Limits of Abductivism about Logic*

Ulf Hlobil

Abstract

I argue against abductivism about logic, which is the view that rational theory choice in logic happens by abduction. Abduction cannot serve as a neutral arbiter in many foundational disputes in logic. For we must identify the relevant data in order to use abduction. Which data one deems relevant depends on what I call one's conception of logic. One's conception of logic is, however, not independent of one's views regarding many of the foundational disputes that one may hope to solve by abductivism.

1 Introduction

Anti-exceptionalism about logic, i.e. the view that logic does not have any special status but is continuous with science, is currently popular in the philosophy of logic (Hjortland, 2019; Russell, 2019; Read, 2019; Finn, 2019; Costa and Arenhart, 2018; Wyatt and Payette, 2018; Williamson, 2017; Priest, 2014; Quine, 1964). One central tenet of anti-exceptionalism is abductivism about logic.[1] This is the view that rational theory choice in

*This is a draft version of an article published in *Philosophy and Phenomenological Research*. The version of record is available online at: `https://doi.org/10.1111/phpr.12707`

[1]The most notable recent criticism is due to Woods (2019b; 2019a). Woods argues that certain parts of logic are not rationally revisable by abduction because such a revision would undermine the very argument for the revision. While that may be right, it is not part of my criticism.

logic happens via a broadly abductive method. According to abductivism, if we are justified in accepting a logical theory, we are justified because the theory performs best, among the available theories, in explaining the relevant data.

As Gillian Russell (2019, p. 549) points out, abductivism "permits a hope that we might eventually be able to determine which is the correct logic to everyone's satisfaction." For if we agree on a way to compare competing logical explanations on various criteria and to aggregate the results of such comparisons, we may hope to converge on a unique logic (or set of logics) as the result of abduction. The goal of this paper is to show that this hope is an illusion because abductivism cannot serve as a neutral arbiter, at least not for many foundational disputes, such as, disputes about paraconsistency or structural rules. My argument can be summarized in two theses:

(T.i) Different conceptions of logic lead to different views about which data logics should explain.

(T.ii) Since foundational disputes in logic usually turn on which conception of logic is correct, the opposing parties in such disputes will not agree on which data logics should explain.

I proceed as follows: Section 2 sets the stage. In Section 3, I argue for (T.i) by showing that prominent conceptions of logic differ with respect to the data they deem relevant. In Section 4, I argue for (T.ii) by looking at three foundational disputes in logic. Section 5 considers objections, and Section 6 concludes.

2 Abductivism

Abductivism is the thesis that accepting a particular logic is justified, if it is, via a broadly abductive methodology. Thus, justification in logic is holistic. We should accept a logical theory if it offers the best overall explanation of the data compared to rival theories, i.e., it explains the

relevant data well while also possessing the most favorable balance of theoretical virtues, such as simplicity, over vices, such as ad-hoc-ness.[2]

Quine (1951) famously accepted a view of broadly this kind. Priest (2016, 33) endorses abductivism by saying that a logical theory is rationally "preferable when it is sufficiently better on sufficiently many of the [relevant] criteria," where the first criterion Priest mentions is "adequacy to the data." And Williamson writes:

> Scientific theories are compared with respect to how well they fit the evidence, of course, but also with respect to virtues such as strength, simplicity, elegance, and unifying power. We may speak loosely of inference to the best explanation, although in the case of logical theorems we do not mean specifically causal explanation, but rather a wider process of bringing our miscellaneous information under generalizations that unify it in illuminating ways. (Williamson, 2017, 334)

It is a difficult question what kind of explanation logical theories may provide (Wyatt and Payette, 2018). For the purposes of this paper, I assume the abductivist has a satisfying answer. Plausibly, such explanations work by providing some understanding in virtue of unifying and connecting disparate data.

Although many abductivists are anti-exceptionalists about logic, abductivism is independent of many theses of the larger anti-exceptionalist program (see Russell, 2019, sec 2). Hjortland (2017, 631) formulates anti-exceptionalism thus:

> 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.

[2]This claim must be distinguished from the descriptive claim that theory choice in the history of logic has happened (more or less) in accordance with an abductive methodology. I will leave this claim for historians. Wyatt and Payette (2018) seem to have this in mind.

It is, at least *prima facie*, coherent to accept abductivism while holding that logic is *a priori* if one holds that the relevant data can be known *a priori*. And an advocate of such a view may hold that the aprioricity of logic constitutes a discontinuity with science. If we can know the meanings of our words in a broadly abductive way, we could even accept abductivism while also claiming that logical truths are analytic. My target is abductivism and not anti-exceptionalism.

Abductivism presupposes that we must choose between different logical theories. As long as we view logics merely as mathematical objects, such as relations between sets of sentences, this requirement is not obvious. Similarly, if we view logics as tools for solving particular problems, we may hold that different problems call for different logics. The need to choose between logics arises if we assume that there is something like an "all-purpose logic" (Field, 2009a) or a "canonical application of logic" (Priest, 2005). Abductivism aims to explain how we should choose such a logic (or logics). What is an all-purpose logic or the canonical application of logic? The answer depends on what I call different "conceptions of logic." So I'll treat the idea as a black box.

Why is abductivism so popular? One reason is the possible hope that it will provide a way to choose between logics without relying on controversial presuppositions (Russell, 2019, 549), which may seem reasonable because advocates of many different logics accept abductivism. Williamson (2017) advocates classical logic; Priest (2016) advocates the paraconsistent logic LP; and Beall (2017) advocates the logic of first degree entailment. Hjortland (2017) and Russell (Blake-Turner and Russell, 2019) are logical pluralists; Williamson and Priest are monists. Nevertheless, all of them accept abductivism. Hence, it may seem that (a) abductivism does not prejudge any issues on which foundational disputes in logic may turn, and (b) it offers a method for deciding disputes that is neutral, by which I mean equally acceptable to all (reasonable) participants in the dispute.

My goal is to show that claims (a) and (b) are false. I will argue that (a) is false because before we can apply an abductive methodology, we must

settle on points that are not neutral with respect to many foundational disputes. As a result, abductivism cannot provide a neutral method for choosing a logic; i.e., (b) is also false. My central point will be that participants in foundational logical disputes will consider different data to be relevant.

Let me foreshadow my central point with an analogy. If two parties want to arbitrate a dispute by using abduction, they must agree on the relevant data. We couldn't, e.g., use abduction in a dispute between heliocentric and geocentric astronomy if crucial data used by heliocentrists stemmed from the sublunar sphere and the geocentrist held that what happens in the sublunar sphere is independent of what happens in the supralunar spheres. The geocentrist will be within her rights to reject data from the sublunar sphere as irrelevant because she doesn't share the heliocentrists' view that her astronomic theory should explain those data. That is why it was important for Galileo and his fellow heliocentrists (i) to have data from the supralunar spheres (e.g. the phases of Venus), and (ii) to refute the view that different laws apply in the two spheres (e.g. using Brahe's demonstration that comets are supralunar) (Heidarzadeh, 2008; Kuhn, 1957).

In the dispute between heliocentrism and geocentrism, we can use further data to argue that sublunar data is relevant (e.g. observations of new stars in 1572 and 1604 put pressure on the division between the two realms). There is no guarantee, however, that such data will be available in other cases. I will argue that, in logic, we are in a broadly similar situation to the dispute between heliocentrism and geocentrism, in that it is controversial what the relevant data are. Unfortunately, we likely cannot resolve this meta-dispute by pointing to further data. The issues I am raising may arise, in principle, for any application of abduction. They are particularly relevant for abductivism about logic, however, because in logic we find highly developed and ostensibly comparable formal systems with remarkably deep disagreements about the role and nature of logic.

