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Anti-Exceptionalism about Logic (Part I): From Naturalism to Anti-Exceptionalism

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Abstract

According to *anti-exceptionalism about logic* (AEL), logic is not as exceptional in terms of its epistemology and subject matter as has been conventionally thought. Whereas logic's epistemology has often been considered distinct from those of the recognised sciences, in virtue of being both *non-inferential* and *a priori*, it is in fact neither. Logics are justified on the basis of similar mechanisms of theory-choice as theories in the sciences, and further the sources of evidence which inform these theory choices are (at least) not wholly *a priori*. In this first part of a two-part entry on AEL, we trace these epistemological elements of AEL back to Quine's naturalism and evidential holism, but then highlight important differences between the motivations and commitments of Quine's version of AEL and those within the contemporary literature. This demonstrates the need to assess contemporary anti-exceptionalist positions on their own merits, rather than treating them as mere reincarnations of Quine's evidential holism.

1 | WHAT IS EXCEPTIONAL ABOUT LOGIC?

The historical consensus is that logic is special. Unlike the laws of other fields of enquiry, those of logic apply to all domains. Even the most fundamental laws of physics apply only to physical systems. In contrast, the logical laws are wholly *general*, applying to all entities. To this extent, logic is not concerned with the particular identity of any object

or property. Indeed, logic is not concerned with the content of propositions at all, but with their *form*. For this reason, logical laws are both *analytic* and *necessary*, in not being responsive to the peculiarities of events in the actual world. Furthermore, the logical laws must be knowable in a wholly different fashion to those of mathematics and the empirical sciences. While in mathematics and the sciences we often presume the validity of certain logical inferences in order to establish results, within logic we cannot do this without begging the question. Accordingly, justification for logic must be *non-inferential*. In addition, given that no observable states of affairs directly demonstrate that a rule of inference is valid, or a law true, in virtue of the justification for logic being *non-inferential*, it must also be *a priori*. This has led to the long-standing view that logical knowledge must either be a product of direct rational insight into the truths of logic (Bealer, 1998; BonJour, 1998) or a result of epistemic analyticity (Ayer, 1936; Boghossian, 1996, 2000). Thus, both in terms of its epistemology and the content of its laws, logic is significantly different from the (other) mathematical and empirical sciences.

Anti-exceptionalism about logic (AEL) challenges this traditional picture of logic, calling into question the presumed exceptional nature of logic's epistemology and subject matter, and drawing a closer connection between logic and the sciences than has been customary (Hjortland, 2017; Williamson, 2007). In particular, two connected but distinct variants of anti-exceptionalism are prominent in the literature (Martin & Hjortland, 2022).

Metaphysical AEL, which proposes that the laws of logic are about the world in the same way that those of the sciences are; they are simply concerned with more "general" facts (Maddy, 2007; Sher, 2016; Williamson, 2017). While the laws of organic chemistry are concerned with the structure and properties of carbon-containing compounds, and the laws of epidemiology are concerned with the distribution and determinants of diseases, logic studies the most general "abstract" or "structural" features of the world which hold of all its entities and properties. As a consequence, while logic is indeed more general than the other sciences, its laws are no less descriptive and no more necessary than those of the sciences.

Second, *Epistemological* AEL which, taking its lead from Quine's (1951) evidential holism, proposes that logics are justified by a similar means to scientific theories. Whereas logic's epistemology has often been thought to be exceptional, in virtue of being both *non-inferential* and *a priori*, it is in fact neither. Logics are justified and ultimately chosen on the basis of a similar mechanism of theory-choice as theories in the sciences, and further the sources of evidence which inform this theory choice are (at least) not wholly *a priori*.

