



Inferentialism naturalized and anti-exceptionalism about logic

Dolores García-Arnaldos¹ · Concha Martínez-Vidal²

Received: 6 October 2024 / Accepted: 3 June 2025
© The Author(s) 2025

Abstract

Logical anti-exceptionalism, that is the idea that logic is not fundamentally different from other forms of inquiry such as science or mathematics, can be broadly characterized as being contrary to paradigmatic examples of exceptionalism about logic, such as the rationalist and semanticist conceptions. Logical inferentialism asserts that the meanings of logical expressions are determined by the basic rules prescribed for their correct application, such that comprehension of a logical expression is achieved through its use in accordance with the appropriate logical rule Brandom (Making it explicit: Reasoning, representing, and discursive commitment. Cambridge, 1994); Boghossian (Blind Reasoning. Proceedings of the Aristotelian Society, Supplementary Volume 77(1), 225–248, 2003a), Boghossian (Epistemic Analyticity: A Defence. Grazer Philosophische Studien 66(1), 15–35, 2003b). Despite the fact that inferentialism may appear to be an exceptionalist theory given its semanticist approach, not all inferentialists keep to the exceptionalist tenets of logic. This paper scrutinizes the recent moderate anti-exceptionalist proposal of naturalized inferentialism by Peregrin and Svoboda (Moderate anti-exceptionalism and earthborn logic. Synthese 199 (3–4), 8781–8806, 2021). To contextualize Peregrin and Svoboda’s proposal, the paper presents a series of issues concerning the various anti-exceptionalist and exceptionalist theories; this discussion shows that naturalized inferentialism can resolve the adoption problem identified by Kripke, and Boghossian and Wright (Kripke, Quine, the “Adoption Problem” and the Empirical Conception of Logic. Mind, 133(529), 86–116, 2024) while remaining faithful to the anti-exceptionalism it seeks to advance, except for its adherence to the fundamental nature of logical human practice. Moreover, it illustrates that as anti-exceptionalist proposals reduce their aspirations, the distinction from exceptionalist positions progressively diminishes in clarity and precision.

Keywords Anti-exceptionalism · Logic · Exceptionalism · Inferentialism · Naturalism

Extended author information available on the last page of the article

1 Introduction

The debate between Exceptionalism (EL) and Anti-Exceptionalism about logic (AEL) has become increasingly significant. Proponents of logical exceptionalism posit that logic constitutes a distinct domain of inquiry, a special field of knowledge (a discipline), either because of the form and generality of its laws, or because it provides fundamental and a priori knowledge, or because its logical theories do not demand anything from the world and have normative force.

Unlike the empirical sciences, which necessitate adjustments upon experiential findings, logical principles remain steadfastly formal and comprehensive, with their validation grounded in demonstrative proof. Logical knowledge, uniquely, retains an a priori, non-inferential nature.¹ A pertinent example is provided by Frege (1979, p. 175), who asserts the autonomous validation of foundational inferential rules—arguing that a basic proposition is self-justifying—and introduces his conceptual notation as a tool for depicting inferences. Thus, traditionally, logical knowledge is acclaimed for offering fundamental and a priori insights, concerning itself with linguistic structure rather than worldly phenomena,² and lacking a specific subject-matter.³ These, among other characteristics, contribute to its perceived exceptional nature. Nonetheless, exceptionalism about logic confronts challenges, particularly regarding the contention that logic’s purely formal nature is disputable, owing to at least the following considerations:

- There is more than one correct logical theory.
- The discussion on the sources of a priori evidence:
 - It is not possible to justify a logical system in a non-inferential way,
 - There is no a priori at all.⁴
- (EL) does not take account of “real” logical practice since logical theories are defeasible and on the same grounds as scientific theories.⁵

This has led to claims that logic as a discipline is not fundamentally different from other forms of inquiry, such as science or mathematics. Thus, AEL is presented as the denial of at least one of these properties traditionally associated with logic:

¹ Although, as we will see, some logical knowledge is clearly inferential such as the logical knowledge we get from closure principles, the problem comes with non-inferential logical knowledge, that is to say with the knowledge of logical axioms or basic rules of inference.

² Wittgenstein (1922); Carnap (1937).

³ Logic (pure, but non applied logic) has no particular subject-matter (Frege, 1879, *Begriffsschrift*).

⁴ The debate on a priori is still ongoing: see Boghossian and Williamson (2020).

⁵ As well summarized by Hjortland:

“Logic isn’t special. Its theories are continuous with science; its method continuous with scientific method. Logic isn’t a priori, nor are its truths analytic truths. Logical theories are revisable, and if they are revised, they are revised on the same grounds as scientific theories. These are the tenets of anti-exceptionalism about logic.” (Hjortland 2017, p. 631).

- Logical laws are a priori and fundamental or foundational.
- Logical theories “‘treat’ of nothing,”⁶ they are formal.
- Traditionally, logical theories are distinguished from scientific theories by their *normative* force, as they prescribe how reasoning should be conducted.

However, it remains an open question whether anti-exceptionalism fundamentally contradicts the normative dimension of logic. For instance, Hjortland (2017b) advances the hypothesis that “the normativity of logic will ultimately be derived from broader considerations concerning the normative influence of scientific theories.”

Many philosophers have increasingly adhered to anti-exceptionalism about logic,⁷ and responses from positions closer to exceptionalism have not been long in coming.⁸ In the current debate, the AEL seems to gain strength from the proliferation of different positions within the same approach. However, this dispersion may reveal the vulnerability of the AEL, given that the anti-exceptionalist theories that have grown out of the Quinean AEL have branched out to avoid the problems of this position, and the number of desiderata has been reduced.

As elucidated subsequently, inferentialism represents a perspective on logic that, although fundamentally a variant of exceptionalism, maintains compatibility with both exceptionalist and anti-exceptionalist stances regarding logic. The paper examines the recent moderately anti-exceptionalist proposition by Peregrin and Svoboda (2021), grounded in Peregrin’s naturalistic inferentialism (2022), to assert that it encounters analogous challenges as those posed by conventionalism, including a variant of the *adoption* problem, as detailed later. Moreover, the manner in which Peregrin and Svoboda attempt to navigate the “adoption” problem identified by Kripke-Boghossian and Wright (2024), positions them proximally to the exceptionalist assertion that inferential practices are fundamental. Peregrin and Svoboda (2021, p. 8797) acknowledge that to clarify the debate it is important to realize that the term ‘logic’ is not unequivocally employed in the discourse between Exceptionalism and Anti-Exceptionalism about “logic”. Specifically, they differentiate “logic as a natural phenomenon” from “logic” encompassing the general nature of a discipline and “logic” as it pertains to logical theories, “logic as a (complex) apparatus structured and utilized within the discipline.” (Peregrin & Svoboda, 2021)⁹

Sections 2 and 3 of the paper expound on the varieties of anti-exceptionalism and exceptionalism to elucidate the claims proposed by various frameworks, along-

⁶ “The logical propositions describe the scaffolding of the world, or rather they present it. They ‘treat’ of nothing.” (Wittgenstein, 1922, *TLP* 6.124).