3 Different Conceptions of Logic, Different Data

Abductivists hold that logical theories ought to explain data. In this section, I argue that what I call different "conceptions of logic" lead to different views on what those data are.

Many agree that logical theories are theories of logical consequence, of what follows logically from what and why.[3] What is logical consequence? Unfortunately, agreement ends here. It is clear that we cannot define logical consequence by giving some familiar model-theoretic or proof-theoretic account (Field, 2015). For advocates of different logics don't disagree about the model-theoretic or proof-theoretic facts. They disagree about what follows logically from what.

Discussions of logical consequence typically offer lists of potentially essential features, such as formality, truth-preservation, topic-neutrality, necessity, *a priori* knowability, or a close (perhaps normative) relation to meaning, proofs, or rationality (Shapiro, 2007).[4] Such rhapsodic lists are a first step toward clarity about logical consequence. There is, however, considerable disagreement about which of these features are the most (or at all) important and why. To address such disagreements, one needs a view about the nature and role of logic or logical consequence. I will call such views "conceptions of logic." In this section, I describe some such conceptions and, assuming abductivism, I argue that different conceptions of logic lead to different views about which data are relevant in logical theory choice.

I hasten to add that I discuss merely four simplified "ideal types," which could be combined and amended to create other conceptions of logic. An adequate treatment of extant conceptions of logic requires book length, and philosophical ingenuity is the only limit to plausible future

[3]There is some disagreement about subtleties (see Barrio et al., 2019). But such points won't matter here.

[4]Many debates revolve around the question whether and how a given logical theory captures these features. It is, e.g., a central part of Etchemendy's (1990) critique of Tarski to argue that Tarski's theory cannot adequately capture the modal element of logical consequence.

conceptions. Fortunately, the rough sketches below will suffice for my purposes.

Before we start, one clarification is in order: I will assume that at most one conception of logic can be correct. This could be challenged in two ways. First, if the term "logic" is ambiguous or polysemous, then one conception may be correct for one meaning of "logic" and another conception for another meaning. Second, perhaps there is some viable (meaning-of-"logic" invariant) "conceptions-of-logic pluralism." Neither point undermines my arguments below. For the view that several conceptions are equally correct is itself best seen as part of another conception of logic. From the opposite direction, an opponent might worry that if we can identify the uniquely correct conception of logic before engaging in abduction, the problems regarding data that I raise below will be solved. That is not an objection to my view. Rather, it is a way to acknowledge the limits of abductivism that are my topic.

3.1 The Semantic Conception of Logic

According to the semantic conception of logic, logical consequence is constitutive of, or an immediate consequence of, the meaning of logical vocabulary. Dominant versions of this conception hold that logical consequence is a way to spell out or capture some aspect of the correct use (and hence meaning) of logical vocabulary, i.e. the logical terminology, or the natural language analogues of the logical constants. On some versions of this view, logics are models of certain aspects of natural language, and they abstract away from many other aspects (Shapiro, 2014, 2006; Cook, 2010; Peregrin and Svoboda, 2017).[5] Let's look at two versions of the semantic conception of logic.[6]

[5]One might also group Shapiro's and Cook's "logic as modeling" view under the epistemic conception of logic. That depends on how much of what we want to model in logic is epistemic in nature.

[6]For a discussion of the contrast between these conceptions see (Ripley, 2017a).

3.1.1 Bilateralism

Bilateralists like Ripley (2017a; 2015) and Restall (2005) maintain that logical consequence is the relation that holds between two sets of sentences iff it is incoherent—or, as they put it, "out of bounds"—to assert everything in the first set and deny everything in the second set, and this holds in virtue of the meaning of the logical vocabulary that occurs in these sentences.[7] Bilateralists typically think that this incoherence is explained by the norms that govern our discursive practices.

> What it is for a bunch of premises to entail a bunch of conclusions is that if you assert the premises and deny the conclusions, then you're out of bounds. [...]. The role this is playing is as a constraint on what kinds of things people can get away with in the conversational positions that they adopt. For example, [...] reflexivity [of consequence] is the claim that asserting and denying the same thing is out of bounds. [...] Not that you can't do it; go ahead. But what you've done clashes in some way. It's to be ruled out by some coherence-based norms on assertion and denial. (Ripley, 2015, 28)

A bilateralist abductivist should think that the data a logical theory needs to explain are facts about which collections of assertions and denials are out of bounds. These data are a matter of the coherence constraints governing our discourse, or what "people can get away with." Bilateralists will think that we have some pre-theoretic knowledge of cases in which this constraint is, or is not, violated. These are the data that we can use in abduction.

3.1.2 Traditional Inferentialism

According to what I call "traditional inferentialism," a conclusion follows logically from a set of premises if and because there is a chain of steps leading from the premises to the conclusion such that, for each step, the input is direct evidence for the output, and that is so in virtue of the

[7] The kind of incoherence in question is the incoherence we can find even among mere suppositions (so Moorean-Paradox-style incoherence does not count) (see Ripley, 2017b).

meaning of the logical vocabulary that occurs in the step. Prawitz is a chief proponent of such a view.

The meaning of a logical constant is determined, according to Prawitz, by what is evidence for a sentence in which the constant occurs, where evidence is understood as "the ground on which we assert sentences" (Prawitz, 2009, 681). Among the things that are evidence for a sentence in which a given logical constant is principal, some are basic and explanatory of the meaning of that constant (Prawitz, 2009, 682).[8] A logically valid chain of inferential steps is one in which each step can be justified by these basic and explanatory facts about the meaning of the logical constants.

If a traditional inferentialist accepts abductivism, she should hold that the data a logical theory ought to explain are facts about what constitutes direct evidence for logically complex sentences. Thus, the data will be facts about what compels us to accept the kind of sentence in question in a basic way, such that no further justification is needed or, indeed, possible.

In general, different meta-semantic theories give rise to different versions of the semantic conception of logic. Once we fix the meta-semantics, the relevant data are quite clear. They are data that are (taken to be) relevant to what logical expressions mean according to the given meta-semantic theory.

3.2 The Epistemic Conception of Logic

The conception of logic with perhaps the most impressive pedigree views logic as an investigation of how we should think and argue. Aristotle, e.g., presents his logic in the two *Analytics* as a tool (*organon*) for gaining knowledge. Kant disagrees and holds that logic is merely a minimal standard for the correctness of thoughts (a *canon*).

> In logic we want to know [...] how the understanding ought to proceed in thought. Logic ought to teach us the correct use of the

[8] To rule out tonkish connectives, we could insist on a harmony condition for the meaning-constituting rules. I ignore the endless discussions to which they give rise.

> understanding, i.e., the use that is in agreement with itself. (Kant, AA IX, 14, my translation)

A different but related view is advocated today by Priest, who holds that logical theories are theories about which pieces of reasoning, in natural language, are good or correct.

> [L]ogic [...] is supposed to provide an account of correct reasoning. When seen in this light the full force of these absurdities [e.g. that arbitrary premises entail any logical truth, according to classical logic] can be appreciated. Anyone who actually reasoned from an arbitrary premise to, e.g., the infinity of prime numbers, would not last long in an undergraduate mathematics course. (Priest, 1979b, 279)

The idea is that, *ceteris paribus*, A is a consequence of Γ if and because it is correct to reason from the members of Γ to A. We can focus on *logical* consequence by quantifying over possible substitutions or reinterpretations of non-logical vocabulary in familiar ways.

