the justification of one's beliefs. It does not take into account the *social* dimension of justification. Yet, as the case of Maud indicates, one cannot ignore readily available evidence and such evidence, even if ignored, can be relevant to the justification of one's beliefs. Hence, any plausible account of undermining evidence must take into account evidence that one does *not actually possess* but which is *present* within one's epistemic community and to which one has *ready access*. Goldman's (b) must be replaced by

(b*) this permission is not undermined by S's cognitive state at t or evidence present within S's epistemic community to which S has ready access at t.[71]

(b*) yields the correct result that Maud's justification is undermined by the readily accessible evidence present in her epistemic community regarding the unreliability of clairvoyance. The primary consequence of (b*) is that information within S's epistemic community regarding both the possibility and the reliability of a belief forming process is relevant to whether that process justifies the beliefs that it produces in S. Hence, the question we must address is whether the causal inertness of abstract entities provides any basis for questioning the possibility or reliability of the processes alleged to produce beliefs about such entities.

Proponents of the a priori maintain that they have cognitive access to abstract entities via a nonexperiential process, call it *intuition*, and that the process justifies beliefs about those entities. Associated with the process are cognitive states with a unique phenomenology that its proponents recognize. The experience of such phenomenologically distinct states provides them with some reason to believe that they have cognitive access to abstract entities. But there is also contrary evidence of two kinds. First, there is controversy over the existence and reliability of intuition. Some maintain that they do not have the cognitive states in question, while others acknowledge having such states but deny that they provide cognitive access to abstract entities. Moreover, there are others who question the reliability of beliefs based upon intuition and there have been movements within the fields of mathematics and philosophy to dispel such appeals. In the face of evidence that others do not have such experiences, proponents of the a priori must believe either that they have unique cognitive equipment, or that the others have the same equipment but that it is malfunctioning, or that the others are less reliable reporters of the facts of their cognitive lives. There is little evi-

dence to support any of the alternatives. In the face of alleged instances of intuitive error, proponents can provide only anecdotal evidence to support the contention that the instances cited are anomalous and that the process is generally reliable.

Second, these problems are reinforced by the fact that little is known about the neurophysiological mechanisms by which intuition produces beliefs. Since we take for granted that all cognitive processes have a neurophysiological basis, the absence of supporting neurophysiological evidence heightens suspicions about the existence of the process. Moreover, the causal inertness of abstract entities ensures that they play no role in generating beliefs about them. Hence, if intuition is a reliable process, its reliability cannot be explained along the same lines as the reliability of our best understood cognitive processes. But, given that the underlying causal processes are unknown, we are not in a position to o er an alternative explanation. e belief that intuition is a reliable process introduces an explanatory gap, which reinforces the concerns about the reliability of the process.

e question before us is whether the causal inertness of abstract entities poses an obstacle to satisfaction of (b*) in (G) by processes, such as intuition, that produce beliefs whose truth conditions refer to abstract entities. Beliefs produced by intuition satisfy (b*) only if there is no readily accessible evidence present within one's epistemic community that calls into question the possibility or reliability of intuition. I have argued that there is such evidence. Reaching a nal determination on the matter, however, requires a more detailed investigation of two issues: the scope and quality of the evidence; and how strongly a potential defeater must be supported in order to defeat the justi cation conferred on a belief by virtue of its being reliably produced. is more detailed investigation goes beyond the scope of the present discussion. My primary conclusion is that, within the framework of process reliabilism, the causal inertness of abstract entities poses a *threat* to a priori justi cation. Although process reliabilism does not rule out the *possibility* that processes such as intuition justify beliefs whose truth conditions refer to abstract entities, the absence of an explanation of how those processes can reliably produce such beliefs generates potential defeaters for such justi cation.

4.5. Scientific Naturalism

e nal issue that we must address is whether scienti c naturalism precludes knowledge of abstract entities. Penelope Maddy provides the most articulate attempt to show that the causal inertness of such entities poses a genuine problem regarding mathematical knowledge from a Quinean naturalized perspective. e problem is not conceptual but explanatory. When mathematicians, such as R. M. Solovay, form opinions on mathematical matters, they are usually correct. Hence,

> Even if reliabilism turns out not to be the correct analysis of knowledge and justi cation, indeed, even if knowledge and justi cation themselves turn out to be dispensable notions, there will remain the problem of explaining the undeniable fact of our expert's reliability. In particular, even from a completely naturalized perspective, the Platonist still owes us an explanation of how and why Solovay's beliefs about sets are reliable indicators of the truth about sets.[72]

e causal inertness of abstract entities, alleges Maddy, is a bar to explaining the reliability of Solovay's mathematical beliefs.