⁷ See Ferrari et al. (2023); Martin and Hjortland (2022); Peregrin and Svoboda (2021); Hjortland (2019); Finn (2019); Williamson (2017); Quine (1951).

⁸ Recent criticisms: Boghossian and Wright (2024), Kripke (2024), Andersen (2023), Rossberg and Shapiro (2021).

⁹ See also Peregrin-Svoboda (2023, p. 425): “[...] we need to begin with a disambiguation of the term ‘logic’ as it is used in the relevant literature on logic and the philosophy of logic. [...]:

- (1) the name of a phenomenon we construct theories of, resp. we anchor our (logical) theories in – logic^{Ph}.
- (2) the name of a (scientific?) discipline producing the specific theories – logic^{Di}.
- (3) the general name of the individual theories (or systems, or apparatus...) produced by the discipline – logicTh.”

side the challenges they encounter, and the methods utilized to address them. These analyses enable, first, an evaluation in Sect. 4 of whether Peregrin and Svoboda's moderate anti-exceptionalism, which originates from Peregrin's naturalized inferentialism, stands as a viable form of AEL. This is particularly significant given that, should Kripke (2024) be accurate, it may ultimately support at least one exceptionalist assertion. In the context of the debates initiated by Kripke and developed recently, especially by Boghossian and Wright, it is argued that this moderate approach does not provide an anti-exceptionalism that would be considered plausible, as it may ultimately support at least one exceptionalist assertion. Secondly, it is asserted that this approach is inadequate in providing a satisfactory explanation of the mechanisms by which they can reach a consensus on logical revision.

Furthermore, the examination of the diverse proposals underscores, or at least illustrates, the idea that, as anti-exceptionalist proposals are compelled to lower their desiderata, the demarcation between them and exceptionalist positions becomes increasingly vague and imprecise.

2 Varieties of anti-exceptionalism about logic

Many recent anti-exceptionalist theories present W. O. Quine as the standard-bearer and promoter for these theories; "Two Dogmas of Empiricism" (1951) has become one of the classic accounts of the anti-exceptionalist conception of logic; note that Quine is discussing the status of logic as a discipline by discussing how one particular logical theory or other comes to be part of our best scientific theory.

In general terms, Quine argues that no logical theorem is justifiable *a priori*, but, like any other scientific theory, is justifiable on the basis of *a posteriori* evidence. His epistemological holism is crucial to the rise of a specific AEL approach according to which logic (as a discipline) is unexceptional because its theories are continuous with science and its method is continuous with the scientific method. Quine defends that it is our web of belief as a whole (that includes our best theory about the world), rather than individual hypotheses, that face experience in such a way that even logical laws are subject to revision, always taking into account pragmatic reasons. Thus, from an evidential point of view, we need to rely on the epistemic sources that count as scientific evidence. Logic, therefore, has no foundational epistemic status, and its theories are revisable in the same way as scientific theories.¹⁰ Quine's holism and his rejection of the *a priori* status of logic go hand in hand with his rejection of the analytic/synthetic distinction (Quine, 1951), since logical truths are a special case of analytic truth. Consequently, in the Quinean 1951 approach, the justification of logical theories arises neither from rationalist sources of evidence such as intuition, nor from semantic sources such as analyticity; logical truths encompass a kind of descriptive content akin to that found in other scientific disciplines and their justification depends on the essential role they play in the scientific understanding of the world. Quinean AEL, with its defense of this evidential holism, epistemological empiricism

¹⁰ Quine's holism (1951) also requires that our web of belief is underdetermined by data, so there is place for choice.

and naturalism, takes science and its methodology to be the only acceptable ways to go. For exceptionalists, on the other hand, logic does not demand anything from the world and its method is proof.

Hjortland and Martin's (2022) work represents an attempt to distance their perspective from the logical anti-exceptionalism that is characteristic of the Quinean tradition. While they acknowledge the epistemological roots of anti-exceptionalism in Quine's naturalism and evidential holism, they emphasize significant divergences between Quine's framework and modern interpretations of anti-exceptionalism. Notably, they argue that modern anti-exceptionalists generally do not subscribe that "sources of evidence of the sciences are the only viable sources of evidence" (Hjortland & Martin, 2024). They suggest, instead, defining anti-exceptionalism as the denial of at least one property among those that classical exceptionalism typically considers to be distinctive of logic (among them those listed above).

One of the advantages of this proposal is that it distinguishes two branches of AEL: *metaphysical* AEL and *epistemological* AEL. The basic difference is that *metaphysical* AEL is the theory according to which logical laws are similar to scientific laws; they have the same kind of descriptive content except that they deal with the most general abstract features of the world, so they are as descriptive and necessary as the laws of the rest of the sciences. *Epistemological* AEL, on the other hand, is the theory according to which logic is to be justified in a similar way as scientific laws are justified, i.e. they are chosen on the basis of a mechanism for selecting theories based on sources of evidence that are not (at least not entirely) a priori. Consequently, logic does not hold a foundational epistemic status, and is typically positioned on an equivalent plane with other fields of research. While metaphysical AEL aligns with what Peregrin and Svoboda describe as "logic as a phenomenon," this alignment does not imply consensus among Peregrin and fellow anti-exceptionalists regarding the metaphysical status of the phenomenon. Conversely, epistemological AEL addresses epistemological concerns associated with logical theories.

Although Quinean naturalism is anti-exceptionalist both metaphysically and epistemologically, Martin and Hjortland emphasize the necessity of differentiating between these two forms of anti-exceptionalism. Moreover, they distinguish (Martin & Hjortland, 2024) two further variants within epistemological AEL: *Evidential* AEL and *Methodological* AEL. Thus, epistemological AEL comprises two dimensions where the evidential dimension refers to the sources of evidence for logic and the methodological dimension refers to the methodology of theory selection. The prevailing view is that the methodologies employed in the selection of theories are analogous in both science and logic, and are typically selected on the basis of criteria that are regarded as non-exceptional.

This divergence between the evidential and methodological aspects of *epistemological* AEL is not congruent with Quine's holism regarding justification, as within Quine's view, evidential and methodological facets of justification are intricately connected.