In this two-part introduction, we concentrate our attention mainly on *Epistemological* AEL, which has been the focus of much of the debate in the literature. In this first part of the entry, we briefly outline the two prominent traditional exceptionalist accounts of logic's epistemology–*rationalism* and *semanticism*–the rejection of which partially motivated Quine's evidential holism, and which contemporary forms of Epistemological AEL are equally opposed to, before moving onto discussing Quine's position on logic's epistemology itself in Section 3. Here we highlight Quine's motivations for his position and show that Epistemological AEL is actually constituted of two claims, *Evidential* and *Methodological* AEL, which although come as a package for Quine need not do so. Indeed, we show that several contemporary advocates of AEL reject *Evidential* AEL while endorsing *Methodological* AEL. In the second part of the entry, we go onto discuss the various distinct motivations for contemporary Epistemological AEL, before moving onto describe the two prominent anti-exceptionalist models of logical theory-choice in the literature —*logical abductivism* and *predictivism*—and how they differ from Quine's holism. We conclude with a discussion of the challenges facing contemporary Epistemological AEL and highlighting important future work.

Why begin a survey of contemporary Epistemological AEL with a discussion of Quine's evidential holism?[1] Quine's reputation as the archetypal anti-exceptionalist still dominates the philosophy of logic literature, to the point that even those writing about contemporary anti-exceptionalism closely associate these proposals with Quine's evidential holism (Baggio, 2023; Boghossian & Wright, 2024; Hattiangadi, 2023; Saint-Croix & Cook, 2024; Sereni et al., 2023). This has the common effect that it is presumed a problem for Quinean evidential holism is automatically a problem for contemporary versions of Epistemological AEL. This is a mistake, which is important to rectify. Contemporary versions of Epistemological AEL differ from Quine's holism both in terms of their content and their motivations. In particular, while Quine was significantly motivated by his naturalism, in believing that the

sources of evidence of the sciences are the *only* viable sources of evidence, this is not true of most contemporary versions of Epistemological AEL. One can, coherently, propose that the mechanisms of theory-choice within logic are similar to those found in the sciences, while conceding that like most fields of research it has its own peculiar sources of evidence (some of which, at least, are *a priori*). The goal of this two-part entry then is not only to inform the community of the most recent research into AEL, but emphasize the need to assess these contemporary anti-exceptionalist positions on their own merit rather than treating them as mere reincarnations of Quine's evidential holism.

2 | EXCEPTIONALIST EPISTEMOLOGIES OF LOGIC

In order to understand anti-exceptionalist epistemologies of logic, it will help to briefly appreciate some of their historical and contemporary exceptionalist competitors. One immediate complication that arises when we speak of the epistemology of *logic* is that talk of "logic" is ambiguous, and so talk of its *epistemology* is bound to be derivatively ambiguous. In particular, talk of the epistemology of logic often stands, simultaneously, for how we become justified in *making certain inferences* which are deemed *logical*, such as making the inference to "I'll go to Marseille this weekend" on the basis of my standing commitments that "I'll either go to Nice or Marseille this weekend" and "I won't ever go to Nice again", and our justification for believing certain *logical laws* or *principles*, such as the disjunctive syllogism.[2] Clearly, these two forms of "logical" justification are non-equivalent. An able mathematician can justifiably infer in accordance with the disjunctive syllogism without justifiably believing the law (indeed, unless they have taken a discrete mathematics course, this is probably inevitably the case). On the other hand, a logic student could be justified in believing the validity of the disjunctive syllogism on the basis of an introductory course without having the justified ability to infer in accordance with the law in more complex cases.

While the matter of what justifies our *making inferences* which we deem logical and what justifies our belief in logical laws are both important questions, it is the latter which is the focus of Epistemological AEL. In distinguishing between the epistemology of logic and the recognised sciences, the pertinent distinction is not between our justification in making *logical* and *scientific* inferences, but rather the means through which we come to be justified in believing logical claims (or theories) and scientific theories. This means, in challenging traditional accounts of logic's epistemology, the focus is not on challenging accounts of how we came to be *reliable reasoners* but how we come to be justified in believing *logical laws and theories*.[3] The pertinent question, then, is how can we come to be justified in believing that a logical law such as the law of excluded middle is true, contrary to what some constructivist logicians suggest, or that despite what classical logicians suggests, the disjunctive syllogism is in fact invalid. In sum, the question is how we come to be justified in believing the correct theory of the logical laws.