From a completely naturalized perspective, science is an autonomous discipline that is not subject to philosophical demands from without. Hence, if the bar to an explanation of Solovay's reliability arises from within a completely naturalized perspective, it must arise from within science. Maddy o ers the following reason for thinking that the causal inertness of mathematical entities poses an obstacle to providing a scienti cally acceptable answer:

> Obviously, what we are up against here is another, less speci c, version of the same vague conviction that makes the causal theory of knowledge so persuasive: in order to be dependable, the process by which I come to believe claims about *x*s must ultimately be responsive in some appropriate way to actual *x*s.[73]

e alleged bar to explaining Solovay's reliability is a causal condition on reliable belief formation:

(M) e process by which S comes to have beliefs about xs is reliable (dependable) only if that process is appropriately responsive to xs.

If the alleged bar arises from within science, there must be evidence from some relevant branch of science that supports (M). Maddy o ers three supporting considerations:

(a) the mathematics/science analogy;
(b) the belief that all explanations are ultimately causal;
(c) a strong form of physicalism.

All three considerations appear to be philosophical in character. Moreover, Maddy does not attempt to dispel the appearances by o ering some evidence that commitment to either (a), (b), or (c) arises from within science. She does, however, maintain that there is support for (a) from within mathematics.

According to the mathematics/science analogy, mathematics resembles natural science in two important respects:

(a1) Some mathematical beliefs are basic and noninferential;
(a2) Basic mathematical beliefs are produced by a "perception-like" mechanism, which is most likely casual.[74]

e support Maddy o ers for the analogy from within mathematics is that

> mathematicians are not apt to think that the justi cation for their claims waits on the activities in the physics labs. Rather, mathematicians have a whole range of justi catory practices of their own, ranging from proofs and intuitive evidence, to plausibility arguments and defences in terms of consequences.[75]

Maddy's description of mathematical practice, if taken at face value, supports (a1); it supports a conception of mathematics as an autonomous discipline with its own justi catory procedures, some of which are noninferential. e primary epistemic consequence of the description is that it undercuts Quine's holistic account of mathematical knowledge. Nothing in the description supports (a2). e only support that Maddy o ers for (a2) is the opinion of one, albeit signi cant, mathematician: Kurt Gödel. But from the fact that one mathematician endorses (a2), it does not follow that it is supported by *mathematical practice*. Mathematicians can have opinions about issues that don't arise from within mathematics and not all issues about mathematics arise from within mathematics. Some arise from within traditional epistemology. What needs to be shown is that Gödel is addressing a question that arises from within the practice of mathematics and that his answer is generally accepted mathematical practice.

In conclusion, scienti c naturalists must provide evidence from within science that indicates that knowledge of abstract entities is problematic. Our examination of Maddy's position reveals that the supporting evidence she o ers is philosophical rather than scienti c. Hence, she has not provided a reason to believe that scienti c naturalism cannot accommodate such knowledge.

5. TOWARD A RESOLUTION

e results of sections 3 and 4 are inconclusive. Neither proponents nor opponents of the a priori o er convincing arguments for their position. Moreover, their strategy is typically negative: each argues, primarily on a priori grounds, that the opposing position is de cient in some respect. e result is an impasse.

Advancing the debate beyond this impasse requires o ering supporting evidence for one of the positions that is compelling to both parties. e most promising strategy for advancing the case for the a priori is to enlist empirical support for the claim that there are nonexperiential sources of justi cation.[76]

is strategy recommends itself on two grounds. e rst is dialectical. A case for the a priori that is based on evidence and methodological principles endorsed by radical empiricists is one that they must acknowledge by their own lights. is dialectical advantage persists even if there is some competing, noncircular, a priori argument in the wings. e second is strategic. By limiting themselves to a priori arguments, proponents of the a priori place themselves in a needlessly handicapped position. ey acknowledge that we have both a priori and a posteriori justi ed beliefs, yet don't employ the latter when supporting their position. In the absence of some principled objection to employing a posteriori support, it is simply a mistake to overlook it.

What empirical evidence is relevant to establishing that there are nonexperiential sources of justi cation? Before proponents of the a priori can enlist empirical support for this claim, it must be more fully articulated. Let us call this the *Articulation Project* (AP):

> Provide (a) a generally accepted description, at least at the phenomenological level, of the cognitive states that noninferentially justify beliefs a priori; (b) the type of beliefs they justify; and (c) the conditions under which they justify the beliefs in question.[77]

We now brie y canvass the three components of (AP).

Much of the controversy over the a priori focuses on the cognitive states alleged to justify a priori. Radical empiricists claim that they nd these states puzzling or even mysterious. Proponents respond that they are familiar and o er phenomenological descriptions. Yet, if one surveys these descriptions, one nds enormous variation.

Alvin Plantinga appeals to an analogy with perception to characterize the source of a priori knowledge: "*one* way to believe *p* a priori is to see that it is true."[78] Furthermore, he alleges that

> [is 'seeing'] consists, rst (I suggest), in your nding yourself utterly convinced that the proposition in question is *true*. It consists second, however, in nding yourself utterly convinced that this proposition is not only true, but *could not have been false*.[79]

According to Plantinga, the perceptual analogy can be articulated in terms of some more familiar cognitive state. Phenomenological re ection reveals that the

"seeing" that underlies a priori justification is not at all mysterious. It consists in being convinced that p is necessarily true.