Martin and Hjortland (2024) maintain that well-known anti-exceptionalist philosophers, such as Williamson (2013), move away from evidential AEL and accept non-naturalistic sources of evidence, such as modal laws.¹¹

The distinction between *methodological* AEL and *evidential* AEL is relevant because many of the critiques of AEL, such as those of Boghossian and Wright (2024), as we shall see, associate AEL with Quine's evidential holism in such a way that, when they raise serious objections to holism, they see it as affecting all non-exceptionalist views. But if we accept with Martin and Hjortland the differences between the Quinean version and the other contemporary versions that do not accept evidential AEL, the criticisms mentioned above would not apply to the new proposals.

Boghossian and Wright criticisms claim to be an improved version of Kripke's adoption problem. They state that some logical principles are so fundamental that they cannot be revised or "adopted" in the same way that we revise a scientific theory. Not every fundamental logical law or inference rule can be rejected on empirical grounds and an alternative adopted in its place. This challenges the idea that logic (as a discipline) is fully continuous with science (with other scientific disciplines).

Peregrin and Svoboda (2021) bridge this version of the adoption problem arguing that "proto-rules," standards within a logical theory, and corresponding inferential practices—which presumably encompass the rules Boghossian and Wright claim to be fundamental—, can be imposed for the first time because they are, in a sense, already present in discursive practice (this means that they are part of the phenomenon of logic, of the corresponding inferential practices; logic as a discipline is about these rules). But an obvious price this solution pays is that inferential practices are accepted as fundamental. (They are part of the phenomenon; they are fundamental in the theory because they are fundamental in the phenomenon)

The question is then where to place Peregrin and Svoboda's proposal given that Peregrin's naturalized inferentialism seems to withstand the Boghossian and Wright/Kripke criticisms by committing to something that sounds at the same time as foundational and naturalist since logic comes from the (proto)logic in natural language (the phenomenon). Besides, Peregrin and Svoboda (2022) seem to claim that their position is moderate because it is not radically opposed to logic being, in a certain sense, fundamental. What they oppose is to account for that fundamental character in a way that is not acceptable to the naturalist (logic as a discipline is to be compatible with naturalism and the way in which the phenomenon is understood has to be compatible with naturalism too).

A more inclusive and less contentious framework for characterizing anti-exceptionalism about logic, one we have already mentioned above, encompasses both, the Quinean (or the Quinean-derived variant) and contemporary approaches that do not share Quinean epistemological holism. This broader perspective facilitates the contextualization of Peregrin and Svoboda's proposal.

¹¹ However, Williamson (2013) contends that the world possesses modal properties, while modal knowledge is defined as knowledge of counterfactuals, a method that has been extensively employed within the scientific community. Those features seem to imply a lack of reliance on non-naturalistic evidence. Hence, though it is clear that Williamson fits into methodological AEL, it is not entirely clear that he does not fit also into the evidential AEL, as Martin and Hjortland claim.

Martin and Hjortland (2024) suggest relying on the observation that these views collectively stand in opposition to the two most dominant exceptionalist perspectives in the epistemology of logic, namely *rationalism* and *semanticism*. Contesting these exceptionalist views entails rejecting the manner in which they define what constitutes evidence for logical laws, along with repudiating the accompanying exceptionalist attributes these explanations convey.

3 Varieties of exceptionalism about logic

Among the several varieties of exceptionalism about logic that we can find,¹² logical *rationalism*¹³ and logical *semanticism* set the trend. The difference between them is that they rely on different sources of a priori evidence for the justification of logical laws.

Semanticism dismisses intuition and similar quasi-perceptual faculties (Martin & Hjortland, 2024), positing instead that justification for accepting the truth of logical rules stems from understanding their constituent terms and possessing linguistic competence (Boghossian, 1996, for example, defends this approach on the basis of the idea of epistemic analyticity).

It is well-recognized that the difficulty in justifying logical knowledge lies in our reliance on the very inferential principle we aim to justify, such as conjunction introduction or modus ponens. The inferential support for logical rules is circular, depending on logical principles themselves, leading to an endless cycle and infinite regression of justification (Carroll, 1895). Understanding inferential knowledge necessitates awareness of the specific inferences or general rules assumed in that context (Wright, 2004, p. 158). Our focus here is not on rationalist exceptionalist accounts but on meaning-based a priori theories of justification. An intriguing case is inferentialism, which asserts that meaning is defined through inferential rules (Brandom, 1994; Peregrin, 2012, 2014, 2022). According to Brandom (2000), conceptual meaning is not to be analyzed in terms of reference; rather, the classical representational relation between language and the world is replaced by that of *inference*. Inferentialist theories such as Boghossian's (2000; Boghossian, 2003b) are based on conceptual role semantics.

Conceptual role semantics represents a comprehensive viewpoint within inferentialist theories. In accordance with this standpoint, the meaning of logical terms is derived from the role these terms play in inferences. The meaning of an expression is determined by the function it fulfils in a particular set of inferences. Thus, theories of meaning as use that give inference a central place fall under the label "inferential role semantics" (IRS), a type of conceptual role semantics¹⁴ in which semantically

¹² See, e.g., Boghossian & Peacocke (2000); Boghossian (2000); Sher (2023) among others.

¹³ Bealer (1998); BonJour (1998).

¹⁴ "Use theories of meaning of this sort are commonly known as inferential role semantics (IRS) or inferentialism for short. IRS is a species of conceptual role semantics. On a broad understanding of it, conceptual role semantics includes 'any theory that holds that the content of mental states or symbols is determined by any part of their role or use in thought'." (Harman & Greenberg, 2006, p. 295).

relevant features of an expression's conceptual role are substituted for properties of inference. (Murzi & Steinberg, 2017)

If we express that the meaning of “and” is determined by the rules of inference that govern it, and, at the same time, accept that if we understand “and” we can infer according to such rules, then our theoretical framework is that of IRS (Murzi & Steinberg, 2017, p. 198). Indeed, as Murzi and Steinberg point out, the most natural application of IRS is logical inferentialism, the theory that the meanings of logical expressions are determined by the basic rules given for their correct use, so that to understand a logical expression is to use it according to the appropriate logical rule (Brandom, 1994; Boghossian, 2003a, b).

Among the arguments in favor,¹⁵ Boghossian (2003a) has defended logical inferentialism on the basis of the constitutive model to explain how “blind but blameless reasoning” can justify the knowledge transferred from premises to conclusion in deductive inference. His approach, according to which logical truths are epistemically analytic (Boghossian, 1996, 2003b), is one of the most prominent analytic approaches to logic within exceptionalist semanticism.