Our justification of logical laws has traditionally been considered to be both (i) at least partially *non-inferential*, and (ii) *a priori*. At least partially non-inferential, for otherwise one would need to presume the validity of some *rules of* inference in order to be able to establish the reliability of those inferences we use to justify the logical laws that constitute our logical theory (Haack, 1976). *A priori* because, firstly, no observable states of affairs directly demonstrate that a rule of inference is valid (or, law true) and, secondly, the possibility of *inferring support* for particular logical laws from empirical evidence is precluded by the first condition, that logical evidence is non-inferential (Martin, 2021). Thus, we must have unmediated *a priori* access to at least *some* laws of validity. These putative properties of logic's epistemology both distinguish logic from other fields of enquiry and go some way to illuminating the historical view that logic is epistemically foundational to our other intellectual enterprises (Sher, 2016). While logic can be used by, and evidentially inform, the sciences and mathematics, the inverse is not possible without presupposing certain logical laws and thus ultimately begging the question.

From these traditional properties of logical justification, two accounts of logic's epistemology have dominated the market: *logical rationalism* and *logical semanticism*. While both positions agree that the justification for logical laws must be non-inferential and *a priori*, they disagree on the source of this *a priori* evidence. According to

rationalists, one comes to be justified in believing logical laws via a *quasi-perceptual* intellectual faculty, commonly known as *intuition* or *mental insight*, in which one simply *non-perceptually sees* that a particular logical law is true (Bealer, 1998; BonJour, 1998). In contrast, *semanticists* deny the need to posit a novel cognitive faculty to accommodate logical knowledge. Instead, knowledge of logical laws can be understood in terms of linguistic proficiency; in virtue of understanding the meaning of the constituent terms of a logical law, we automatically become justified in assenting to its truth (Ayer, 1936). In other words, logical laws are *epistemically analytic* (Boghossian, 1996).

Both of these proposals face well-known criticisms in virtue of the sources of evidence they posit. Rationalism faces the challenge of providing a scientifically respectable account of this new faculty of rational insight, which seems to attempt to solve the mystery of *a priori* evidence with just another mystery, that of *non-perceptual seeing* (Boghossian, 2000; Devitt, 1998). In contrast, semanticism faces classic Quinean concerns over both its putative commitment to logical conventionalism and the coherence of the analytic-synthetic distinction itself (Quine, 1936, 1951). Indeed, it was against the backdrop of these exceptionalist accounts of logic's epistemology, and their perceived inadequacies, that Quine motivated his own epistemology of logic.

Importantly, though, while these perceived inadequacies with traditional exceptionalist accounts motivate anti-exceptionalist epistemologies of logic, they do not suffice to provide positive evidence for anti-exceptionalist proposals. First, these challenges to rationalism and semanticism have not gone unaddressed by their advocates. While Chudnoff (2013) has attempted to make intuitions unmysterious and intellectually respectable, Warren (2020) has offered a detailed defence of logical conventionalism, meeting many of Quine's original concerns over implicit conventions and analyticity. This goes to show that these recognised problems facing exceptionalist epistemologies should not necessarily be considered terminal. Second, there are other broadly exceptionalist epistemologies which are similarly motivated by the perceived inadequacies of rationalism and semanticism while immune to the same concerns, such as the *entitlement view* of logic: that one is entitled to believe a logical law if it is *impossible for one to doubt it* (Hale, 2002; Wright, 2004).[4] According to this view, given that in order to call into question the truth of certain logical laws, such as *modus ponens* and universal instantiation, one ends up having to *use* instances of these laws, such question begging undercuts any potential sceptical doubts over their truth. Further, once one appreciates that one has this entitlement to believe these fundamental logical laws, one can then use this entitlement to both infer the *other* correct logical laws and construct a rule-circular proof of the fundamental logical laws themselves, from which we gain cognitive access to our reasons for believing these laws and thus full-blown justification for them (Wright, 2004, pp. 172-3). Given that the entitlement view is immune to those concerns typically raised against rationalism and semanticism, dissatisfaction with these traditional exceptionalist accounts will not suffice to support an anti-exceptionalist proposal. Both of these points show that in order to justify anti-exceptionalist proposals, concerns with traditional exceptionalist proposals won't suffice; positive evidence in support of anti-exceptionalist proposals will need to be provided.[5]