Plantinga is not alone in resorting to a perceptual analogy to characterize the source of a priori justification. Laurence BonJour also appeals to such an analogy in articulating his account of a priori justification. He offers the following description of rational insight, the alleged source of such justification:

> when I carefully and reflectively consider the proposition (or inference) in question, I am able simply to see or grasp or apprehend that the proposition is *necessary*, that it must be true in any possible world or situation (or alternatively that the conclusion of the inference must be true if the premises are true).[80]

Although he endorses the perceptual analogy, BonJour disagrees with Plantinga in a fundamental respect. He insists that a priori insights are apparently *irreducible*: "they are apparently incapable of being reduced to or constituted out of some constellation of discursive steps or simpler cognitive elements of some other kind."[81] The perceptual metaphor cannot be articulated in terms of some more familiar cognitive state. Plantinga, alleges BonJour, simply misrepresents the phenomenological facts.[82]

Despite their differences, BonJour and Plantinga seem to agree on one point: the cognitive state that justifies a priori the belief that p includes the belief that p. George Bealer, however, disagrees even with this point. According to Bealer, a priori justification is rooted in a priori *intuition*:

> We do not mean [by intuition] a magical power or inner voice or anything of the sort. For you to have an intuition that A is just for it to *seem* to you that A. Here 'seems' is understood, not as a cautionary or "hedging" term, but in its use as a term for a genuine kind of conscious episode. . . . Of course, this kind of seeming is *intellectual*, not sensory or introspective (or imaginative). The subject here is *a priori* (or rational) intuition.[83]

An intellectual seeming that p must be distinguished from a belief that p. For example, it may seem to one that the naive comprehension axiom of set theory is true although one does not believe that it is true. Conversely, there are mathematical theorems that one believes on the basis of having constructed a proof but that don't seem to be either true or false.

Ernest Sosa agrees with Bealer that an intuition that p need not involve the belief that p or, for that matter, any belief at all. Nevertheless, he suggests that such seemings might be analyzable in terms of what one *would* believe in certain circumstances:

> Seemings then, whether sensory or intellectual, might be viewed as inclinations to believe on the basis of direct experience (sensory) or understanding (intellectual) and regardless of any collateral reasoning, memory, or introspection – where the objects of *intellectual* seeming also present themselves as necessary.[84]

Sosa and Bealer di er in two signi cant respects. First, they o er di erent phenomenological descriptions of seemings. Sosa maintains that an intellectual seeming that p is an inclination to believe that p based on understanding that p. Bealer insists that "intuition is a *sui generis*, irreducible, natural propositional attitude which occurs episodically."[85] Hence, Bealer agrees with BonJour that the cognitive state that justi es a priori is irreducible but disagrees with him over the character of the state. Sosa, on the other hand, agrees with Plantinga that the state is reducible to a more familiar cognitive state but disagrees with him over the character of the reducing state. Second, although both agree that there are sensory and intellectual seemings, they disagree over how those seemings di er.[86] Bealer maintains that sensory seemings and intellectual seemings are phenomenologically distinct conscious states. According to Sosa, they do not di er phenomenologically. Both involve an inclination to believe that p, but they di er in the basis of the inclination: sensory seemings are based on direct experience, while intellectual seemings are based on understanding.

Proponents of the a priori are faced with a dilemma. Either we have direct introspective access to the cognitive states that provide noninferential a priori justi cation or we do not. If we do, sympathetic proponents of the position should be able to agree on the correct description of those states. If we do not, then some alternative rationale must be o ered to support the claim that there are such states. e lack of consensus among proponents lends support to the claim of radical empiricists that more needs to be said here.

Turning to the second component of (AP), there is also wide variation among proponents over the scope of beliefs justi ed a priori. ese di erences are not typically manifest within epistemological contexts since the focus is on stock examples such as elementary logical or mathematical propositions, simple analytic truths, and some familiar cases of alleged synthetic a priori truths. Few proponents, however, maintain that a priori knowledge is limited to those cases. Consequently, they cannot e ectively address the issue of the truth-conduciveness of the cognitive states that are alleged to justify a priori by focusing exclusively on the noncontroversial cases. Instead, they must provide a more complete speci - cation of the range of beliefs alleged to be justi ed by such states. In the absence of a more complete articulation of the scope of the a priori, the crucial issue of

truth-conduciveness will remain a subject of speculation, supported or rejected by bits of anecdotal evidence.

ere is one issue regarding the scope of a priori justi cation that requires particular attention. e examples of a priori knowledge typically cited by proponents are necessary truths. But, as we stressed in section 3, we must be careful to distinguish between knowledge of the *truth value* of a necessary proposition as opposed to knowledge of its *general modal status*. A critical question arises here. What is the target of a priori justi cation: the general modal status of a proposition, its truth value, or both? If a priori justi cation extends to the truth value of propositions, two further questions arise. Are beliefs regarding the truth value of necessary propositions and beliefs regarding their general modal status justi ed by a single cognitive state or di erent cognitive states? Can one have an a priori justi ed belief that a contingent proposition is true?