However, there have been many criticisms of this position. Among the most important is that of Wright (2004), who argues that the constitutiveness of meaning based on blind reasoning is insufficiently explanatory because it does not clarify how “blind” reasoning conveys knowledge. Another well-known critique is that of Williamson (2007). For Boghossian, competence in relation to a logical term consists in assenting to the kind of understanding-assenting relation that is inferentially required. Williamson (2011, p. 503) on the contrary argues that linguistic competence does not suffice for knowledge. For Williamson (2000), propositional knowledge comes first, so that knowledge can be accepted as implying agreement, but not vice versa (Williamson, 2007, p. 76). Moreover, understanding-assenting links are not necessary because, from the moment that a word or term becomes part of a public language, being proficient in that term inherently involves a complex network of intertwined causal relations with other speakers. It is therefore these relationships that constitute competence.

Given that we have characterized anti-exceptionalist positions as those opposing rationalism and semanticism, it might seem that inferentialism falls under the exceptionalist side since, after all, it is a semanticists approach. However, we argue below that not all inferentialists subscribe to exceptionalism about logic.

4 Inferentialism: exceptionalism or anti-exceptionalism about logic?

In this section, we first argue that inferentialism can give rise to both EL and AEL approaches. We then suggest that Peregrin's naturalized inferentialism, faces problems similar to those of conventionalism, such as arbitrariness and logical disagreement.

The inferentialist approach by itself is compatible with EL and AEL views. It shares perspective with exceptionalism in that both reject reducing logical principles

¹⁵ Murzi and Steinberg (2017) present some of the arguments in favour of inferentialism and some of the main criticisms.

to more fundamental or empirical elements and, they both highlight the vital role of *inference*.

Another shared aspect is the assumption of *normativity*. Both Brandom (1994, 2000) and Peregrin (2014) argue that language is normative in the sense that its vocabulary is governed by inferential rules (Peregrin, 2014, p. 6 ff.). For Brandom (1994), the normative attitude is irreducible, it is the core of the game of “giving and asking for reasons” according to which we treat our own and others’ utterances as right or wrong (Brandom, 1994, p. 37).

On the other hand, since conceptual role semantics accepts that logical terms derive their meaning from the role they play in inferences considered in context, i.e. it accepts the *contextual dependence* of meaning, inferentialism contends that the validity of inferences can vary according to a particular context. In this sense, EL is much more rigid than inferentialism. (See Beall & Restall, 2006)

Moreover, arguably, for certain inferentialist approaches, logic is not a discipline that is distinct from other semantic systems, since logical terms can be understood as concepts whose meaning is determined by their relations within a network of inferences. In that sense, logic would be continuous with other forms of meaning construction.

In contrast, from the point of view of exceptionalism, the rules of logic are traditionally considered special, as we have seen, and distinct from the inferential relations that govern the meaning of other concepts. Precisely, inference (transformation) rules determine the meaning of logical terms, hence how they contribute to the meaning of the statements in which they feature.¹⁶ Carnap (1950) would be a representative of exceptionalism; take Finn’s description of the view.

“Carnap, of *The Logical Syntax of Language*, is said to hold a position where logical truths are necessary and known a priori, grounded on linguistic conventions. On this interpretation, logic is such that it is true by virtue of meaning, where its statements are considered the product of linguistic conventions. So, on this picture there will be prescriptive stipulated conventions of how we infer, and rules of inference will become valid or justified in virtue of these conventions. Logical truths are therefore established by means of conventional stipulations and are unlike scientific truths in that they are not about the world.” (Finn, 2019).

However, this approach was overtaken by the Quinean critique. The difficulties of logical conventionalism are well known (Quine, 1936, 1960). The crux of the matter is that the conventions that determine the meaning of the logical expressions cannot be established without using those logical expressions themselves, thereby giving rise to infinite regress. Furthermore, in the event that each epistemic subject imposes a distinct set of normative constraints on logical beliefs, to explain how these agents can achieve consensus when it comes to logical revision becomes imperative.

Instead, normative inferentialism—in particular Peregrin’s (2014)—, adopts a different strategy; it seeks to explain the elements in logic as a phenomenon that give or receive justification in chains of inferences, i.e. in judgments and assertions. This

¹⁶ In the case of Carnap a term is meaningful because the sentence containing the logical expression is deductively verifiable. See Murzi, M. (2007). *The philosophy of logical positivism*. URL: <https://www.murzim.net/lp.html>.

aspect is interesting because it underlines the importance of seeking justifications for statements, as well as understanding them and judging their semantic correctness, without falling into reductivism.

Brandom (1994, 2000) rejects the reductivism of meanings – or of the normative in general – to the natural; in order to establish the meaning of an expression, the function it plays in the language games of the speakers of that given language must be evaluated. For Brandom, as for Wittgenstein (1953), language games are governed by rules, so that the meaning of a term or expression is determined by its inferential roles, which encompass the manner in which it can be utilized to infer other statements and the statements that can be inferred from it.

Peregrin (2022), however, wants to rely on a naturalistic theory of meaning based on Brandom's inferentialism. In this regard, drawing on Sellars' work,¹⁷ Peregrin contends that inferential rules are founded on both normative and practical attitudes. Specifically, our inferential practices are influenced not solely by the implementation of logical principles nor exclusively by our *normative* beliefs regarding correctness, but additionally by our practical objectives and intentions which constitute our *practical attitudes*. The relevance of a given rule therefore, depends on the context. Since neither Wittgenstein nor Sellars clarify what a norm is, nor point the way to a connection with naturalism, Peregrin searches for such an explanation and proposes to understand normativity as something created and instituted by us. As we have said, for Brandom it is not possible to reduce the normative to the natural, because, accepting that the rule is constituted by correct normative attitudes, we would first have to explain what makes a normative attitude correct, and it seems that from the naturalistic point of view an answer cannot be offered without falling into a regression into infinity or circularity.

However, Peregrin argues that Brandom could offer a naturalized notion of norm, one that relied on the Brandomian idea of 'normative attitude,' a notion Brandom characterizes as a willingness to sanction, positively or negatively.

In their article "Moderate anti-exceptionalism and earthborn logic," Peregrin and Svoboda (2021) offer a naturalistic theory of logical consequence as the foundation of the rules implicit in human linguistic practices.