3 | QUINE ON THE JUSTIFICATION OF THE LOGIC LAWS

Quine's own epistemological anti-exceptionalism had three main motivations. First, a deep dissatisfaction with existent foundationalist epistemologies of logic. Given his commitment to naturalism, Quine did not take seriously the viability of a quasi-perceptual mental faculty in order to justify the logical laws. We should rely only upon those epistemic sources for which we have scientific support, and there is none for a mental faculty such as intuition (Quine, 1990, p. 19).[6] Rationalism, then, was off the table. Unlike other empiricists who preceded him, however, Quine (1951) was equally unwilling to explain our justification for logical laws in terms of analyticity, given his rejection of the analytic/synthetic distinction on the grounds that analyticity could not be non-circularly defined. Whatever our epistemology of logic looks like then, it cannot depend upon either rational intuition or analyticity.

In its place, Quine proposed that our logical commitments are justified as part of our wider web of belief, and ultimately evaluated in light of the same (empirical) evidence as our theories within the sciences; a position known as *evidential holism*. Rather than being justified individually and separately from the rest of our scientific world view, our logical (and mathematical) commitments are justified by the indispensable role they play within our overall scientific understanding of the world (Quine, 1986, p. 99).

Quine's motivation for this evidential holism is composed of two factors. First, a commitment to the so-called Duhem-Quine thesis: that an individual hypothesis cannot be conclusively verified or falsified in isolation. While already recognised within the context of the empirical testing of scientific theories, the thesis becomes equally pertinent to our justification of the logical laws once we reject the presumption that we have some direct unmediated justificatory access to these laws, whether via intuition or analyticity. If the truth of any putative law must instead be tested against some relevant data, then it is not just the law itself which is tested, but rather a cluster of commitments. From this, Quine concludes that it is whole theories (including our accepted logic), and not individual hypotheses, which are (dis)confirmed by pertinent evidence.

One consequence of this view is that it is always possible to rescue a particular element within our overall belief system in the face of troublesome data by making suitable alterations elsewhere in the web, even if this means revising one of our logical commitments. Consider the following example: We conjecture that Napoleon was poisoned on St Helena, and that if he was poisoned, there must be high levels of arsenic in his hair today. Testing the hair, however, we find that it contains only normal levels of arsenic. What do we conclude? We could conclude that Napoleon wasn't poisoned after all. Or we could conclude that *even if* he was poisoned, there might not be high levels of arsenic in his hair. In other words, the evidence–that the hair only contains normal levels of arsenic–does not single out one of the relevant conjectures. The evidence underdetermines the choice of theory. What Quine actually suggests, however, is more radical. In the example above, we also assumed an instance of the logical law *modus ponens* as a background hypothesis: that it follows from 'Napoleon was poisoned' and 'If Napoleon was poisoned, there are high levels of arsenic in his hair today', that 'There are high levels of arsenic in his hair today'. In principle, Quine argues, we could reject the logical law, and thus maintain that both premises are true while the conclusion is nonetheless false. The bizarre result is that by rejecting the logical law, we can maintain both that Napoleon was poisoned, that *if* he was poisoned, there must be high levels of arsenic in his hair today, and nonetheless deny that there are high levels of arsenic in his hair.

