Anti-Exceptionalism About Logic

1 Aspects Relating to the Research Project

1.1 Background and Status of Knowledge

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 when they are revised, they are revised on the same grounds as scientific theories.

These are the tenets of anti-exceptionalism about logic. What makes them controversial is that they reject the received exceptionalist view: logic is *a priori*, and therefore set apart from the sciences. Although exceptionalism about logic is still orthodoxy, new objections have questioned its foundations (Williamson 2007; 2013b; 2015). If logic's privileged epistemological role in philosophy is to be rejected, however, we need an alternative anti-exceptionalist account. This project seeks to develop and defend precisely such an account of logic, as part of a wider anti-exceptionalist programme in philosophy.

The consequences of carrying out the anti-exceptionalist programme are wide-ranging. Many philosophical doctrines presuppose an exceptional status for logic, typically that logic is self-justifying and leads to *a priori* knowledge. Anti-exceptionalism undercuts these presuppositions, and forces us to reconsider broader debates. Furthermore, anti-exceptionalism is not an isolated philosophical position. It comes with substantial claims about the pscyhology of reasoning, and ultimately challenges the way we understand and teach logic.

1.1.1 Exceptionalism about logic

Anti-exceptionalism is a dramatic departure from the historical precedent. Logic's role as epistemologically foundational was part of the firmament of early modern philosophy, and was further entrenched in the first half of the 20th century. Philosophy of logic has been shaped, explicitly and implicitly, by exceptionalism about logic: the idea that logic enjoys a special and privileged position among the sciences. Its theories are unlike other scientific

theories, its methods distinctive, and the knowledge it yields unburdened by empirical matters. Frege (1884) founded the modern version of exceptionalism by bringing Kantian ideas to the development of formal logic (MacFarlane 2002, Linnebo 2003). Two central claims of exceptionalism are: (i) while the method of science is *a posteriori*, the method of logic is *a priori*; (ii) while science provides synthetic truths, logic provides analytic truths.

The claim that logic is *a priori* has been argued for in a number of ways, e.g. because of rational intuition (Gödel 1947, BonJour 1998), because logic is constitutive of thought (Frege 1893), or because analyticity entails aprioricity (Carnap 1937). A recent defence of exceptionalism comes out of an epistemological conception of analyticity. According to Peacocke (1992) and Boghossian (1997; 2003), a sentence is (epistemologically) analytic just in case everyone who fully grasps its meaning will assent to it. Applied to logic, this leads to a principle at the forefront of recent debates between exceptionalism and anti-exceptionalism:

- ANALYTICITY: Logical truths are epistemologically analytic.

A natural ally of this principle is the idea that the meaning of logical constants are constituted by their inferential rules (e.g. Gentzen 1934, Prawitz 1974; 1977, Dummett 1991, Boghossian 2003). We can formulate this as a second principle:

- STIPULATIONISM: Basic logical laws are valid because they are implicit definitions.

Together analyticity and stipulationism ensure that agents are warranted in inferring deductively, and ultimately are in a position to have basic logical knowledge. As a result, logical knowledge is *a priori*.

Since exceptionalism sets logic apart from other sciences, the method of logic is distinctive. The criteria for theory selection in logic differ from those of, say, theoretical physics. Given stipulationism and epistemological analyticity, arguments about theory selection in logic will be, in part, a matter of semantics. The most influential example is Arthur Prior's (1961) infamous connective tonk. Exceptionalists such as Dummett and Boghossian have argued that the reason we aren't justified in applying the inference rules of tonk, is that the rules fail to determine a coherent meaning for the connective. A standard proposal is that the inference rules of tonk fail to satisfy some antecedent constraint on implicit definitions, e.g. conservativeness, normalizability, or harmony.

Controversially, revisionists like Dummett, Prawitz, Tennant (1997), and Wright (2000) have suggested that classical negation is also 'semantically dysfunctional', and its rules therefore in need of revision. In general, then, the exceptionalists think that logic is in principle revisable, but that its revision is fundamentally different from revision of scientific theories. Dummett, Prawitz, and Wright have all called for classical logic to be replaced by intuitionistic logic, whereas Boghossian, Peacocke, and others share their exceptionalism but reject the argument against classical logic.