This makes it immune to Quine's criticism of basing logic on explicit conventions. Logical theories, they argue, are established in a similar way to those of the sciences, but their methodology is somewhat special in that they do not claim to be a mere explanation but rather their laws serve as tools to foster rational communication. Peregrin and Svoboda contend that their anti-exceptionalism is *moderate*, although they claim that their methodological background is Quine's *naturalism* (1969, p. 26).¹⁸ They accept certain normativity, reject the abductive method as exclusive and, curiously, although they maintain that logic is continuous with science, they stress that their methodology is special:

¹⁷ "To say that man is a rational animal, is to say that man is a creature *not of habits*, but of *rules*" (Sellars, 1949, p. 298).

¹⁸ "We thus declare that our methodological background is *naturalism*." (Peregrin & Svoboda, 2021, p. 8782).

“This implies that logic cannot be seen as a discipline that only aims to explain certain phenomena. Thus it cannot simply take over methods employed in disciplines that have purely descriptive (explanatory and predictive) aspirations. In particular, it cannot simply take over the abductive method which is sometimes given pride of place. In this sense logic is both continuous with other scientific disciplines but also methodologically special.” (Peregrin & Svoboda, 2021, p. 8785).

In this proposal, the naturalization of inferentialism depends on accepting the naturalization of social rules. Peregrin’s argument is that if we accept that inferential rules are understood to constitute meanings, and if a naturalistic account of rules based on normative attitudes is found, it will also serve to naturalize meanings and conclude that meanings are also constituted by normative attitudes. Thus, normative attitudes turn out to be natural. The naturalization of social rules is the naturalization of inferential rules, which are a special case of social rules.¹⁹ (Peregrin, 2022)

This is due to the fact that anti-exceptionalist inferentialism holds that the meaning of logical terms is acquired through their inferential roles. In other words, it is through “adopting” inferential practices that meaning emerges.

We will now discuss the adoption issue within Quine’s AEL framework and examine how the critique by Boghossian and Wright (2024), which draws on Kripke’s (2024) idea that logical rules are not chosen, but are instead imposed upon us—and thus not merely adopted practices—could impact inferentialist theories related to conceptual role semantics.

5 Problems for quinean AEL... and for inferentialism naturalized?

Boghossian and Wright (2024), along with Martin and Hortjland (2022), have detected a potentially problematic aspect for the Quinean framework of AEL in their respective papers. The issue is whether the same objection has any bearing on Peregrin’s inferentialism naturalized.

Remember, according to Boghossian and Wright (2024), the empirical confirmation thesis, according to which logical laws, like all scientific generalizations, can only be confirmed by empirical experience, is untenable. Their argument draws on the problem of “adoption” which was formulated by Saul Kripke in 1974 to challenge Quine’s view of logic:

“The original adoption problem (OAP) You cannot simply explicitly adopt a basic logical rule, and thereby for the first time introduce inferential practices in accordance with it, because in order competently to follow it, you will need *already* to be an (implicit) practitioner of it.” (Boghossian & Wright, 2024, p. 92).

¹⁹ The classic problem with inferentialism is that “inferences cannot constitute meanings because they presuppose meanings,” reasoning is not an operation on symbols but on contents of thought (Boghossian, 2014, p. 17). In this sense, the objection to inferentialism is circularity. For Boghossian (2014, 2015), rules, on the contrary, are abstract objects.

Kripke's Adoption Problem (1974/2024) entails that it is untenable to claim that any logical law or pattern of inference, however fundamental, can in principle be rejected on purely empirical grounds and an alternative "adopted" in its place. Imagine a community using a logical system different from ours in which a fundamental principle such as modus ponens or universal instantiation (which allows specific instances to be inferred from general rules) is rejected. In Quine's view, we could simply "adopt" this logic and see whether it leads to better results. Kripke, however, argues that certain basic logical principles, such as universal instantiation or modus ponens, are crucial for reasoning and for making sense of our own language. We could not simply adopt a logic that rejected them, because it would undermine our ability to reason and communicate effectively.

The adoption problem suggests that some logical principles may be so fundamental that they cannot be revised or "adopted" in the same way that we might revise a scientific theory. This challenges the idea that logic is fully continuous with science. However, since the circularity problem counts as an analogous problem for exceptionalism, the adoption problem does not necessarily prove that logic is exceptional, although it does highlight the limitations of treating it in exactly the same way as any other scientific theory.

According to Quinean anti-exceptionalism, logic is continuous with other conceptual domains. We learn logic by "adopting" its rules, just as we learn other concepts. The problem is how this "adoption" works for logic. Its rules seem to have such force that they are not something we choose to accept, we don't arbitrarily choose to adopt them, but they seem justified to us, given that they are imposed on us.

Treating logic just like any other field of knowledge suggests its principles should be embraced similarly. Yet, unlike learning to identify colors, we can't really claim that we discover the rules of logic voluntarily; rather, they are imposed on us. As Aristotle states: "A syllogism is an argument ($\lambda\acute{o}\gamma\omicron\varsigma$) in which, certain things being posited, something other than what was laid down results by necessity because these things are so." (*Prior Analytics* I 1, 24b19-20).

On the one hand, *evidential* anti-exceptionalism suggests that logic is revisable on the basis of evidence or proof, similarly to scientific theories. On the other hand, logic tells us how to think properly and is not limited to describing a practice. According to Boghossian and Wright, certain basic logical principles are essential for evaluating evidence and for revising theories at all, and they argue that anti-exceptionalism undermines the tools we need to revise theories, including logic itself.

For Kripke too:

"The point is that logic, even if one tries to throw intuitions to the wind, cannot be just like geometry because one cannot adopt the logical laws as hypotheses and draw the consequences. You need logic in order to draw these consequences.

There could be no neutral ground in which to discuss the drawing of consequences independently of logic itself. This is the basic point that I want to make." (Kripke, 2024, p. 20).

Boghossian and Wright's critique, building on Kripke and focusing on the role of reasoning, is that revising one's theories necessarily requires good reasoning. If logic is just another revisable theory, what is the basis for such good reasoning? How can we justify the methods used to evaluate evidence and revise theories if the logic itself

is questionable? This criticism is related to the problem of *regression* to infinity: If everything, including logic, is revisable on the basis of evidence or proof, how do we avoid a regression of justifications (Boghossian, 2000). The anti-exceptionalists must explain how we get out of this regression.

“Quine famously used the (Carroll’s) puzzle as an objection against Carnap to show that logical rules cannot be analytically true by convention. More recently, Kripke uses the puzzle as an objection against Quine to show that logical rules cannot be empirical and unprivileged. Kripke takes his objection to Quine to be ‘exactly the same’ as the objection that Quine makes to Carnap, thus entailing that Kripke’s objection should apply to Carnap as well.” (Finn, 2019)²⁰

On the other hand, justifying logic on the basis of a system that depends on logic itself creates *circularity*. How can we use logic to justify logic if logic itself is being questioned?²¹

Peregrin’s proposal presents a theory that views logical inference as a natural-social phenomenon and a social-cognitive process. This perspective distinguishes his work from logical exceptionalism, which traditionally considers logic as formal and distinct from the natural realm.