e third component of (AP) concerns the conditions under which beliefs are justi ed a priori. ere are two distinct sets of issues here. e rst is a speci cation of the conditions under which beliefs are prima facie justi ed by the cognitive state proposed as the source of a priori justi cation. BonJour, for example, maintains that there are certain background conditions that must be satis ed in order for an apparent rational insight to have its justi catory force: the proposition must be considered with reasonable care, the person must have an approximate grasp of the concept of necessity, and one's reason must not be clouded by dogmatism or bias.[87] Two questions emerge. Is the list complete? Are the conditions su ciently articulated so that it can be determined whether they are satis ed? One condition is that the cognizer have an *adequate grasp* of the concept of necessity. Does such a grasp require familiarity with the basic principles of modal logic? Does a modal sceptic lack all a priori knowledge?

e second is a speci cation of the conditions under which prima facie a priori justi cation is defeasible. Defeaters fall into two broad categories: overriding defeaters and undermining defeaters. ere are two primary questions in the case of overriding defeaters. First, under what conditions, if any, do con icts of rational insight undermine justi cation based on such insight? Second, can there be empirically justi ed overriding defeaters for beliefs justi ed a priori? Parallel questions arise in the case of undermining defeaters. Does a track record of con icting beliefs or errors based on rational insight undermine justi cation based on such insight? Can a priori justi ed beliefs be defeated by empirically justi ed beliefs regarding the cognitive processes that underlie rational insight?

Once the main pieces of the Articulation Project are in place, the project of o ering empirical supporting evidence for the a priori can be implemented. Let us call this the *Empirical Project* (EP):

> Provide (a) evidence that the cognitive states identified at the phenomenological level are associated with processes of a single type or relevantly similar types; (b) evidence that the associated processes play a role in producing or sustaining the beliefs they are alleged to justify; (c) evidence that the associated processes are truth-conducive; and (d) an explanation of how the associated processes produce the beliefs they are alleged to justify.

We now briefly canvass the four areas of investigation highlighted by (EP).[88]

The leading claim of proponents of the a priori is that sources of justification are of two significantly different types: experiential and nonexperiential. Initially, this difference is marked at the phenomenological level. Proponents identify certain phenomenologically distinct states as the source of a priori justification. The fact that the states are phenomenologically distinct, however, does not ensure either that they are produced exclusively by processes of a single type or, if they are, that those processes differ significantly from experiential processes. Yet the character of the processes that produce the state is relevant to whether the state justifies a priori.

For example, suppose that intellectual seemings have a distinctive and readily identifiable phenomenological character. Moreover, suppose that a tutor teaches a child to "see" that 4 x 4 = 16 by utilizing techniques like those employed in the *Meno* and also teaches the child that balls roll down inclined planes by having the child perform experiments with balls and planes. Finally, suppose that the child later forgets the tutor's lessons but, as a result of them, both propositions, when considered, appear to the child to be true. It is implausible to maintain that both beliefs are justified a priori for the child. The first is justified a priori since it is based on a "rational" or nonexperiential process, but the second is justified a posteriori since it is based on a perceptual or experiential process. Hence, the fact that some cognitive states have a distinctive phenomenology, one different from those associated with familiar experiential processes such as perception, memory or introspection, does not ensure either that those states are produced by a single type of process or that the process producing them is nonexperiential.

The second area of investigation assesses the claim that beliefs alleged to be justified a priori are produced and/or sustained by processes involving the cognitive state alleged to provide such justification. If an epistemic theory is to provide an account of how our beliefs are *in fact* justified, then the processes to which the theory appeals must actually play some role in acquiring or sustaining the beliefs in question. Empirical investigation can offer support for this claim. Although a proponent of the a priori might rest content with the weaker claim that the processes in question *can* justify beliefs a priori, empirical considerations remain relevant in three ways. First, if the weaker claim involves more than an assertion of mere logical possibility, evidence is necessary to show that the cognitive process in

question can, in some more robust sense, play a role in producing or sustaining the beliefs in question. Second, the epistemic status of our *actual* beliefs regarding the subject matter in question must be addressed. Do the processes that actually produce the beliefs in question also justify those beliefs? Are our actual beliefs epistemically overdetermined or unjusti ed? ird, some explanation of why the nonexperiential process is not employed by cognizers is in order. Is it because the process can be employed only by experts? Is it because the process is cognitively dispensable? Answers to these questions are necessary to provide an accurate picture of the role of such processes in our cognitive economy.

e third area of investigation addresses the issue of truth-conduciveness. e issue plays a dual role. If truth-conduciveness is a necessary condition for epistemic justi cation, as many proponents of the a priori allege,[89] or, if it is a necessary condition for a priori justi cation, as others allege,[90] then if one is to o er evidence in support of the claim that a particular cognitive process is a source of a priori justi cation, one must o er evidence in support of the claim that beliefs based on that process are likely to be true. Even those who deny that truth-conduciveness is a necessary condition for epistemic justi cation concede that evidence to the e ect that a particular source of beliefs is error-conducive defeats the justi cation such a source confers on the beliefs that it produces. If one is to o er evidence in support of the claim that a particular process is a source of a priori justi cation, one must o er evidence in support of the claim that defeating evidence is not available that undermines the capacity of that source to justify any beliefs. e claim that a process is truth-conducive or, more minimally, that it is not error- conducive is a contingent general claim that can only be supported by empirical investigation.