If an advocate of the epistemic conception of logic adopts abductivism, she will take the relevant data to be facts about correct thought or reasoning, or intuitions about these facts. Priest is helpfully explicit on this point:

> 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, 2016, 41)

There are also social or dialogical versions of the epistemic conception of logic (Dutilh Novaes, 2016; Marion, 2009). According to such conceptions, logic provides rules or standards for (certain) argumentative exchanges.

In general, an abductivist advocate of the epistemic conception of logic should hold that we have some pre-theoretic access to the correctness or incorrectness of some pieces of reasoning or thoughts or arguing, which

provides some relevant data. This access may be spelled out in terms of intuitions or in some other way.[9]

We can highlight the contrast to bilateralism by noting that an advocate of the epistemic conception of logic and a bilateralist could agree that (a) it is not good reasoning to infer, say, "Either I have a sister or I don't" from "It is raining" and (b) it is always out of bounds to deny that I either have a sister or I don't. For the advocate of the epistemic conception, (a) is a data point that speaks against any logic that deems "Either I have a sister or I don't" a logical consequence of "It is raining" and (b) doesn't count as immediately relevant. For bilateralists, by contrast, (b) speaks in favor of a logic that deems "Either I have a sister or I don't" a logical consequence of arbitrary premise sets, and (a) doesn't count as relevant.

3.3 The *ancilla scientiae* Conception of Logic

According to what I call the "*ancilla scientiae* conception," the primary role of logic is to reflect on or use non-logical theories. Logic is a tool for investigating and evaluating theories or theorizing. We can distinguish two prominent versions.

3.3.1 Codification of Mathematical Practice

Burgess (1992, 9) holds that "[c]lassical logic is to be conceived of as having mathematical proof as its object of investigation." In general, logic is a theory of the norms implicit in the practice of mathematicians, especially in the practice of evaluating proofs.

> Logic, according to almost any conception, is a theory dealing with standards of evaluation of deduction, much as linguistics deals with standards of evaluation of utterances. (Burgess, 1992, 12)

[9] All three conceptions discussed so far presuppose that logical consequence is normative. It is essentially normative for bilateralists, and it is at least derivatively normative for advocates of the epistemic conception of logic. This is one more respect in which conceptions of logic are not independent of foundational disputes in philosophical logic.

According to this conception of logic, the data that logical theories ought to explain are particular evaluations of deductions by professional mathematicians.

> The data for descriptive theorizing consist of evaluations of members of the community whose evaluative practices are under investigation [...]. These evaluations are of particular examples, not general rules. (Burgess, 1992, 12-13)

On this view, a logical theory provides a descriptive theory of the norms that govern the practice of evaluating deductions in mathematics.

Burgess's data differ markedly from the data of bilateralists, traditional inferentialists, and advocates of the epistemic conception of logic. They are evaluations of the activities of a very small group of academics. These data have no immediate connection to meanings, natural language, or non-mathematical knowledge or reasoning.

3.3.2 Logical Consequence as the Most General Closure Operator

According to the second version of the *ancilla scientiae* conception, logical consequence is the most general closure operator, and its primary purpose is to move from a finite set of propositions to a complete theory. Beall writes:

> The role of logic, on the picture I advocate, is to serve as the (unique) non-empty foundational closure operator for all of our true theories. [... W]e require a theory that reflects all of the true consequences of the theory's claims. And this is the job for a closure relation: a relation that 'completes' the set of truths by adding all sentences that are consequences of the theory according to the relation. (Beall, 2017, 3-5)

The idea is that when we espouse theories, we are not interested in the finite set of propositions with which a theory is stated, but rather all things that are true according to the theory. Why? Tennant suggests that this is because the closure tells us how we can falsify the theory.

> [W]hat are the exact uses that we need to be able to make of [logic]? [...] Two areas of inquiry immediately come to mind. In mathematics, we should be able to derive all consequences of our axiom systems [...]; and in the natural sciences, we should be able to derive all the empirical predictions that would follow from our scientific hypotheses [...]. In both these cases, we [...] are concerned to be able to deduce from [our assumptions] all logically falsifiable conclusions that follow from them. (Tennant, 2005, 699-700)

According to this view, logic doesn't provide explanations but 'complete' theories. However, an abductivist advocate of this view might say that logic explains why showing something false is a falsification of a theory. Such an abductivist should hold that the data logical theories ought to explain are known facts about what falsifies (or does not falsify) a set of assumptions. Hence, the data will be successful and unsuccessful falsification attempts in the history of science and mathematics.

To illustrate, an advocate of the *ancilla scientiae* conception of logic may agree with an advocate of the epistemic conception that it is not good reasoning to infer an arbitrary conclusion from a contradiction. But she may not regard this as data that speaks in favor of a paraconsistent logic. She may point instead to data that suggests that a contradictory theory is falsified by anything (pace Beall's and Tennant's views).

3.4 The Metaphysical Conception of Logic

According to the metaphysical conception of logic, the topics of logic are worldly facts or their relations and structure. On this view, logic is not especially concerned with meaning, reasoning, language, knowledge, mathematical proofs, or the like. We can distinguish two prominent versions.

3.4.1 Logic as the Theory of the Most General Facts

According to one interpretation, Frege held that "the logical laws are maximally general truths, substantive generalizations that are 'about reality' in the same fashion that the laws of geometry, physics and chemistry are"

(Ricketts, 1996, 123). Today, Williamson holds a similar view. He thinks that the usual meta-linguistic understanding of logical consequence and logical truth is misleading (Williamson, 2017, 329). We can bring this out by replacing the usual meta-linguistic quantification over models with quantification in an extension of the object language.

> Let L^+ be the result of adding to [the language] L both the new variables v^e [i.e. variables for each type of nonlogical terms] and universal quantifiers for all the corresponding types. A universal quantifier for a given type is interpreted as ranging unrestrictedly over all members of that type. For any sentence α of L, let $UG(\alpha)$ be the result of prefixing α^v [i.e. the result of replacing each nonlogical term in α with an appropriate variable] with a sequence of universal quantifiers for the relevant types on all its free variables (in some fixed order). (Williamson, 2017, 329)

These quantifiers are intended to have the same effect as the usual quantification over models (and variable assignments). Instead of talking about schemata in a meta-language, we can now use their universal closures in our extended object-language.

> Thus any sentence α of L is logically true ($\vDash \alpha$) if and only if $UG(\alpha)$ is (simply) true. But $UG(\alpha)$ is simply a nonmetalinguistic generalization (unless α itself contains a metalinguistic logical constant, such as a truth predicate) [...]. (Williamson, 2017, 329)

According to this conception, logical truths are not different in kind from the truths of other sciences. They are just more general.

The data for abductivism are the known facts that are relevant to the truth of universally generalized sentences that don't contain any nonlogical terms.

> We may use anything we know as evidence. For example, [...] we may know that the coin could have come up heads, and could have not come up heads, but could not have both come up heads and not done so, and on that basis eliminate this proposed law: $(\Diamond p \& \Diamond q) \rightarrow \Diamond(p \& q)$. By contrast, this law identifies a useful pattern in the modal data: $(\Diamond p \vee \Diamond q) \leftrightarrow \Diamond(p \vee q)$. In that sense, we can

> verify some predictions of the law by using our pre-theoretic ability to evaluate particular modal claims. (Williamson, 2017, 335-336)

Notice that an advocate of this version of the metaphysical conception of logic could agree, e.g., with an inferentialist (motivated by considerations of harmony) that double negation elimination cannot be justified by considerations about what warrants assertions of logically complex sentences in a basic way. But she may doubt that facts about what warrants such assertions are relevant data. She will hold that the relevant datum is rather that there is no known counterexample to $\forall p\,(\neg\neg p \rightarrow p)$.