On the contrary, from his perspective, logic is discovered through our interactions with the world, it is not a special case. Our naturalized normative attitudes can be studied with the same methods as those of other sciences because they are accepted as natural phenomena.

“Like the sciences, logic is concerned with phenomena within the natural world. Its data are facts concerning the correctness of inferences as they can be extracted from the ways people argue and reason and how they assess correctness of arguments. Like the sciences, logic interconnects data to form models that envisage the relevant structures, displayed, in a not so recognizable way, by the data. In contrast to the case of the natural sciences, however, the data for logic are often ‘gappy’: not by far are all arguments in natural languages determinately correct or incorrect.” (Peregrin & Svoboda, 2021, p. 8801).

The question is how, in the face of different inferential practices, some of which may be demonstrably incorrect, we rescue the normativity of logic, which does not merely describe a practice. Peregrin and Svoboda turn to the proto-rules present in our discursive practices:

“Thus logic is not epistemologically exceptional as concerns the formation of its theories. It is exceptional in the sense that (1) the data on which logical theories are built are by their nature specific—normative (logic focuses on rules, or proto-rules, already present within our discursive practices) and not completely determinate; (2) in the case of logic, the creation of theories is not the whole story.” (Peregrin & Svoboda, 2021, p. 8801).

“[...] logic is not only a scientific theory, but also something of a technology.” (Peregrin & Svoboda, 2021, p. 8803).

²⁰ Boghossian, 2000, p. 234 makes a similar point.

²¹ Boghossian (2000, p. 245 & ff.) came to accept some circularity in the justification of logical knowledge, but then leave behind this solution for an intuitive account. (Boghossian & Williamson, 2020)

Peregrin and Svoboda's approach seems to overcome the objections raised by Boghossian and Wright. The instrumental view that Peregrin and Svoboda defend states that choosing certain logic or another is a pragmatic matter, in the same way that using one screwdriver or another depends on what we want to do.²² Our argumentative practice is constituted in this way. We determine whether we are going to use one logic or another depending on what we want to do.

Thus, the adoption problem, and Boghossian and Wright's critique, seem to be bridged because Peregrin & Svoboda argue that "proto-rules," standards within a logical theory and corresponding inferential practices, can be imposed for the first time because they are, in a sense, already present in discursive practice (the phenomenon). The price is that then, inferential practices are accepted as fundamental.

One problematic aspect of this approach is that Peregrin asserts that the determination of what is correct is made by us, while divergent practices can be sustained by different communities sharing different sets of proto-rules. In the event that each majority of members of a relevant community imposes different normative constraints on logical beliefs, Peregrin and Svoboda accept logical pluralism:

"Our position yields us a—more or less trivial—form of pluralism: there is an irreducible plurality of languages (both the natural and the artificial ones) and no 'language in itself'; and there is a plurality of conflicting logical languages and no 'genuine logic'. And there is no neutral standpoint from which to adjudicate which logic is the correct one". (Peregrin & Svoboda, 2021, p. 8783)

For them, logical pluralism and the existence of various standards do not appear problematic; this must be because they either believe that arbitrariness is avoided because the selection of an appropriate tool for promoting rational discourse is linked to theory choice, implying that adopting a specific perspective is goal-driven, or they accept that, in the absence of a neutral perspective, some degree of arbitrariness is inevitable.

At the root of Peregrin's (2024) response to these problems is the adoption of a naturalized view of the concept of correctness. For Peregrin, a rudimentary form of correctness arose through the emergence of normative attitudes and shared tendencies to favor or discourage peers from doing certain things.²³ But he takes this notion not to be enough: "there must be other forms of correctness; for there are obviously things that are correct despite being not generally approved of; and vice versa." (Peregrin, 2024) These more sophisticated forms of correctness obtain "by moving from correctness to its criteria." (Ibidem) where, "a criterion may be seen as a way of finding out that something has a property or is of a kind."

In the case two different communities disagree about logic, Peregrin advocates for 'criterial ascent', a term denoting the process of deliberation between both communities regarding the selection of a suitable criterion. The crux of the issue is that, coming to an agreement about which criterion to adopt cannot be done without using

²² "The standards fixed by logical theories are, we suggest, to a certain extent conventional and their appropriateness depends on the discourse in question. (...) The normativity of logic is instrumental—we impose the standards established within logical theories as our tool." (Peregrin & Svoboda, 2021, p. 8803).

²³ This answer plays better than the answer that tries to overcome the circularity issue in terms of implicit definition. Going for implicit definition amounts to giving up deliberateness and it is not clear that it keeps the explanatory force conventionalism aimed at (Quine, 1936).

logic. Moreover, Peregrin rejects what he terms ‘unhuman or instrumental objectivity.’ Take we are riding a bike. We do say that someone does not ride correctly meaning that she falls. According to Peregrin, this sort of correctness is not genuine but instrumental, a mere simulacrum of normativity because we can paraphrase what we say without using any normative term: in order to prevent falling from your bike you have to do this and that. Genuine correctness is human correctness, the sort of correctness that is established by human communities in their practices and cannot be reduced to instrumental or unhuman correctness, the sort of correctness that seems to rely on independent standards. Given his rejection of unhuman correction, it is true that the logic from which a community assesses another community is not arbitrary, but it is also the case, as they themselves state, and we have already noted, that “there is no neutral standpoint from which to adjudicate which logic is the correct one.” (Peregrin & Svoboda, 2021, p. 8783) The debate about which logic to adopt can take into account certain goals that both communities share. Consider the one Kripke pointed out and they mention: the logic adopted “has to allow for our ability to reason and communicate effectively.” But, again, as Peregrin and Svoboda acknowledge, this does not seem enough to fully characterize the logic to adopt. Kripke just mentions two rules. Thus, Peregrin’s naturalized inferentialism starkly fails to furnish answers to the challenges of arbitrariness and logical disagreement. Our authors resolutely acknowledge that this is the unyielding reality. It appears to be the theoretical price they incur for their reliance on the notion of human normativity, though human normativity might be all there is to the story. This remains to be seen.