Empirical investigation can play a second important role in assessing the credentials of a cognitive process. In order to assess the truth-conduciveness of a belief forming process, one must have some approximation of the full range of beliefs that can be produced and/or sustained by the process in question. e a priori is typically introduced and defended using a narrow range of examples. Radical empiricists o en attack the a priori by arguing that some of the examples, such as the principles of Euclidean geometry, have turned out to be false. Merely settling these disputes cannot either convincingly support or refute the a priori since the range of cases under consideration is so limited. Historical and psychological investigations, however, can provide a fuller picture of the range of beliefs produced by such processes.

e fourth area of empirical investigation, which focuses on explanatory considerations, o ers the prospect of advancing the case for the a priori along several di erent fronts. First, if such investigation reveals that the cognitive processes associated with states alleged to justify a priori are of a single type or

of relevantly similar types, then identi cation of the distinctive features of those processes might provide the basis for articulating the experiential/nonexperiential distinction. e net result would be a deeper understanding of the concept of a priori justi cation. Second, such investigations may provide a better understanding of how the processes in question produce true beliefs about their subject matter. is understanding, in turn, is the key to providing a noncausal-perceptual explanation of how the states in question provide cognitive access to the subject matter of the beliefs they produce and why they are truth-conducive. ird, as we achieve a better understanding of these processes, our epistemological and psychological theories become more integrated. e fact that our epistemological theory coheres well with psychological theories for which we have independent support increases the overall support for the former theory.

6. CONCLUSION

I have argued for three primary conclusions. e rst is a minimal conception of a priori justi cation: a priori justi cation is nonexperiential justi cation. Second, the traditional arguments, based largely on a priori considerations, both for and against the existence of a priori knowledge are inconclusive. Finally, the most promising strategy for advancing the case for the a priori is to o er empirical supporting evidence for the claim that there are nonempirical sources of justi cation.[91]

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1. Immanuel Kant, *Critique of Pure Reason*, trans. N. K. Smith (New York: St Martin's Press, 1965).
2. Ibid., 43.
3. Philip Kitcher, *e Nature of Mathematical Knowledge* (New York: Oxford University Press, 1983), chap. 1.
4. W. V. Quine, "Two Dogmas of Empiricism," in *From A Logical Point of View*, 2d rev. ed. (New York: Harper and Row, 1963).
5. Hilary Putnam, "'Two Dogmas' Revisited," in *Realism and Reason: Philosophical Papers*, vol. 3 (Cambridge: Cambridge University Press, 1983).
6. See, for example, Albert Casullo, "Revisability, Reliabilism, and A Priori Knowledge," *Philosophy and Phenomenological Research* 49 (1988): 187–213; Aron Edidin, "A Priori Knowledge for Fallibilists," *Philosophical Studies* 46 (1984): 189–197; Bob Hale, *Abstract Objects* (Oxford: Basil Blackwell, 1987), chap. 6; and Donna Summer eld, "Modest A Priori Knowledge," *Philosophy and Phenomenological Research* 51 (1991): 39–66. e articles by Casullo, Edidin and Summer eld are reprinted in *A Priori Knowledge*, ed. Albert Casullo (Aldershot: Dartmouth Publishing Company, 1999). For more comprehensive bibliographies on the a priori, see Albert

Casullo, "A Priori Knowledge Appraised," in *A Priori Knowledge*, ed. Casullo; and *A Priori Knowledge*, ed. Paul K. Moser (Oxford: Oxford University Press, 1987).