Of course, in the example at hand, a rejection of the logical law would not be a tempting option. Yet, unlike for foundationalist epistemologies of logic, which wholly preclude this possibility by disallowing inferential evidence for logical laws, once one admits the logical laws into one's testable web there is no principled reason to preclude them from being revised in the face of recalcitrant data. Whether one should revise one's commitment to a logical law or some non-logical belief then becomes a matter of cost-benefit analysis. If we are justifiably reluctant to change our beliefs regarding the correct laws of logic, this is only because of the laws' centrality in our web of belief, and thus the extensive repercussions such a revision could have for our overall commitments (Quine, 1950: xiv).[7] What justifies only considering a change in our logical commitments as a matter of last resort is a general methodological *maxim of minimal mutilation*: that one should make as little change as needed to our current belief system to accommodate any recalcitrant data, so as not to simultaneously lose existent virtues of our belief system (Quine, 1986, p. 100). The process of justifying our logical commitments and revising these commitments in the face of recalcitrant data then is no different in kind from justifying any of our other commitments; any perceived difference is due to the central role they play in our overall nexus of beliefs, and thus the potential far-reaching repercussions resulting from alterations to the centre rippling through the rest of the web. As Quine puts it, "[t]he price [of revising one's logical commitments] is perhaps not quite prohibitive, but the returns had better be good" (1986: 86).

This brings us onto Quine's second positive motivation for his evidential holism, his commitment to *empiricism* bound intimately with his naturalism: "[I]t is a finding of natural science itself, however fallible, that our information about the world comes only through impacts on our sensory receptors" (Quine, 1990, p. 19). Thus, to justify *any*

claim, whether about the physical world, mathematics, or *logic*, we must look exclusively to those sources of evidence deemed naturalistically acceptable. There is no substantial divide between the evidence which motivates our choice of logic and that which motivates theory-choice in the sciences. Justification for our logical theory does not rest upon arguments from analytic truth or *a priori* sources, but rather the same considerations that justify other commitments within our web of belief. Thus, while our commitment to a set of logical laws may have a distinguished *position* in the centre of our web of belief, there is no distinguished form of *evidence* by which we justify and evaluate our logical commitments (Quine, 1986, p. 100).

Quine's commitment to evidential holism, and his naturalism more generally, is perceptible in most of his discussions of proposed deviations from classical first-order logic. Whether this be his rejection of quantified modal logic on the basis that it would commit one to metaphysical essentialism (Quine, 1980), his hesitancy to embrace a multiple-valued logic on the basis of the set-theoretic paradoxes, as a more conservative solution that only required making the less drastic alteration of revising our set theory was available (Quine, 1986, p. 85), or his unwillingness to embrace intuitionistic logic as it would require embracing a constructivist interpretation of existence within our wider web of belief (Quine, 1986, pp. 88-9).

Yet, the clearest example of Quine's empiricism influencing his assessment of challenges to classical logic is his brief discussion of the possibility of results from quantum mechanics requiring a revision to our established logical theory. First proposed by Birkhoff and Von Neumann (1936), but later advocated as an all-purpose logic by Putnam (1969), *quantum logic* was proposed as a means to solve the measurement problem in quantum mechanics not through more standard means, such as wave function collapse, but rather by invalidating the classically valid law of distributivity: $(A \wedge (B \vee C)) \rightarrow ((A \wedge B) \vee (A \wedge C))$.

For Quine, any revisionary argument against classical logic must be ultimately grounded in empirical evidence, even those challenges from set theory or semantics. After all, our correct set-theoretic or semantic commitments must themselves be justified by empirical considerations, such as their indispensable role in our best scientific theories. Yet, what makes Quine's discussion of the case of quantum logic particularly illustrative is its more immediate connection to an empirically motivated theory of physics. Here we have a putative challenge to a logical law in the classical logician's web of belief based directly upon our best empirically-informed physical theory of the world. Indeed, Quine even admits that it is this directness of the logic's motivation in term of our best theories of physics that makes the case particularly compelling: "I do place the claims of physics somewhat above those of set theory, because I see the justification of mathematics only in what it contributes to our integral science of nature. It is a question of remoteness from the data of observation; physics is less remote than set theory" (1986: 86). Thus, while Quine did not himself accept the revisionary argument for quantum logic (he considered the loss of similarity and familiarity too great), he did treat it as an exemplary case for the *possibility* of how empirical evidence could justify a revision to our logical theory.