Therefore, although exceptionalist theories have many limitations and have been subject to much criticism, Martin and Hjortland (2024) point out that these inadequacies are not sufficient to sustain anti-exceptionalist theories. They need to provide additional positive evidence. Indeed, there are advances from exceptionalism about logic with proposals that do not necessarily fall within rationalism or semanticism, such as Wright’s (2004), that offer a response to the criticisms received.

6 Conclusion

The doctrine of anti-exceptionalism regarding logic posits that logic is not unique in character and asserts that its principles are substantiated in a manner analogous to scientific theories, rather than through a singular a priori method. To follow the debate between AEL and EL, it is crucial to recognize, as Peregrin and Svoboda point out, that the term ‘logic’ is used in different senses, in particular, they distinguish three.

Inferentialism, by focusing on relations within a system (e.g. natural deduction), undermines the idea of absolute, pre-established logical truths. This opens the door to the idea that logic itself could be revised on the basis of new information, which is consistent with anti-exceptionalism.

In particular, it appears that although *traditional* inferentialism ascribes exceptionalism about logic, certain approaches to inferentialism, such as Peregrin’s naturalistic inferentialism, fit well with anti-exceptionalism.

A concise synopsis of the contemporary debate has been provided in the initial sections. In recent epistemology of logic, it is common to assume that any anti-excep-

tionalist theory of logic derives from Quine's view, characterized by its evidential holism, epistemological empiricism, and naturalism. Martin and Hjortland (2022, 2024) argue that Quinean AEL is not the only way to understand AEL. They distinguish between *metaphysical* AEL and *epistemological* AEL. While Quinean AEL includes both perspectives, other AEL variants are based on only one of them. In particular, Martin and Hjortland distinguish two further variants within epistemological AEL: *Evidential* AEL and *Methodological* AEL.

We have examined the extent to which criticisms of AEL are elicited by the influence of evidential holism. But by distinguishing metaphysical from epistemological AEL in its two varieties (methodological and evidential), AEL theories can leave aside evidential holism and continue to defend AEL. One of the more recent AEL proposals is Peregrin and Svoboda's (2021) *moderate* AEL, based on Peregrin's *naturalized inferentialism*.

Inferentialism can be seen partly as an EL theory, but also partly as an AEL theory, as we have seen. In particular, *naturalized inferentialism* is the theory that defends a naturalization of the concept of 'correctness'. This is defined by Peregrin in terms of "positive normative attitudes" that we find in a large majority of a given relevant community. Peregrin emphasizes the role of normative attitudes in shaping our logical theories, focusing on the proto-rules already present in our discursive practices. He argues that logical laws are normative in nature but not fully determined.

We have argued that this naturalized inferentialism adopts the foundational nature of proto-rules, thereby embracing a feature that is incongruous with anti-exceptionalism, while still encountering challenges such as arbitrariness and disagreement. Ultimately, Peregrin appears to successfully address the adoption issue, although because the proto-rules that assign meaning to logical expressions are established by us and the notion of correctness is intersubjective, it remains uncertain whether it adequately eliminates arbitrariness, as it evidently does not resolve the issue of logical disagreements.

Either way, it seems that the very possibility of a view such as Peregrin and Svoboda's may allow for the following consideration: the AEL approach is becoming increasingly robust, a development that can be attributed to the proliferation of diverse positions that subscribe to it. However, this proliferation may also be interpreted as indicative of its vulnerability, given that the anti-exceptionalist theories that have emerged from the Quinean AEL have diversified to circumvent the issues inherent in this position. However, as anti-exceptionalist proposals lower their desiderata, the distinction with exceptionalist positions becomes less clear and precise.

Acknowledgements We are grateful to Frederick Andersen for his comments and feedback on an earlier version of this paper. We thank the reviewers of this article for their suggestions and their lucid and accurate remarks.

Author contributions All authors contributing equally.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature. Funded by PID2020-115482GB-I00 MCIN/AEI/10.13039/501100011033 and by Xunta de Galicia "Consolidación e Estruturação" 2023 GPC GI-2046 – Episteme ED431B2023/24. It is also part of the PID2023-150396OA-I00 support, which is financed by MCIU/AEI/10.13039/501100011033 and FSE+.

Data availability Not applicable.

Declarations

Financial interests The authors declare they have no competing and no financial interests.

Conflict of interest The authors have no conflicts of interest to declare. All authors read and approved the final manuscript.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Andersen, F. J. (2023). Countering justification holism in the epistemology of logic: The argument from pre-theoretic universality. *Australasian Journal of Logic*, 20(3), 375–396.
- Bealer, G. (1998). *Intuition and the autonomy of philosophy*. In M. DePaul, & W. Ramsey (Eds.), *Rethinking intuition: The psychology of intuition and its role in philosophical inquiry* (pp. 201–240). Rowman & Littlefield.
- Beall, J. C., & Restall, Greg. (2006). *Logical pluralism*. Oxford: Clarendon.
- Boghossian, P. A. (1996). Analyticity reconsidered. *Noûs*, 30(3), 360–391. <https://doi.org/10.2307/2216275>
- Boghossian, P. A. (2000). Knowledge of logic. In P. A. Boghossian, & C. Peacocke (Eds.), *New essays on the a priori* (pp. 229–254). Clarendon Press.
- Boghossian, P. A. (2003a). Blind reasoning. *Proceedings of the Aristotelian Society, Supplementary Volume*, 77(1), 225–248.
- Boghossian, P. A. (2003b). Epistemic analyticity: A defence. *Grazer Philosophische Studien*, 66(1), 15–35.
- Boghossian, P. A. (2014). What is inference? *Philosophical Studies*, 169(1), 1–18. <https://doi.org/10.1007/s11098-012-9903-x>
- Boghossian, P. A. (2015). Rules, norms and principles: A conceptual framework. In T. Gizbert-Studnicki, & K. Pleszka (Eds.), *Problems of normativity, rules and rule-following* (pp. 3–11). Springer.
- Boghossian, P. A., & Williamson, T. (2020). *Debating the A priori*. Oxford University Press.
- Boghossian, P. A., & Wright, C. (2024). Kripke, Quine, “the adoption problem” and the empirical conception of logic. *Mind*, 133(529), 86–116. <https://doi.org/10.1093/mind/fzad011>
- BonJour, L. (1998). *In defense of pure reason*. Cambridge University Press.
- Brandon, R. B. (1994). *Making it explicit: Reasoning, representing, and discursive commitment*. Cambridge. Harvard University Press.
- Brandon, R. B. (2000). *Articulating reasons: An introduction to inferentialism*. Cambridge. Harvard University Press.
- Carnap, R. (1937). *The logical syntax of language*. Harcourt Brace.
- Carnap, R. (1950). Empiricism, semantics, and ontology. *Revue Intern. de Phil.* 4, 20–40; revised and reprinted in *Meaning and Necessity*, 2nd ed. Chicago: University of Chicago Press, 1956.
- Carroll, L. (1895). What the tortoise said to Achilles. *Mind*, 4(14), 278–280.
- Ferrari, F., Martin, B., & Sforza, M. P. F. (2023). Anti-exceptionalism about logic: An overview. *Synthese*, 201(2), 1–9.
- Finn, S. (2019). The adoption problem and anti-exceptionalism about logic. *The Australasian Journal of Logic*, 16(7), 231–249.