7. Paul Benacerraf, "Mathematical Truth," *Journal of Philosophy* 70 (1973): 661–679.
8. R. M. Chisholm, *eory of Knowledge*, 3d ed. (Englewood Cli s: Prentice Hall, 1989), 26–28, provides a cogent account of the traditional view.
9. See, for example, Albert Casullo, "Causality, Reliabilism, and Mathematical Knowledge," *Philosophy and Phenomenological Research* 52 (1992): 557–584; Hartry Field, *Realism, Mathematics and Modality* (Oxford: Blackwell, 1989); Bob Hale, "Is Platonism Epistemologically Bankrupt?," *Philosophical Review* 103 (1994): 299–324; Jerrold J. Katz, "What Mathematical Knowledge Could Be," *Mind* 104 (1995): 491–522; and Penelope Maddy, "Mathematical Epistemology: What is the Question?," *Monist* 67 (1984): 46–55. e four articles are reprinted in *A Priori Knowledge*, ed. Casullo.
10. Saul Kripke, "Identity and Necessity," in *Identity and Individuation*, ed. M. K. Munitz (New York: New York University Press, 1971); and *Naming and Necessity* (Cambridge: Harvard University Press, 1980).
11. See, for example, C. Anthony Anderson, "Toward a Logic of A Priori Knowledge," *Philosophical Topics* 21 (1993): 1–20; Albert Casullo, "Kripke on the A Priori and the Necessary," *Analysis* 37 (1977): 152–159; Keith S. Donnellan, " e Contingent A Priori and Rigid Designators," in *Contemporary Perspectives on the Philosophy of Language*, ed. P. French et al. (Minneapolis: University of Minnesota Press, 1979); Gareth Evans, "Reference and Contingency," *Monist* 62 (1979): 161–189; Philip Kitcher, "Apriority and Necessity," *Australasian Journal of Philosophy* 58 (1980): 89–101; and R. G. Swinburne, "Analyticity, Necessity, and Apriority," *Mind* 84 (1975): 225–243. e articles by Casullo, Kitcher and Swinburne are reprinted in *A Priori Knowledge*, ed. Moser. e article by Anderson is reprinted in *A Priori Knowledge*, ed. Casullo.
12. See, for example, Carl Hempel, "On the Nature of Mathematical Truth," in *Necessary Truth*, ed. R. C. Sleigh (Englewood Cli s: Prentice-Hall, 1972); and A. J. Ayer, *Language, Truth and Logic* (New York: Dover, 1952).
13. Quine, "Two Dogmas."
14. See, for example, Paul A. Boghossian, "Analyticity Reconsidered," *Nous* 30 (1996): 360–391; Laurence BonJour, "A Rationalist Manifesto," *Canadian Journal of Philosophy*, supp. vol. 18 (1992): 53–88; M. Giaquinto, "Non-Analytic Conceptual Knowledge," *Mind* 105 (1996): 249–268; Gilbert Harman, "Analyticity Regained?," *Nous* 30 (1996): 392–400; and Putnam, " 'Two Dogmas' Revisited." e rst four articles are reprinted in *A Priori Knowledge*, ed. Casullo.
15. Kant, *Critique of Pure Reason*, 42, states that "Such universal modes of knowledge, which at the same time possess the character of inner necessity, must in themselves, independently of experience, be clear and certain. ey are therefore entitled knowledge a priori; . . . "
16. For a more comprehensive discussion of analyses of the concept of a priori knowledge, see chaps. 1–3 of Albert Casullo, *A Priori Justification* (New York: Oxford University Press, 2003).
17. See, for example, Kitcher, *e Nature of Mathematical Knowledge*, and Swinburne.

18. Anthony Quinton, "The A Priori and the Analytic," in *Necessary Truth*, ed. Sleigh, 90.
19. Ibid., 92.
20. Ibid., 93. e emphasis is Quinton's.
21. Swinburne, in A Priori *Knowledge*, ed. Moser, 186–187.
22. Ibid., 186.
23. Laurence BonJour, *e Structure of Empirical Knowledge* (Cambridge: Harvard University Press, 1985), 192. BonJour no longer endorses this conception.
24. See, for example, Chisholm, 41.
25. Ibid., 28.
26. Ibid.
27. Ibid., 29.
28. Ibid., 26. e quoted passage is from G. W. Leibniz, *New Essays Concerning Human Understanding*, trans. and ed. Peter Remnant and Jonathan Bennett (New York: Cambridge University Press, 1982), book IV, chap. 7.
29. Kripke, *Naming and Necessity*; and Kitcher "Apriority and Necessity."
30. Chisholm, *eory of Knowledge*, 2d ed., 12, states that "p is certain for S = Df For every q, believing p is more justi ed for S than withholding q, and believing p is at least as justi ed for S as believing q."
31. See Panayot Butchvarov, *e Concept of Knowledge* (Evanston: Northwestern University Press, 1970), part 1, section 9; and John L. Pollock, *Knowledge and Justification* (Princeton: Princeton University Press, 1974), chap. 10.
32. Butchvarov, *Concept of Knowledge*, 93.
33. Laurence BonJour, *In Defense of Pure Reason* (Cambridge: Cambridge University Press, 1998), 106–110.
34. Kitcher, *e Nature of Mathematical Knowledge*, 89.
35. Hilary Putnam, "Analyticity and Apriority: Beyond Wittgenstein and Quine," in *Realism and Reason: Philosophical Papers*, vol. 3 (Cambridge: Cambridge University Press, 1983), 127.
36. It is commonplace to distinguish between those a priori justi ed beliefs that are *directly* justi ed and those that are *indirectly* justi ed by nonexperiential sources. ose that are justi ed indirectly are justi ed exclusively by other beliefs that are either directly justi ed by nonexperiential sources or justi ed exclusively by other beliefs that are directly justi ed by nonexperiential sources. For ease of exposition, I do not introduce the distinction into my formulations. e reader should regard it as implicit in these and subsequent formulations.
37. Kripke, *Naming and Necessity*, 35.
38. Kitcher, *e Nature of Mathematical Knowledge*, 22. e plausibility of Kitcher's criterion derives from the observation that the following argument is intuitively invalid: S knows that p. It is possible that S knows a priori that p. erefore, S knows a priori that p.
39. I follow Kitcher, *e Nature of Mathematical Knowledge*, 22, here in assuming that the modalities collapse.
40. S's justi ed belief that not-p is an *overriding* defeater for S's justi ed belief that p. S's justi ed belief that S's justi cation for the belief that p is inadequate or defective is an *undermining* defeater for S's justi ed belief that p.