3.4.2 Logic as the Science of What Preserves Truth

According to a final conception, logic is the study of what preserves truth (in virtue of logical form).[10] The idea is that logic is about how truths, i.e. worldly facts, pattern with respect to what is expressed by logical vocabulary. Russell, e.g., writes:

> On my positive view, logic is the study of patterns of truth-preservation on truth-bearers. [...] Logic studies the way the property of truth is preserved over arguments. [... A statement that asserts an entailment] makes a claim about truth-preservation over changes in sentences (or sentential schemata), and rules out any situations where the premise-sentences are all true without the conclusion sentence being true. (Russell, 2017, 12)

Thus, logic studies certain patterns of truths expressible by sentences of given logical forms. Truths, e.g., that can be expressed in sentences of the form $\alpha\&\beta$ occur only together with the truths of the corresponding α and β. This view is opposed, e.g., to the idea behind relevance logic that necessary truth-preservation (in virtue of logical form) is necessary but not sufficient for consequence (Hjortland, 2019).

[10] Field attributes such a view to Harman and writes: "One might not need to connect logic to rationality if one could view logic as the science of what preserves truth by a certain kind of necessity (or by necessity plus logical form)" (Field, 2009b, 251). Field argues that any solution to the Curry paradox must abandon that view. However, this is controversial (Shapiro and Murzi, 2015).

Accordingly, the data for abduction in logic are primarily counterexamples, i.e., known facts like: the truth-bearers in Γ are all true and have such-and-such a logical form and the truth-bearer A is false. Conversely, the absence of counterexamples may be taken to speak, *pro tanto*, in favor of a logic that posits a corresponding pattern.

3.5 Upshot

I sketched four conceptions of logic. Each comes with a different view about what the relevant data for abduction in logic are. Sometimes even variants of the same conception disagree on which data are relevant. Hence, if the result of applying abduction to logical theory choice will depend on which data is considered relevant, then it will—at least sometimes and in part—depend on the conception of logic with which we start.

An opponent may point out that the different data recognized by different conceptions often support the same claims about what follows from what. It is, e.g., plausible that no matter which conception of logic we adopt, a theory that denies that conjunctions logically entail their conjuncts will fail to be adequate to the data. Unfortunately, this won't help. For, according to most logics, conjunctions entail their conjuncts. To apply abduction to arbitrate a dispute, it is not enough that both parties agree that the data support most claims of any theory. They must agree on the data (or what it supports) that make a difference to the dispute at hand. Data that are uncontroversial and easily accommodated by all theories don't make any such difference.

4 Logical Disputes

In the previous section, I have argued that if advocates of different conceptions of logic subscribe to abductivism, they will have different views regarding what data logical theories ought to explain. In this section,

I will argue that this undermines a central motivation for abductivism, namely the neutral arbitration of logical disputes.

4.1 Disputes and Conceptions

Let's look at three disputes in logic and see how we could apply abductivism to them. In each case, I will argue that abduction is unlikely to move the debate forward. My point is intended to apply beyond the three examples below. In some cases, we may be able to evade the difficulties I discuss. But my examples show that abductivism can and will sometimes fail to arbitrate disputes in a neutral way.

I don't aim to show directly that different conceptions of logic yield different results of abductive comparisons, given the same facts as inputs. That isn't feasible because of the holistic and non-algorithmic nature of abduction. My goal is to show that different conceptions recognize data that pull in opposite directions. It would be surprising if this didn't have a systematic influence on overall abductive comparisons of logics. Hence, showing that different conceptions recognize data that pull in different directions suffices for my purposes.

4.1.1 Paraconsistency

One foundational dispute in logic is whether we should accept a logic that underwrites explosion, i.e. the classically valid principle that everything follows from a contradiction. Rejecting this principle has been advocated, e.g., as a response to the semantic paradoxes (Priest, 1979a). If abductivism could move this debate forward, that would count in its favor. We could, e.g., compare a paraconsistent logic like LP with classical logic and ask which logic explains the relevant data better. Unfortunately, the result of that comparison is itself controversial. Priest (2006, sec. 7.5) has argued on abductivist grounds for a paraconsistent logic, while Williamson (2017) holds that abductivism supports classical logic.

There are two distinct but related issues here. First, there is the question of whether deductive strength is a theoretical virtue in logical

theories, holding fixed adequacy to the data.[11] Williamson thinks it is; others disagree (Russell, 2019; Hjortland, 2019). Second, there is the question what the relevant data are. Both issues arise from different conceptions of logic.

Let's start with deductive strength. According to Williamson's metaphysical conception of logic, logical truths are simply truths that are of maximal generality. Now, LP and classical logic agree in their theorems and, hence, on what they deem logical truths. Nevertheless, Williamson (2017) holds that classical logic is preferable on abductive grounds. He thinks that restricting classical logic, e.g. by rejecting explosion, reduces the explanatory power of many non-logical, scientific principles by undermining the derivation of classical consequences from those principles. In particular, it undermines the use of classical mathematics in science. In general, a deductively stronger logic will allow us to derive more consequences from non-logical principles and, hence, increase the explanatory power of our non-logical theories. Since explanatory power is a theoretical virtue, this gives us reason, *ceteris paribus*, to prefer deductively stronger to weaker logics.[12] Williamson writes:

> [C]lassical logic has a head start on its rivals, none of which can match its combination of simplicity and strength. [...] In many cases, it is unclear what abductive gains are supposed to compensate us for the loss of strength involved in the proposed restriction of classical logic. (Williamson, 2017, 337-338)

Williamson thinks that classical recapture results for non-classical logics do not allow us to recover the explanatory power of non-logical theories because they require that we use additional auxiliary assumptions in our derivations, and those auxiliary assumptions will be *ad hoc*. By contrast, making adjustments to the naive truth-predicate to avoid paradoxes does

[11] A logic $\mathfrak{L}_1$ is deductively stronger than a logic $\mathfrak{L}_2$ just in case if $\Gamma \models_{\mathfrak{L}_2} A$, then $\Gamma \models_{\mathfrak{L}_1} A$ but not vice versa, i.e., from some Δ and B, we have $\Delta \models_{\mathfrak{L}_1} B$ but not $\Delta \models_{\mathfrak{L}_2} B$.

[12] Some non-classical logicians agree that restricting classical logic is a *pro tanto* theoretical cost. Rosenblatt (2020, 31), e.g., writes that the following methodological requirement fits nicely with anti-exceptionalism: "when choosing among rival logical theories, the theory that should be favored—other things being equal—is the one that drifts away the least from classical logic."

not have such widespread detrimental effects. Thus, the best solution to the paradoxes is to revise the naive truth-predicate rather than reject explosion.

Williamson's framing of the issue is reflected in which data he deems relevant in an abductive comparison between LP and classical logic, namely data that speak to the usefulness of classical mathematics (and classical entailments more generally) in non-logical theories. Facts about good reasoning do not count as data.