1.1.2 Anti-exceptionalism about logic

Williamson (2007) coins the term 'anti-exceptionalism' for a non-apriorist methodology in philosophy. Part of the philosophical exceptionalism he objects to is precisely the epistemological analyticity claim outlined above. From his example it is clear that anti-exceptionalism is also a methdological proposal for logical theories. The seminal influence on contemporary anti-exceptionalism is Quine (1951; 1986), who articulates three central anti-exceptionalist claims:

- NON-APRIORISM: Logic isn't apriori, nor are its truths analytic truths.

- GRADUALISM: Logical theories are continuous with scientific theories; logical method is continuous with scientific method.

- REVISIONISM: Logical theories are in principle revisable by the same standards as other scientific theories.

The case for quantum logic is an early example of anti-exceptionalism about logic (e.g. Putnam 1969; 1976). Although both Quine and Putnam ultimately rejected quantum logic, they entertained the possibility that quantum mechanics would require a revision of classical logic, in particular the law of distributivity. More generally, classical logic might have to be revised because of the demands of natural science, say, a theory of mechanics. As such, logic is no different from geometry, where Euclidean theories were supplanted by non-Euclidean geometry to accommodate Special Relativity.

If anti-exceptionalism is correct, logic and the sciences have a common methodology. This project aims to make excplicit the methodological gradualism by comparing theory choice in the sciences with theory choice in logic. The assumption is that the standard of theory choice in the sciences is abduction (cf. Harman 1965, McMullin 1992, Niiniluoto 1999, Psillos 1999; 2002, Douven 2002, Lipton 2003). Logic, therefore, must have abductive inference as a core methodological element.

- ABDUCTIVISM: Choice of logical theory is done on the basis of abductive arguments, i.e. inference to the best explanation.

Williamson (2013a; 2015) and Priest (2006; 2014) are two influential figures who have recently rejected exceptionalism about logic. Both endorse gradualism and abductivsm, and at least Williamson endorses non-apriorism. However, they disagree about what this entails for the choice of logic. Williamson sides with Quine and argues for retaining classical logic; Priest argues for a shift to nonclassical logic. That is, although they list the very same criteria for theory choice (e.g. fit with the evidence, explanatory strength, simplicity, unification), their abductive arguments take them to incompatible conclusions. The main reason their conclusions diverge is that neither give a detailed articulation and weighting of the

criteria. The difference in Priest and Williamson is symptomatic of a broader issue within anti-exceptionalism. The anti-exceptionalists have never developed detailed guidelines for theory choice in logic. Even if the criteria for selection of a logical theory are derivative on general criteria for scientific theories, logic—like any science—comes with discipline-specific considerations.

1.1.3 Key challenges for anti-exceptionalism

The rejection of exceptionalist claims (e.g. epistemological analyticity) does not by itself lead to an adequate anti-exceptionalist theory of logic. The project aims to meet four key challenges to anti-exceptionalism about logic.

First challenge: What are the abductive criteria for theory selection in logic? The sciences share a number of general criteria for theory selection, e.g., fit with the evidence, explanatory strength, simplicity, and unification (cf. van Fraassen 1980, Kitcher 1993, Thagard 1978, Forster & Sober 1994). These criteria are all content-sensitive. Their formulation and weighting will vary with the discipine in question. Logic is no different. Anti-exceptionalists need abductive criteria, but haven't provided a detailed articulation and weighting. Even worse, it remains an open question what counts as evidence for a logical theory, and indeed what a logical theory purports to explain.

Second challenge: Does the abductive strategy for theory selection in logic favour classical or nonclassical logic? Anti-exceptionalists agree on method but disagree on results. Abductive arguments have been used to reach incompatible conclusions about which logical theory is best supported (e.g. Priest 2014, Williamson 2015). In part, the divergent results are due to the underdeveloped state of the abductive criteria. Once the abductive critera have been made sufficiently clear, a further question is to what extent logical theories are underdetermined by the evidence. If abductivism leads to underdetermination, the anti-exceptionalist may have to settle for logical pluralism (Beall & Restall 2006, Hjortland 2012; 2014).