This highlights that what sets Quine's view on the justification of the logical laws apart is not only his insistence that the *justificatory process* by which we justify and assess logical laws is akin to those of other commitments within our wider web of belief, including scientific theories, but that the *sources of evidence* we use to assess these logical and scientific commitments are ultimately the same. Both aspects of his epistemology of logic are themselves grounded, ultimately, in his naturalism, and his commitment to embracing the ontology, methods, and sources of evidence that science provides us with.

4 | METHODOLOGICAL AND EVIDENTIAL AEL: FROM NATURALISM TO ANTI-EXCEPTIONALISM

Quine's philosophy of logic has been a key influence on contemporary anti-exceptionalist accounts of logic's epistemology. There is no privileged non-inferential route to logical justification, be it via rational insight or semantic competence. It would be a mistake, however, to conclude that all contemporary anti-exceptionalists are

naturalists. Although contemporary anti-exceptionalists share important views with Quine, they also often reject parts of his project (Martin & Hjortland, 2021; Priest, 2016; Russell, 2015). The difference between Quine's naturalism and this broader category of anti-exceptionalist positions becomes easier to appreciate when we distinguish two distinct claims about the epistemology of logic in the Quinean position.

First, there is the claim that the *methods of theory choice* by which both logical and non-logical theories are selected are similar in kind. This is not to say that there are no differences in the methods of theory choice across different research areas, but rather, to use Quine's phrase, that any difference is merely gradual. Call this view *Methodological* AEL. This is the variant of AEL shared by those contemporary advocates who favour some kind of abductive methodology for logic (Priest, 2006, 2016; Russell, 2015; Williamson, 2017). While each differ on the details of how to articulate and weigh selection criteria in an abductive argument, all agree that: (i) logics should be (or, are) selected according to abductive criteria, and (ii) by using such abductive criteria, this makes the mechanisms of theory-choice in logic unexceptional.[8]

Even though Methodological AEL draws a close connection between the mechanisms of theory choice in logic and the recognised sciences, it is not itself committed to the stronger claims of evidential holism. Firstly, it is possible to simultaneously hold that theory choice in logic is unexceptional while admitting that *parts* of a theory can be (dis)confirmed in isolation. Consequently, neither Methodological AEL, nor logical abductivism in particular, is committed to the more controversial evidential holist elements of Quine's position. Secondly, Methodological AEL itself comes with no constraints on what counts as *admissible evidence* in the selection of candidate theories. In particular, it does not commit one to the claim that what counts as evidence for a logical theory is naturalistically constrained. Recall that for Quine, any justification of a commitment is grounded in empirical evidence, regardless of whether that commitment is logical or not. As seen in the case of quantum logic, the impetus for a revision in our logical commitments ultimately comes from observation, which indirectly affects logical laws through their participation in the overall "web of belief". The result is that logical laws are justified and revised on the basis of the very same type of evidence that justify other non-logical commitments. Not only then are the mechanisms by which logical theories are chosen *unexceptional*, but the *sources of the evidence* which inform this theory choice are also unexceptional. We call this second position *Evidential* AEL. This view rules out accounts of logic's epistemology in which the source of the evidence is non-naturalistic.