41. ere are versions of each of these three types of argument stated in terms of *justification* rather than *knowledge*. For ease of exposition, when o ering general characterizations, I o er only the version stated in terms of *knowledge*. I use the term "radical empiricism" to designate the view that *denies* the existence of a priori knowledge, and the term "apriorism" to designate the view that *a rms* the existence of such knowledge. Similarly, I use "radical empiricist" to designate a person or theory endorsing radical empiricism, and "apriorist" to designate a person or theory endorsing apriorism. For a more comprehensive discussion of the supporting arguments, see Casullo, *A Priori Justification*, chapter 4.
42. Hilary Putnam, " ere Is at Least One A Priori Truth," in *Realism and Reason: Philosophical Papers*, vol. 3 (Cambridge: Cambridge University Press, 1983), 98.
43. See, for example, Hilary Putnam, " e Analytic and e Synthetic," in *Mind, Language and Reality: Philosophical Papers*, vol. 2 (Cambridge: Cambridge University Press, 1975).
44. Putnam, " ere Is at Least One A Priori Truth," 106.
45. Kant, 43. Kant's claim is echoed by Bertrand Russell, *e Problems of Philosophy* (Oxford: Oxford University Press, 1971), chap. 7; and by Roderick Chisholm, *eory of Knowledge*, 2d ed. (Englewood Cli s: Prentice-Hall, 1977), chap. 3.
46. Ibid.
47. Ibid., 52.
48. Saul Kripke, "Identity and Necessity," and *Naming and Necessity*.
49. Tyler Burge, "Content Preservation," *Philosophical Review* 102 (1993): 457–488, disputes this claim. Burge's article is reprinted in *A Priori Knowledge*, ed. Casullo.
50. See, for example R. M. Chisholm, *eory of Knowledge*, 2d ed., 37; and C. McGinn "*A Priori* and *A Posteriori* Knowledge," *Proceedings of the Aristotelian Society* 76 (1975–76), 204. Philip Kitcher, "Apriority and Necessity," 100–101, also maintains that the plausibility of the Modal version of the Argument from Necessity depends on this claim. He goes on to reject the argument for reasons di erent from mine.
51. Carl Hempel, "On the Nature of Mathematical Truth," 36. A. J. Ayer, *Language, Truth and Logic*, 75–76, o ers a similar argument.
52. Laurence BonJour, *In Defense of Pure Reason*, 4. For a more comprehensive discussion of BonJour's position, see Albert Casullo, " e Coherence of Empiricism," *Pacific Philosophical Quarterly* 81 (2000): 31–48.
53. Ibid., 91.
54. Ibid., 92.
55. BonJour, ibid., 162, articulates the view as follows:
    A person apprehends or grasps, for example, the properties redness and greenness, and supposedly "sees" on the basis of this apprehension that they cannot be jointly instantiated. Such a picture clearly seems to presuppose that as a result of this apprehension or grasping, the properties of redness and greenness are themselves before the mind in a way that allows their natures and mutual incompatibility to be apparent.
56. Ibid., 184. e emphasis is mine.
57. Ibid., 145.
58. Hilary Putnam, " ere Is at Least One A Priori Truth," 98. Putnam provides a lucid summary of his case against the a priori in " 'Two Dogmas' Revisited." For a more

comprehensive discussion of the opposing arguments, see Casullo, *A Priori Justification*, chap. 5.