Priest (2006, 207), by contrast, holds that logical theories aim to give an account of "the structure of norms that govern valid/good reasoning." In particular, Priest rejects explosion on the grounds that logic is supposed to provide an account of correct reasoning, and it is not good reasoning to argue from a contradiction to an arbitrary conclusion (Priest, 1979b, 279).[13] According to Priest's epistemic conception of logic, the fact that, intuitively, it is not good reasoning to reason from a contradiction to an arbitrary conclusion is a paradigmatic piece of data. Of course, as in science, data can be revised. Sometimes we must reject an observation because it is incompatible with our best theory. But prior to any such revision, our intuition that reasoning by explosion is not good reasoning counts as data for Priest.

In general, regarding deductive strength, advocates of an epistemic conception of logic like Priest should reject Williamson's idea that deductive strength is a virtue in logics. For it is not a virtue of an account of the norms governing reasoning that it deems many pieces of reasoning good. Priest should agree with Russell (2019, 556)[14] that getting the right level of deductive strength is a matter of "hitting a target: not too strong, not too weak."

Bilateralists should also agree with Russell on this because a logic should deem those positions incoherent that actually are incoherent: not too many, not too few. They should, however, agree with Williamson that

[13]Priest combines this with the claim that there are no convincing arguments that the reasoning that leads to contradictions using the liar sentence is bad. I ignore this here for simplicity.

[14]Russell endorses this view for other reasons.

the intuition (or fact) that reasoning in accordance with explosion is not good reasoning isn't relevant data. For bilateralists, the relevant data are facts that bear on whether every position that includes the assertion of a contradiction is out of bounds.

Different versions of the *ancilla scientiae* conception of logic yield different views about explosion and deductive strength in general. Some advocates of the *ancilla scientiae* conception may hold that logics must be strong enough to capture the syntax of the theories we want to study (e.g. by allowing the addition of arithmetic). They may hold that logic must allow us to establish meta-theoretic results that require formulating the syntax of the theories under investigation.[15] Another version of the *ancilla scientiae* conception yields the opposite result: that deductive strength—especially the strength that comes with explosion—is a theoretical vice. According to that version, the role of logic is to tell us what follows from theories of a maximally wide variety. From this perspective it is a limitation of "explosive" logics that we cannot fruitfully apply them to inconsistent theories. Routley (2019, 13), e.g., argues that deductive weakness is a theoretical virtue because it allows for "logical examinations of [...] inconsistent deductive theories." In a similar spirit, Beall (2018, 48) writes:

> But what by way of theories do we gain [by adopting the paraconsistent and paracomplete logic of first degree entailment]? The answer is clear: we gain the possibility of true glutty theories [i.e. inconsistent theories] and true (and prime) gappy theories. These possibilities mightn't be strikingly important in the face of normal phenomena with which natural science or even mathematics deals; however, they are strikingly important for the strange phenomena at the heart of other theories (e.g., paradoxes, weird metaphysical entities, more).

The idea is that logic shouldn't rule out potentially interesting theories; rather, it should be a useful tool in wielding as many potentially interesting theories as possible. Thus, weaker logics are *ceteris paribus* preferable

[15] If I understand him correctly, Jack Woods has defended a view in this ballpark in presentations.

to stronger logics. In particular, if there is any evidence that an inconsistent theory is worth studying, then this is data that counts against explosion.

The upshot is this: whether underwriting explosion increases or decreases or is irrelevant to a logic's adequacy to the data will depend on one's conception of logic. If we accept an epistemic conception of logic, there is a good chance that abduction will (to some extent) support a paraconsistent logic because explosion doesn't correspond to any good piece of reasoning.[16] If we accept a metaphysical conception of logic, abduction will most likely yield the verdict that, *ceteris paribus*, a logic that accepts explosion is more adequate to the data. Other conceptions, like bilateralism or some versions of the *ancilla scientiae* conception, will again take different data to be relevant. This means, firstly, we cannot apply abductivism in a dispute about explosion unless we first settle a deeper disagreement about which data are relevant. Secondly, a particular application of abductivism to explosion will not be perceived as neutral by Priest and Williamson because they advocate different conceptions of logic. Even if Priest and Williamson could agree on the relevant data, advocates of other conceptions would likely still disagree.

To sum up, how strong one judges the case for adopting a paraconsistent logic like LP to be depends on one's conception of logic and the relevant data that comes with it.

4.1.2 Transitivity

The nontransitive approach to semantic paradoxes recommends that we reject the structural rule of cut (Ripley, 2013; Cobreros et al., 2013). Thus, advocates of the nontransitive approach hold that it can happen that A entails B and that B entails C but that A does not entail C.[17] This allows us to add a transparent truth-predicate to our logic while also accepting all classical validities.

[16]For simplicity, I am ignoring the possibility that it may be good reasoning to infer an arbitrary conclusion from a contradiction in suppositional reasoning (Warren, 2020).

[17]My example focuses on a context-mixing version. Nontransitive theorists also reject context-sharing versions of cut.

We may hope to assess this proposal by applying abductivism. Does the nontransitive approach overall offer a better explanation of the relevant data than, say, a classical account with a Tarskian hierarchy of languages or a noncontractive theory? To a large extent, the answer will depend on whether a theory that rejects cut can be adequate to the data.

The rejection of cut can be defended elegantly on a bilateralist conception of logic. Given bilateralism, failures of cut are cases in which it is out of bounds to assert a sentence and also out of bounds to deny it. It is, e.g., out of bounds to deny the liar sentence, which I will call "λ." Hence, $\vdash \lambda$. Moreover, it is out of bounds to assert the liar sentence and it is, therefore, also out of bounds to assert the liar sentence while denying that the moon is made of cheese, which I label "μ." So, $\lambda \vdash \mu$. But it is not out of bounds to deny that the moon is made of cheese. So $\nvdash \mu$, and we have a failure of cut. On a bilateralist conception of logic, paradoxical sentences provide data-points that, *ceteris paribus*, lend support to a logic whose consequence relation is not transitive. Ripley makes the point thus:

> [C]ut says that if you've done some things that rule out your denying A, and you've done some other things that rule out your asserting A, then it's already too late. What you've already done doesn't fit together. [...] I don't see any particular reason why we should expect that. It certainly seems very straightforward, very coherent, to reject that kind of constraint, and say no, there are some sorts of things that the problem is with them. They can't be coherently asserted, and they can't be coherently denied, but that's not my fault. I'm perfectly well in bounds. It's the thing itself that's the source of the trouble with either asserting or denying it. (Ripley, 2015, 30)

Thus, the nontransitive theorist does not merely consider the rejection of cut a cost that is worth paying because of explanatory gains it makes possible elsewhere. Rather, she can and does argue that there is data that speaks directly against transitivity, namely sentences that can neither be coherently asserted nor denied. As long as the existence of such sentences is granted, this will count as the data most immediately relevant to cut.

Unfortunately, advocates of many conceptions of logic other than bilateralism will not recognize these data. If someone, e.g., conceives of logic as the science of what preserves truth in virtue of logical form, then she will not treat the above considerations as data. An advocate of such a metaphysical conception may agree that the liar sentence can be neither coherently asserted nor coherently denied, but she will deny that this speaks against transitivity. She may explain this fact, e.g., by holding that the liar sentence is neither true nor false or that it is otherwise defective in ways that make it unusable in discourse. None of this could speak against transitivity. For if the transitions from A to B and from B to C both preserve some designated truth-value, then it is hard to deny that the transition from A to C preserves that truth-value.