Third challenge: What are the psychological presuppositions of exceptionalism and anti-exceptionalism? Exceptionalists typically rely on the special nature of logical concepts and concept-acquisition. Anti-exceptionalists deny that there is a robust distinction between logical and non-logical concepts, or at least one that is epistemologically significant. These claims come with empirical presuppositions about the nature of cognitive modules. Experimental research in the psychology of reasoning might undercut the conceptual claims of the exceptionalism or anti-exceptionalism (cf. Johnson-Laird & Byrne 1991, Adler & Rips 2008). The connection between exceptionalism and pscyhology of reasoning is broached in Williamson (2007), but no systematic study has been performed on either side of the divide.

Fourth challenge: In what sense, if any, is logic normative? Some have argued that logic provides standards for how we ought to reason (cf. MacFarlane 2004, Field 2009; 2015).

Others maintain that logic as a science does not purport to give a normative theory of reasoning (Harman 1986; 2009). If logic is inherently normative, then it is different from other sciences. Is it possible for the anti-exceptionalist to account for the normativity of logic without surrendering the continuity between logic and the sciences?

1.2 Approaches, Hypotheses and Choice of Method

1.2.1 Hypotheses

The project's approach to the primary objective is based on the following:

- **Main hypothesis**: Knowledge of logic is obtained by a non-apriori, abductive method.

The main hypothesis will be tested by investigating four sub-hypotheses.

- Sub-hypothesis 1: There is an abductive method for theory selection in logic.

- Sub-hypothesis 2: The abductive method supports nonclassical logic.

- Sub-hypothesis 3: To the extent that there is a distinct cognitive module for deductive reasoning, it does not support the aprioricity of logic.

- Sub-hypothesis 4: The normativity of logic is compatible with anti-exceptionalism.

Sub-hypotheses 1, 3, and 4 directly support the main hypothesis, and they answer the first, third, and fourth challenge above, respectively. Sub-hypothesis 2, although strictly speaking orthogenal to the main hypothesis, is an answer to the second challenge. It also shows that abductivism, when properly articulated, supports revision of logic. In other words, anti-exceptionalism has dramatic consequences for choice of logic, one not anticipated by most of its supporters.

1.2.2 Method

The methods of the project are tailored to the respective sub-hypotheses. The method for testing sub-hypotheses 1 and 2 involves a systematic investigation of criteria for theory selection. Such criteria and their relative weighting are already discussed at length in the philosophy of science literature. The project will identify the content of these criteria when applied to logical theories. For example, what counts as evidence for a logical theory, and how does evidence corroborate a logical theory? What is the connection between deductive strength, expressive power, and explanatory power in logical theories? Which features of a logical theory are important for integration with other scientific theories (including mathematics)?

More generally, the criteria for theory selection in logic will depend on what formal properties the abductive method is selecting for. The method will therefore involve a substantial technical component, i.e. comparing formal properties of rival logics.

Sub-hypothesis 3 requires an interdisciplinary method. The hypothesis is an empirical claim, and is supported in experimental work in the psychology of reasoning. The project will identify specific and testable empirical presuppositions of exceptionalism and anti-exceptionalism. Ruth Byrne, Trinity College Dublin (TCD), will assist the project with expertise in the psychology of reasoning. The project will draw on the experimental data already available in the psychology literature, and suggest hypotheses for future testing.

Finally, for sub-hypothesis 4 we will formulate bridge principles between logics and epistemic norms for rational belief (both synchronic and diachronic). The projected result is that such bridge principles can account for the normativity of logic, but that the principles themselves are derived from general epistemic principles that apply to theory-formation in other sciences as well, e.g. the truth norm for belief, evidential probabilism (Wedgewood 2002, Steglich-Petersen 2006, Christensen 2004). In other words, the normativity of logic will turn out to derive from more general consideration about the normative import of scientific theories. The difference between logical and nonlogical theories is one of generality. This is a difference of degree, not of kind.

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