59. Kitcher, *e Nature of Mathematical Knowledge*, 88.
60. Self-correction comes in degrees. A weaker form can be de ned as follows: for *some* false belief that p produced in S by Φ, Φ can also justify for S the belief that not-p. Patently, other versions, both stronger and weaker, are possible. I use the strong version in this context since it yields a more straightforward argument.
61. See for example, D. M. Armstrong, "Is Introspective Knowledge Incorrigible?," *Philosophical Review* 72 (1963): 417–432.
62. John Stuart Mill, *A System of Logic*, ed. J. M. Robson (Toronto: University of Toronto Press, 1973), book II, chaps. V and VI.
63. Ibid., 41.
64. Quine, "Two Dogmas of Empiricism."
65. Putnam, " 'Two Dogmas' Revisited."
66. Paul Benacerraf, "Mathematical Truth," *Journal of Philosophy* 70 (1973): 661–679.
67. W. D. Hart, "Review of Mark Steiner, *Mathematical Knowledge*," *Journal of Philosophy* 74 (1977), 125–126, argues that "it is a crime against the intellect to try to mask the problem of naturalizing the epistemology of mathematics with philosophical razzle-dazzle. Super cial worries about the intellectual hygiene of causal theories of knowledge are irrelevant to and misleading from this problem, for the problem is not so much about causality as about the very possibility of natural knowledge of abstract objects."
68. W. V. Quine, "Epistemology Naturalized," in *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969).
69. Alvin Goldman, *Epistemology and Cognition* (Cambridge: Harvard University Press, 1986), 63.
70. is is a variation of a case presented by BonJour, *e Structure of Empirical Knowledge,* 40, and discussed by Goldman, *Epistemology and Cognition*, 111–112.
71. Gilbert Harman, *ought* (Princeton: Princeton University Press, 1973), chap. 9, and *Change in View* (Cambridge: e MIT Press, 1986), chap. 5, forcefully draws attention to the importance of evidence one does not possess. Alvin Goldman, "What is Justi ed Belief?" in *Justification and Knowledge*, ed. George S. Pappas (Dordrecht: Reidel, 1979), 20, acknowledges the relevance of available belief forming processes in an earlier account of undermining evidence. is account, however, is too restrictive to handle the case of Maud since Goldman explicitly rules out gathering new evidence from the scope of available processes.
72. Penelope Maddy, *Realism in Mathematics* (Oxford: Oxford University Press, 1990), 43.
73. Ibid., 44.
74. Ibid., 45–46.
75. Ibid., 31.
76. is proposal is more fully elaborated and defended against potential objections in Casullo, *A Priori Justification*, chap. 6.
77. Our focus here, and in the subsequent discussion, is on the sources of *noninferential*, or *basic*, a priori justi cation since inferential, or nonbasic, a priori justi -

cation results from applying inferential principles that are (noninferentially) justi ed a priori to other beliefs that are (noninferentially) justi ed a priori. Hence, in the nal analysis, all a priori justi ed beliefs are ultimately justi ed by those sources.

78. Plantinga, *Warrant and Proper Function*, 106.
79. Ibid., 105.
80. BonJour, *In Defense of Pure Reason*, 106.
81. Ibid., 108.
82. Ibid., nn. 12 and 13.
83. George Bealer, "A Priori Knowledge and the Scope of Philosophy," *Philosophical Studies* 81 (1996), 123, reprinted in *A Priori Knowledge*, ed. Casullo.
84. Ernest Sosa, "Rational Intuition: Bealer on its Nature and Epistemic Status," *Philosophical Studies* 81 (1996), 154, reprinted in *A Priori Knowledge*, ed. Casullo.
85. George Bealer, "A Priori Knowledge: Replies to William Lycan and Ernest Sosa," *Philosophical Studies* 81 (1996), 169, reprinted in *A Priori Knowledge*, ed. Casullo.
86. e Müller-Lyer illusion provides an example of a sensory seeming.
87. BonJour, *In Defense of Pure Reason*, 133–137. He o ers two di erent descriptions of what occurs when a cognizer fails to satisfy a background condition for justi cation by an apparent rational insight: (1) the cognizer fails to have even an apparent rational insight; and (2) the justi catory force of the apparent rational insight is defeated.
88. Alvin Goldman, "A Priori Warrant and Naturalistic Epistemology," *Philosophical Perspectives* 13 (1999), 1–28, argues that psychological studies are relevant to the existence of a priori knowledge. His focus is on whether such studies support the view that basic mathematical and logical skills are innate.
89. George Bealer, Alvin Plantinga and Ernest Sosa endorse such a condition although there are di erences in their positions. Bealer, "A Priori Knowledge and the Scope of Philosophy," 129, endorses a reliabilist conception of *basic sources of evidence*: "something is a basic source of evidence i it has a certain kind of reliable tie to the truth." Plantinga, *Warrant and Proper Function*, 17, endorses a reliabilist constraint on *warrant*: "the module of the design plan governing its production must be such that it is objectively highly probable that a belief produced by cognitive faculties functioning properly according to that module (in a congenial environment) will be true or verisimilitudinous." Sosa, "Modal and Other A Priori Epistemology: How Can We Know What is Possible and What Impossible?," *Southern Journal of Philosophy* 38, Supplement (2000), 4, endorses a reliabilist condition on *epistemic justification*: " e epistemic justi cation of a belief B at a time t may thus require the production of B at t through a virtue V resident in that subject. What is required for a disposition V to be a virtue is that in normal circumstances V would yield a su cient preponderance of true beliefs in subjects like S." Although Laurence BonJour, *In Defense of Pure Reason*, 1, rejects reliabilist accounts of epistemic justi- cation, he does introduce truth-conduciveness into his characterization of *epistemic reasons*: "Knowledge requires instead that the belief in question be justi ed or rational in a way that is internally connected to the de ning goal of the cognitive enterprise, that is, that there be a reason that enhances, to an appropriate degree, the

chances that the belief is *true*. Justi cation of this distinctive, truth-conducive sort will be here referred to as *epistemic justification.*"

90. e most familiar example holds that, in the case of basic (or noninferentially) justi ed a priori belief that p, understanding that p is su cient to "see" that p is true.

91. anks to Tim Black for his careful reading of an earlier version of this paper and for his helpful comments.