Turning to the metaphysical conception of logic as the science of maximally general truths, the plausibility of failures of transitivity will depend on whether our use-conditional behaves transitively, in particular on whether $\forall p, q, r\,(((p \to q) \& (q \to r)) \to (p \to r))$ is "simply true," as Williamson says. Any data that supports the truth of this sentence is *ipso facto* data that speaks against the nontransitive approach, according to Williamson's conception. Interestingly, advocates of the dominant nontransitive logic ST will hold that this sentence is indeed a theorem of logic. So they will agree with Williamson on the truth of the sentence, but they will disagree on whether this (known) truth is a data-point that speaks for a transitive logic. Conversely, Williamson will deny that (even known) facts about which patterns of assertions and denials are out of bounds constitute data in favor of failures of cut.

According to the *ancilla scientiae* conception of logic, it is again not clear that the bilateralist advocate of a nontransitive logic has identified genuine data. Firstly, mathematicians have never evaluated the proof of a theorem as incorrect because it first establishes some lemmas and then proves the theorem from those lemmas. Secondly, falsification plausibly obeys transitivity. If showing A false counts as falsifying B and showing B false counts as falsifying C, then showing A false counts as falsifying C. Perhaps the advocate of the *ancilla scientiae* conception of logic must

hold that, for paradoxical sentences, we can falsify both them and their negations, or she might hold that the paradoxes are irrelevant because these issues don't come up when we use logic to theorize about theories in other disciplines. In any event, she is within her rights to dismiss the alleged data of the bilateralist as at most indirectly relevant.

The upshot is that advocates of different conceptions of logic don't agree on which data could lend any support to the adoption of a nontransitive logic or whether there could be any such data. Thus, we cannot apply abductivism while staying neutral regarding the correct conception of logic. Moreover, our choice of a conception will have a crucial influence on the result of our abduction. Hence, abductivism cannot serve as a neutral arbiter in this dispute.

4.1.3 Pluralism

Logical pluralism is the claim that there is more than one correct (all-purpose) logic (Beall and Restall, 2006). As already intimated, some abductivists accept pluralism while others are monists. We may hence hope that abductivism could serve as a neutral arbiter in this debate. Unfortunately, this is not so. For, as I will now argue, we cannot apply abductivism to the dispute over pluralism without deciding which is the correct conception of logic.

Let's consider what pluralism amounts to on different conceptions of logic. According to the semantic conception of logic, logical consequence is determined by the meanings of the logical constants or their natural language analogues. Suppose there is more than one correct (all-purpose) logic. Then there must be more than one meaning for at least one of the logical constants or their natural language counterparts.[18] Thus, data that supports pluralism is data that supports the view that the logical

[18] I am here ignoring the possibility that one set of meanings for the logical constants gives rise to a plurality of consequence relations. As far as I can see, this option is not developed anywhere in the literature. Hence, it is difficult to say what would count as data on this view.

constants are ambiguous or, at least, polysemous.[19] Advocates of semantic conceptions of logic are, hence, more likely to accept meaning-variant versions of pluralism than meaning-invariant versions.[20]

Advocates of logic as the most general science can agree that a variation in meaning may give rise to some kind of pluralism. But it will be merely a plurality of languages and not a plurality of logics. They should consider meaning-invariant pluralism the only genuine kind of logical pluralism because logic concerns which propositions are true, independently of how they are expressed in sentences. According to this version of the metaphysical conception, pluralism amounts to the view that there are different, equally correct views about the most general truths. Thus, advocates of this conception must hold that pluralism about logic implies pluralism about truth.[21] Only data that supports truth-pluralism can support logical pluralism.

Logical pluralism looks again very different for advocates of an epistemic conception of logic. They can hold that there is more than one legitimate way to evaluate reasoning as correct or incorrect. Different correct logics can then be seen as capturing the norms that underwrite these different ways. Hence, any data that supports the claim that there are different equally legitimate ways to evaluate reasoning may count in favor of logical pluralism.

Something similar is true for the conception of logic as codifying the norms implicit in mathematical practices, in which logical pluralism amounts to the claim that there is more than one system of norms implicit in mathematicians' practice of evaluating one another's proofs. This could be, e.g., because there are different, equally legitimate ways of evaluating

[19] Here I am ignoring the Shapiro-Cook "logic as modeling" view (Shapiro, 2014; Cook, 2010). On that conception, there may be several equally good models of the meanings of the natural language analogues of logical constants.

[20] Advocates of a semantic conception could endorse a meaning-invariant pluralism if they locate the source of plurality in the structural rules; see (Dicher, 2016; Ferrari and Orlandelli, 2020).

[21] Notice that it won't do to claim that different logics capture different subsets of the most general truths and no logic captures all the most general truths. That would suggest that we should accept the union of the consequence relations of the "correct" logics as our logical theory.

proofs. Or it could be because how proofs are (or ought to be) evaluated depends on the mathematical theory under discussion (Kissel and Shapiro, 2017), or because these norms differ between groups of mathematicians. Any data that support such claims may count in favor of logical pluralism. And any data that support the view that there is just one set of norms implicit in mathematical practice will, *prima facie*, support monism.

There is some overlap in the data that support pluralism according to different conceptions of logic. For example, the existence of different and equally legitimate ways to evaluate mathematical proofs will count as data in favor of pluralism for advocates of certain versions of the epistemic conception of logic and for advocates of certain versions of the *ancilla scientiae* conception. By and large, however, the kind of data that support or speak against pluralism are very different according to different conceptions. Advocates of a metaphysical conception of logic are, e.g., within their rights to reject the idea that considerations about meaning or about practices of evaluating proofs or pieces of reasoning are relevant data in disputes about pluralism.

4.2 The Problem for Abductivism

I have given three examples of foundational disputes in logic. And I have argued that in order to apply abductivism to solve these disputes, we cannot stay neutral regarding the correct conception of logic. This is a problem for abductivism, for two reasons.

First, which logic someone advocates is not independent of which conception of logic she accepts. Those who accept a traditional inferentialist conception of logic, like Prawitz and Dummett, are likely to accept intuitionistic logic. Those who accept a metaphysical conception of logic are likely to accept classical logic. Those who accept an epistemic conception of logic are likely to accept a paraconsistent logic. As a result, which logic one advocates and which data one considers relevant are not independent of one another. Hence, it is predictable that attempts to

apply abduction in logical theory choice will continuously run up against disagreements about which data are relevant.

Second, even if one's conception of logic and the logic one advocates were largely independent of each other, the fact that we must presuppose a conception of logic to identify the relevant data still makes it implausible that abductivism can serve as a neutral arbiter. At most, it will yield results that vary with the conception of logic used to identify the data for the abduction. Such recommendations of logics relative to a particular conception may be helpful, but they will not allow us "to determine which is the correct logic to everyone's satisfaction" (Russell, 2019, 549).

5 Potential Worries

In this section, I will address four potential worries: First, an abductivist may claim that my notion of conceptions of logic is misguided; in logical disputes we all share a topic, we merely disagree about the facts regarding that topic. Second, an abductivist might hold that my distinction between logical theories and conceptions of logic is unwarranted. Third, an opponent might object that we can apply abductivism first to the choice of our conception of logic and, then, to the choice of a logic. Fourth, an opponent might object that the different conceptions of logic overlap to a large extent in the data they consider relevant. I will address these four worries in turn.

5.1 Logicians Don't Talk Past Each Other

It may seem that I claim that advocates of different conceptions of logic talk past one another, that we cannot settle disputes between them because they don't even share a topic. That is implausible. When logicians disagree about what follows from what, they are (often) engaged in genuine disagreements. Fortunately, I don't have to deny that logical disagreements are genuine disputes about a shared topic.