- Frege, G. (1879). Begriffsschrift: A formula language, modelled upon that of arithmetic, for pure thought. In Jean van Heijenoort (Ed.), *From Frege to Gödel: A sourcebook in mathematical logic, 1879–1931*, pp. 1–82. Cambridge: Harvard University Press, 1967.
- Frege, G. (1979). *Posthumous writings*, H. Hermes, F. Kambartel y F. Kaulbach (Eds.), Oxford: Basil Blackell.
- Harman, G., & Greenberg, M. (2006). Conceptual role semantics. In E. Lepore & B. Smith (Eds.), *The Oxford handbook of philosophy of language*. REF. Oxford: Oxford University Press.
- Hjortland, O. T. (2017a). Anti-exceptionalism about logic. *Philosophical Studies*, 174(3), 631–658. <https://doi.org/10.1007/s11098-016-0701-8>
- Hjortland, O. T. (2017b). Anti-Exceptionalism About Logic. (Research project) antiexceptionalism_project_short.pdf.
- Hjortland, O. T. (2019). What counts as evidence for a logical theory? *The Australasian Journal of Logic*, 16(7), 250–282. <https://doi.org/10.26686/ajl.v16i7.5912>
- Jacobson, A. J. (1992). A problem for naturalizing epistemologies. *The Southern Journal of Philosophy*, 30(4), 31.
- Kripke, S. A. (2024). The question of logic. *Mind*, 133(529), 1–36. <https://doi.org/10.1093/mind/fzad008>
- Martin, B., & Hjortland, O. T. (2022). Anti-exceptionalism about logic as tradition rejection. *Synthese*, 200(2), 1–33. <https://doi.org/10.1007/s11229-022-03653-7>
- Martin, B., & Hjortland, O. T. (2024). Anti-Exceptionalism about logic (Part I): From naturalism to Anti-Exceptionalism. *Philosophy Compass*, 19(8), e13014.
- Murzi, J., & Steinberger, F. (2017). *Inferentialism*. In B. Hale, C. Wright, & A. Miller (Eds.), *A companion to the philosophy of language* (pp. 197–224). John Wiley & Sons Ltd.
- Murzi, M. (2007). *The philosophy of logical positivism*. <https://www.murzim.net/LP/LP.pdf>
- Peregrin, J. (2012). What is inferentialism. In *Inference, consequence, and meaning: Perspectives on inferentialism*, (pp. 3–16). Retrieved from. <http://jarda.peregrin.cz/mybibl/PDFtxt/580.pdf>
- Peregrin, J. (2014). *Inferentialism: Why rules matter*. Palgrave Macmillan.
- Peregrin, J. (2022). Inferentialism naturalized. *Philosophical Topics*, 50(1), 33–54. <https://doi.org/10.5840/philtopics20225013>
- Peregrin, J. (2024). Whence correctness? *Topoi*. <https://doi.org/10.1007/s11245-024-10057-4>
- Peregrin, J., & Svoboda, V. (2021). Moderate anti-exceptionalism and earthborn logic. *Synthese*, 199(3–4), 8781–8806.
- Peregrin, J., & Svoboda, V. (2023). Establishing logical forms: What is assigned to what, how and why. *Logic and Logical Philosophy*, 32(3), 421–442.
- Wittgenstein, L. (1953). *Philosophische Untersuchungen*, Blackwell, Oxford; English translation *Philosophical Investigations*, Blackwell, Oxford, 1953.
- Quine, W. V. O. (1936). Truth by convention. In *Philosophical essays for Alfred North Whitehead*. Longman, Green, & Company Inc.
- Quine, W. V. O. (1951). Two dogmas of empiricism. *The Philosophical Review*, 60(1), 20–43. <https://doi.org/10.2307/2181906>
- Quine, W. V. O. (1960). *Word and object*. MIT Press.
- Quine, W. V. O. (1969). *Ontological relativity and other essays*. Columbia University.
- Rosser, M., & Shapiro, S. (2021). Logic and Science: Science and logic. *Synthese*, 199(3), 6429–6454.
- Sellars, W. (1949). Language, rules and behavior. In S. Hook (Ed.), *John Dewey: Philosopher of science and freedom* (pp. 289–315). Dial.
- Sher, G. (2023). Is logic exceptional? *Universitas-Monthly Review of Philosophy and Culture*, 50(2), 23–42.
- Steinberger, F., & Murzi, J. (2017). Inferentialism. In Steinberger Florian & Murzi Julien (Eds.), *Blackwell companion to philosophy of language*. pp. 197–224.
- Williamson, T. (2000). *Knowledge and its limits*. Oxford University Press.
- Williamson, T. (2007). *The philosophy of philosophy*. Blackwell.
- Williamson, T. (2011). Reply to Boghossian. *Philosophy and Phenomenological Research*, 82(2), 498–506.
- Williamson, T. (2013). *Modal logic as metaphysics*. Oxford University Press.
- Williamson, T. (2017). Semantic paradoxes and abductive methodology. In B. Armour Garb (Ed.), *Reflections on the liar* (pp. 325–346). Oxford University Press.
- Wittgenstein, L. (1922). *Tractatus logico-philosophicus*. Routledge.
- Wright, C. (2004). Intuition, entitlement and the epistemology of logical laws. *Dialectica*, 58(1), 155–175. <https://doi.org/10.1111/j.1746-8361.2004.tb00295.x>

Wright, C. (2001). On Basic Logical Knowledge. *Philosophical Studies*, 106, 41–85. Reprinted in J. Bermudez and A. Millar (Eds.) *Reason and Nature*, Oxford, Clarendon Press, pp. 49–84.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

Dolores García-Arnaldos¹  · Concha Martínez-Vidal² 

✉ Concha Martínez-Vidal
mconcepcion.martinez@usc.es

Dolores García-Arnaldos
dolores.arnaldos@rai.usc.es

¹ Universidad Complutense de Madrid, Madrid, Spain

² Universidad de Santiago de Compostela, Santiago, Spain