What sets Quine's brand of anti-exceptionalism apart, along with his commitment to evidential holism, is precisely the combination of Methodological and Evidential AEL: that *both* the mechanisms of theory choice in logic and the sources of evidence which inform this theory choice are *unexceptional*. Contemporary anti-exceptionalists, on the other hand, have typically focussed on providing accounts of the mechanism of theory choice in logic, and put less emphasis on showing similarities between the sources of evidence in logic and the sciences. Although many have advocated abductivist versions of Methodological AEL, they differ on how to think about the data which inform these abductive criteria. Here, for example, is Priest (2016, p. 355):

> It is clear enough what provides the data in the case of an empirical science: observation and experiment. What plays this role in logic? The answer, I take it, is our intuitions about the validity or otherwise of vernacular inferences.

Priest's approach to evidence is a clear break with Quine's naturalism. Not only does he distinguish evidence for logical laws from that of the empirical sciences, but he has no qualms about linguistic intuitions serving as defeasible data. That is not to say he excludes empirical evidence as a possible source of support for logical laws (see Priest, 2006, Chs. 9-10), but rather advocates a more ecumenical stance towards evidence. It should be clear, then, that Priest's epistemology is not naturalist; while he subscribes to Methodological AEL, he rejects Evidential AEL.

Even in the more thoroughgoing anti-exceptionalism of Williamson, Quine's Evidential AEL is set aside. While Williamson accepts evidence from, say, physics as potential evidence for a logical theory, he also considers other

non-naturalistic sources of evidence as pertinent to logic's epistemology. A prominent example is our evidence for alethic modal laws, where "we can verify some predictions of the [modal] law by using our pretheoretic ability to evaluate particular modal claims" (Williamson, 2017, p. 336). He concludes, with a reference to his own work on evidence (Williamson, 2000), that "[w]e may use anything we know as evidence" (Williamson, 2017, p. 336). As with Priest, Williamson's main epistemological anti-exceptionalist thesis is that theory choice within logic works according to abductive inference and thus is unexceptional. Yet, abductivism is compatible with a number of views on the *sources* of the pertinent evidence, and one need by no means be committed to only naturalistically accepted sources of evidence.

Thus, what is common in these contemporary accounts of AEL is the emphasis on the mechanisms of theory choice, and the claim that theory choice in logic is more similar to other disciplines than previously thought. In other words, we do not have some privileged direct access to the truths of logic. Our investigation into these laws must proceed by the same muddy game as in the recognised sciences. Unlike Quine's version of anti-exceptionalism however, Methodological AEL is compatible with a wide range of evidence, including *a priori* sources of evidence. Abductive arguments for a logical theory might just as well be supported by *a priori* insights from set-theory or theories of truth, as by experimental psychology or empirical linguistics.[9]

Because Methodological AEL in its own right does not put significant restrictions on what constitutes the appropriate *sources of evidence* for logic, it is also compatible with a wide range of metaphysical views about logic. For instance, while some methodological anti-exceptionalists, such as Williamson (2017), endorse a non-metalinguistic account of logic in which the laws of logic express the most general structural features of the world, others such as Priest (2016) think of the laws of logic as metalinguistic laws about logical properties. Thus, there is no requirement for a methodological anti-exceptionalist to further commit themselves to the normal metaphysical commitments of naturalism, such as logical laws being contingent or metaphysically synthetic (that is, true *in virtue of* non-linguistic facts). For instance, Russell (2015) explicitly rejects this naturalistic account of logic while still committing herself to a form of Methodological AEL. This suggests that one's commitment to Methodological AEL does not dictate one's commitment to Metaphysical AEL; methodological anti-exceptionalists may hold a plethora of views about the nature of logical facts, or even whether there are any logical facts at all.[10] Since the evidence that supports this theory choice could be linguistic, psychological, mathematical, or modal, the types of facts these forms of evidence uncover could respectively be linguistic, psychological, mathematical, or modal.