I claim that advocates of different conceptions of logic have different conceptions of the same thing, namely logical consequence.[22] In general, two people can have different conceptions of the same thing that vary enough to make them consider different data to be relevant in abductions regarding theories about that thing. The heliocentrist and the geocentrist, e.g., had different conceptions of the same thing, namely the heavenly bodies and their motion. But their conceptions differed so radically that they considered different data relevant. That meant they could not apply a simple abductive methodology. They had to engage in an additional dispute about the relevance of data from the sublunar domain. Similarly, logicians may disagree about which data are relevant but still have genuine disagreements about a shared topic.

5.2 No Conception-Theory Distinction

The second worry is that the distinction between conceptions and theories is misguided. It is, e.g., at best dubious to distinguish a conception of heliocentrism from the theory of heliocentrism. People like Galileo and Copernicus had a view about how the heavenly bodies move and are related to the earth. It is part and parcel of this view that certain data are relevant in related abductions. Similarly, one may hold that conceptions of logic and logics cannot be considered separately. When someone suggests a logic, this includes (perhaps implicitly) a conception of logic. The theories we ought to compare in our abductions are not just logics but logics together with particular conceptions of logic.

I have great sympathy for the view that there is no principled and clear distinction between logical theories and conceptions of logic. That, however, won't help abductivism. If we must always apply abduction to logics and conceptions as packages, then what are the relevant data? The data that are relevant according to the packages under consideration? That cannot be right. First of all, we compare different packages in our abduction, and these packages will deem different data relevant. And

[22] A similar point is familiar from Rawls, who distinguishes conceptions of justice from the concept of justice. Thanks to [redacted]

second, this policy will allow packages to be biased in such a way that what they deem relevant is systematically biased in their favor. Should we use the data deemed relevant by our currently accepted conception of logic? If the package we select in this way doesn't recognize the data that led to its selection, we may end up in an unstable position (Woods, 2019b,a). So, to sum up, while it may be correct that we shouldn't draw a sharp line between logical theories and conceptions of logic, it is unclear how this could lend any comfort to abductivists.

5.3 Abductive Choices of Conceptions

Another worry may be that I have not taken the full strength of abductivism into account, and that it is a methodology not only for choosing a logic, but also for choosing a conception of logic. Hence, an opponent might hold that we can address the issues I have raised by first applying abduction to conceptions of logic, and then applying it to logical theories.

My response is that I doubt we can use abduction to choose a conception of logic. This is clear if the data relevant in choosing a conception of logic are the same data relevant in choosing a logic. An opponent might hold, however, that the data are different. Perhaps the data relevant for choosing a conception of logic are facts or intuitions about what logicians do. Perhaps, e.g., every conception of logic must explain why logicians usually don't use empirical methods, what they see as major steps forward, etc.

I agree that a conception of logic should make sense of the most salient facts about the history of logic and how it is practised today. I doubt, however, that this desideratum gives us much guidance. The advocates of different conceptions of logic all claim, in effect, that their conception meets that desideratum. And it is far from obvious how we could rule out any of the conceptions sketched above on the grounds that they fail it. We could, of course, try to beef up this desideratum in substantive ways, e.g., by requiring that any conception must explain the role of logic in

classical mathematics. By doing that, however, the desideratum will no longer be neutral between conceptions.

Abduction may have an important role to play, but it cannot be a neutral arbiter between different conceptions of logic. Hence, the envisaged two-step abduction doesn't rescue the claim that abductivism can serve as a neutral arbiter in logical disputes.

5.4 Enough Overlap

Finally, let's turn to the objection that although different conceptions of logic disagree regarding the data that are relevant for abduction, there is enough overlap to use abduction in many logical disputes. If we could find some data that are acknowledged to be relevant by all parties, that may be enough to get some mileage out of abductivism.

We have already seen in the previous sections that many of the data considered central by some parties in foundational logical disputes are not considered relevant by parties with different conceptions of logic. Are some data recognized by everyone? The best candidate of such data are, I think, counterexamples, i.e., cases in which all sides agree that every sentence in a set Γ is (just, strictly) true and A is (just, strictly) false, and the logical forms of all the sentences are uncontroversial. Almost everyone agrees that such cases speak against any logic according to which A is a logical consequence of Γ. As far as I can see, there are no further uncontroversially relevant data in abductive choices of logical theories.

The problem is that there are virtually no (actually advocated) logical theories that are not adequate to these minimal data.[23] Since classical logic is Post-complete, there are no consequence relations that are closed under substitution and are proper supersets of the classical consequence relation. So if we ignore the rather small group of logics that are incomparable to classical logic in strength (such as connexive logics) and require that

[23]Nonmonotonic consequence relations are examples of consequence relations that may have true premises and a false conclusion. But that doesn't speak against such consequence relations unless it is also assumed that there is no intuitive defeater for the inference.

logical consequence be closed under substitution, the minimal data under consideration include a counterexample to a non-classical logic only if they also include a counterexample to classical logic. Since classicists deny that there are any clear counterexamples to classical logic, it is very unlikely that we can settle any interesting disputes in logic by an abduction from the minimal set of data provided by clear counterexamples. Thus, the data on which logical disputes turn, if we adopt abductivism, are the data whose relevance is controversial between different conceptions of logic.

6 Conclusion

I have argued that abductivism cannot serve as a neutral arbiter in many logical disputes. This is because in order to apply abduction, we must decide which data we consider relevant. And in order to do that, we must presuppose some conception of logic. This presupposition will consequently influence the result of our abduction. Hence, abduction cannot play the role of a neutral arbiter in typical logical disputes.

Where does that leave the issue of rational theory choice in logic? I am not sure. An abductivist might seek refuge in this and say: "Look, we are all sailors on Neurath's boat, in logic no less than anywhere else. So why not simply start with the conception of logic that we find most plausible and apply abduction against the background of that conception?" That may or may not be the correct way to approach theory choice in logic. Even if it is, it does not support the idea that abductivism can serve as a neutral arbiter in foundational logical disputes.

Acknowledgments

For invaluable comments, discussion, and conversations, I thank Bob Brandom, Rea Golan, Yao Fan, Shuhei Shimamura, Ryan Simonelli, Katharina Nieswandt, Viviane Fairbank, Mansooreh Kimiagari, Graham Priest, Ole Hjortland, Stewart Shapiro, Gil Sagi, Jack Woods, Tomas Albergo, Sophia Arbeiter, Patrick Chandler, and James Shaw, who allowed me to present this material to his graduate seminar. I also thank the audience at a workshop at the Hebrew University of Jerusalem, where I presented a very early

version of some of the ideas in this paper. Work on this paper was supported by the EXPRO grant No. 20-05180X of the Czech Science Foundation.

References

Barrio, E. A., Pailos, F., and Szmuc, D. (2019). A hierarchy of classical and paraconsistent logics. *Journal of Philosophical Logic*, pages 1–28.

Beall, J. (2017). There is no logical negation: True, false, both, and neither. *Australasian Journal of Logic*, 14(1).

Beall, J. (2018). The simple argument for subclassical logic. *Philosophical Issues*, 28(1):30–54.

Beall, J. C. and Restall, G. (2006). *Logical Pluralism*. Oxford University Press.

Blake-Turner, C. and Russell, G. (2019). Logical pluralism without the normativity. *Synthese*, pages 1–19.

Burgess, J. P. (1992). Proofs about proofs: A defense of classical logic. part i: The aims of classical logic. In Detlefsen, M., editor, *Proof, Logic, and Formalization*, pages 1–23. Routledge, London.

Cobreros, P., Egré, P., Ripley, D., and van Rooij, R. (2013). Reaching transparent truth. *Mind*, 122(488):841–866.

Cook, R. T. (2010). Let a thousand flowers bloom: A tour of logical pluralism. *Philosophy Compass*, 5(6):492–504.

Costa, N. D. and Arenhart, J. R. B. (2018). Full-blooded anti-exceptionalism about logic. *Australasian Journal of Logic*, 15(2):362–380.

Dicher, B. (2016). A proof-theoretic defence of meaning-invariant logical pluralism. *Mind*, 125(499):727–757.

Dutilh Novaes, C. (2016). Reductio ad absurdum from a dialogical perspective. *Philosophical Studies*, 173(10):2605–2628.

Etchemendy, J. (1990). *The Concept of Logical Consequence*. Harvard University Press, Cambridge, Mass.

Ferrari, F. and Orlandelli, E. (2020). Proof-theoretic pluralism. *Synthese*, online first:1–25.

Field, H. (2009a). Pluralism in logic. *The Review of Symbolic Logic*, 2:342–359.

Field, H. (2009b). What is the normative role of logic? *Aristotelian Society Supplementary Volume*, 83(1):251–268.

Field, H. (2015). What is logical validity? In Caret, C. and Hjortland, O., editors, *Foundations of Logical Consequence*, pages 33–70. Oxford University Press, Oxford.

Finn, S. (2019). The adoption problem and anti-exceptionalism about logic. *The Australasian Journal of Logic*, 16(7):231–249.

Heidarzadeh, T. (2008). *A History of Physical Theories of Comets, From Aristotle to Whipple*. Archimedes. Springer Netherlands, Berlin.

Hjortland, O. (2017). Anti-exceptionalism about logic. *Philosophical Studies*, 174(3):631–658.

Hjortland, O. T. (2019). What counts as evidence for a logical theory? *Australasian Journal of Logic*, 16(7):250–282.

Kant, I. (1900 ff.). *Gesammelte Schriften*. Bände I-XXII hg. v. d. Königlich Preussische Akademie der Wissenschaften, Berlin 1900ff., Band XXIII hg. v. d. Deutschen Akademie der Wissenschaften, Berlin 1956, ab Band XXIV hg. v. d. Akademie der Wissenschaften zu Göttingen, Berlin 1966ff.

Kissel, T. K. and Shapiro, S. (2017). Logical pluralism and normativity. *Inquiry: An Interdisciplinary Journal of Philosophy*, online first:1–22.

Kuhn, T. S. (1957). *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought*. A Harvard Paperback. Harvard University Press, Cambridge, Mass.

Marion, M. (2009). Why play logical games? In Majer, O., Pietarinen, A., and Tulenheimo, T., editors, *Games: Unifying Logic, Language, and Philosophy*, pages 3–26. Springer, Dordrecht.

Peregrin, J. and Svoboda, V. (2017). *Reflective Equilibrium and the Principles of Logical Analysis: Understanding the Laws of Logic*. Routledge.

Prawitz, D. (2009). Logical consequence from a constructivist view. In Shapiro, S., editor, *The Oxford Handbook of Philosophy of Mathematics and Logic*, pages 671–695. Oxford University Press, Oxford.

Priest, G. (1979a). The logic of paradox. *Journal of Philosophical Logic*, 8(1):219–241.

Priest, G. (1979b). Two dogmas of quineanism. *Philosophical Quarterly*, 29(117):289–301.

Priest, G. (2005). *Doubt Truth to Be a Liar*. Oxford University Press, Oxford.

Priest, G. (2006). *In Contradiction: A Study of the Transconsistent*. Oxford University Press, Oxford.

Priest, G. (2014). *Revising logic*, pages 211–223. Cambridge University Press.

Priest, G. (2016). Logical disputes and the a priori. *Principios: Revista de filosofia*, 23(40):29–57.

Quine, W. V. O. (1951). Two dogmas of empiricism. *Philosophical Review*, 60(1):20–43.

Quine, W. V. O. (1964). Two dogmas of empiricism. Harvard University Press. TY - CONF.

Read, S. (2019). Anti-exceptionalism about logic. *The Australasian Journal of Logic*, 16(7):298–318.

Restall, G. (2005). Multiple conclusions. In Hájek, P., Valdés-Villanueva, L., and Westerstaahl, D., editors, *Logic, Methodology and Philosophy of Science*. College Publications.

Ricketts, T. (1996). Logic and truth in frege. *Proceedings of the Aristotelian Society, Supplementary Volumes*, 70:121–140.

Ripley, D. (2013). Paradoxes and failures of Cut. *Australasian Journal of Philosophy*, 91(1):139–164.

Ripley, D. (2015). Anything goes. *Topoi*, 34(1):25–36.

Ripley, D. (2017a). Bilateralism, coherence, warrant. In Moltmann, F. and Textor, M., editors, *Act-Based Conceptions of Propositional Content*, pages 307–324. Oxford University Press, Oxford.

Ripley, D. (2017b). Uncut. unpublished manuscript.

Rosenblatt, L. (2020). Maximal non-trivial sets of instances of your least favorite logical principle. *Journal of Philosophy*, 117(1):30–54.

Routley, R. (2019). *Ultralogic as Universal? The Sylvan Jungle*, volume 4 of *Synthese Library: Studies in Epistemology, Logic, Methodology, and Philosophy of Science*. Springer, Cham.

Russell, G. (2017). Logic isn't normative. *Inquiry: An Interdisciplinary Journal of Philosophy*, pages 1–18.

Russell, G. (2019). Deviance and vice: Strength as a theoretical virtue in the epistemology of logic. *Philosophy and Phenomenological Research*, 99(3):548–563.

Shapiro, L. and Murzi, J. (2015). Validity and truth-preservation. In Achourioti, T., Fujimoto, K., Galinon, H., and Martínez-Fernández, J., editors, *Unifying the Philosophy of Truth*, pages 431–459. Springer, Dodrecht.

Shapiro, S. (2006). *Vagueness in Context*. Oxford University Press, Oxford.

Shapiro, S. (2007). Necessity, meaning, and rationality: The notion of logical consequence. In Jacquette, D., editor, *A Companion to Philosophical Logic*, chapter 14, pages 225–240. Wiley & Sons, Oxford.

Shapiro, S. (2014). *Varieties of Logic*. Oxford University Press, Oxford.

Tennant, N. (2005). Relevance in reasoning. In Shapiro, S., editor, *The Oxford Handbook of Philosophy of Mathematics and Logic*, pages 696–726. Oxford University Press, Oxford.

Warren, J. (2020). *Shadows of Syntax: Revitalizing Logical and Mathematical Conventionalism*. Oxford University Press, Oxford.

Williamson, T. (2017). Semantic paradoxes and abductive methodology. In Armour-Garb, B., editor, *Reflections on the Liar*, pages 325–346. Oxford University Press, Oxford.

Woods, J. (2019a). Against reflective equilibrium for logical theorizing. *The Australasian Journal of Logic*, 16(7):319–341.

Woods, J. (2019b). Logical partisanhood. *Philosophical Studies*, 176(5):1203–1224.

Wyatt, N. and Payette, G. (2018). How do logics explain? *Australasian Journal of Philosophy*, 96(1):157–167.