5 | CONCLUDING REMARKS

In this first part of the entry on anti-exceptionalism, we have argued that although contemporary anti-exceptionalism has a precursor in Quine's naturalism about logic, it is different in important respects. In particular, we have to distinguish two commitments in Quine's philosophy of logic: *Methodological* AEL and *Evidential* AEL. Once this distinction is made, it becomes clear that most anti-exceptionalist proposals in the current literature depart from the naturalist project by rejecting the latter, although they accept the former. In the second part of the entry, we will go on to discuss the various contemporary motivations for Methodological AEL and highlight how these motivations may not equally support Evidential AEL. We will then go on to discuss the two most prominent proposals of Methodological AEL in the literature: logical abductivism and predictivism.

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ENDNOTES

[1] We thank an anonymous reviewer for pushing us on this point.

[2] As with many distinctions in epistemology, they can be equally made in terms of *justification* and *knowledge*. Our preference here will be talking in terms of justification, in virtue of the property being non-factive.

[3] Of course, there *are* contemporary philosophers of logic interested in this former project, some of whom aim to provide an answer consistent with naturalistic commitments (Maddy, 2007; Schechter, 2010). Given that these naturalist-friendly attempts to explain our reliability as (logical) reasoners are sometimes associated with Quine's broader naturalist project (cf. Maddy, 2007, I.6), there is the potential to confuse these proposals with instances of Epistemological AEL. That would be a mistake. It is important to sharply distinguish attempts to explain how we come to be reliable reasoners from how we come to be justified in believing the correct logical laws, just as it is to differentiate explanations of how we come to be reliable at basic arithmetic and how we came to justify the axioms of Peano arithmetic.

[4] Entitlement here, as usual, being the possession of epistemic warrant without cognitive access to the reasons for this warrant.

[5] What this positive evidence looks like in contemporary epistemological AEL is covered in the second part of this entry.

[6] For a detailed account of the development of Quine's naturalism, see Verhaegh (2018: Ch. 4), according to whom Quine's mature naturalism is best understood as the commitment to *working from within* our current scientific worldview, embracing the ontology, methods, and sources of evidence science provides us with.

[7] Centrality, thereby, being a suitable analogue of the traditionally presumed *generality* and *necessity* of logic within Quine's metaphor of the web. This centrality, consequently, allows Quine to partially explain the *apparent* foundational status of the logical laws; see Carlson (2015) for discussion.

[8] In keeping with the norm in the literature, we use the term "abductivism" to refer to any account of theory-choice in logic that proposes logics are assessed on the basis of their ability to better accommodate some relevant data, and possess more relevant theoretical virtues, than other available logics. Given that, strictly speaking, abductive accounts of some phenomenon should be *explanatory*, this label is a little misleading, as it's unclear all abductivists wish to commit themselves to logics playing this explanatory role (cf. Russell, 2015). We touch on this matter in some more detail in the second part of the entry. Thanks to an anonymous referee for pressing us on this point.

[9] An interesting case is that of Penny Maddy (2007), who clearly shares with Quine a naturalistically-minded worldview. As noted above, Maddy is primarily concerned with providing an explanation of how individuals come to be *reliable reasoners*, rather than how we come to justify our logical theories. This reliability, she argues, is due to two facts: (i) logical facts are grounded in the structural features of the world, and (ii) humans have evolved to be sensitive to these structural features (Maddy, 2007: III.4-5). This makes Maddy a clear example of a *Metaphysical* anti-exceptionalist, in proposing that logical facts are grounded in the most general facts of the world. Given this metaphysical view on the nature of logical facts, it is likely that Maddy is committed to saying that what justifies our commitment to a particular logical theory will ultimately have to depend upon our best understanding of these structural features of the world (2007: III.7). However, Maddy does not provide us with a detailed account of the mechanisms by which this theorizing proceeds or the sources of evidence used in this theorizing. This makes it difficult to conclusively identify Maddy as either a methodological or evidential anti-exceptionalist.

[10] Resnik (1999, 2004) and Woods (2023) are examples in which Methodological AEL is combined with forms of anti-realism, noncognitivism and conventionalism, respectively.

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