Wadcast 7 Transcript

Opening teaser:

Alex Paseau:

Well, I think there's a lot of progress in philosophy.

Owen Griffiths:

Logic applies to absolutely everything.

Wadcast intro tagline: You're listening to Wadcast, a podcast from Wadham College, University of Oxford, bringing you interviews, seminars and stories from our community.

Martin (Producer):

Is there only one true logic? Is that logic infinite? These are some of the questions we'll be exploring in this mind-bending episode of Wadcast. My name is Martin, I work in the communications team at Wadham. I talk to Alex Paseau, tutor in philosophy here and Owen Griffiths, associate lecturer at UCL. They have a new book out, One True Logic, and they're here to tell you all about it. Let's get deep. Roll episode 7.

Pause for intro music

Martin: Thank you to you both for making the time to talk. Thanks Alex. Thanks Owen for making the trip. To start the conversation, maybe you could just explain what your connexion to Wadham College is and to each other as well.

Alex: I'm Alex Paseau, I've been a Fellow and Philosophy tutor at Wadham since 2005. Owen and I first met when he attended a graduate seminar of mine back in 2011, I think it was.

Owen: Yeah, so my name is Owen Griffiths. I'm a lecturer in philosophy at UCL and also a fellow and Director of Studies at Churchill College, Cambridge. And yeah, I first met Alex at the graduate seminars as he says. We've got the same PhD Supervisor, Alex Oliver in Cambridge and he sort of put us in touch and encouraged me to go and attend his classes. And then I covered for Alex for a year in academic year 2014 to 15 when he was on leave. And that's when we started working together, really.

Alex: We wrote a paper, or a research article together, which was published in 2016 and then we gave a couple of graduate seminars here in Oxford back in 2017 and 2018. And then we thought that we had enough material on the basis of that to write a book, and we've followed that up with some other articles as well.

Martin: That's great, so speaking of the book you've mentioned that it's called one true logic. Now, lots of people might have ideas about what logic is. They might think that, you know, they're a very logical person. What could they possibly have to learn about this subject? But my understanding is that in your field, in philosophy, logic has a slightly more technical meaning. Could you just explain what logic is in your book and what you mean by it?

Alex: Of course. For philosophers, logic is often synonymous with the study of logical consequence or logical validity, and an argument is valid when its premises entail its conclusion in an especially strong way. Logical validity is validity in virtue of forms, and I'll give you an example. So when I teach introduction to logic to 1st year philosophers, I run the following argument past them. It's got two

premises. The first premise is that all horses are ungulates. The 2nd, that all ungulates are mammals. And the conclusion is that all horses are mammals. So the question is: Does it follow from the fact that all horses are ungulates and that all ungulates are mammals that all horses are mammals? And so I asked the students whether they think that this argument is valid and almost everyone thinks it is, recognises it as valid, 'cause it is valid. And then the second question that I asked the students is how many of them know what the word 'ungulates' means. And hardly anyone does, and I think that nicely illustrates the point that logic is a study of formal validity. We can recognise that argument to be valid in virtue of its form. It's got the form "all As are B", "all Bs are Cs," therefore "all As are Cs". So really logical validity is validity in virtue of form.

Martin:

That's great, thanks, just to make sure I'm tracking then... you're saying that logic is less about the particular content of sentences and more how they relate to each other or what follows from them.

Alex:

Exactly, it's not so much about sentences as about how sentences relate to one another and how some sentences can imply another in this especially strong way, which we call logical validity.

Martin:

Thank you for explaining. It can come across to people as maybe a dry subject, but you guys were obviously passionate enough about it to write a book on it. So where does your interest in logic stem from?

Owen: I think that the feature of logic that first interested me was really its generality. The thought is that logic applies to absolutely everything. You might be looking at arguments in law or in economics or in mathematics, and there are different ways that you could then assess those arguments. You might think that the sorts of premises that people are relying on are false, but of course that's going to rely on some knowledge of the subject matter. You know something about law or about economics if you want to assess those things. Whereas logic will always apply. It's a kind of dimension of looking at arguments that will apply to all arguments whatever the subject matter, so that's really why it's such an essential part of the philosophical toolkit, and I think that's the feature that made me interested in the subject.

Alex: Yeah, I completely agree with that actually. So I mean, logic really is a very ancient subject in Western philosophy. Dates back to Aristotle in the 4th century BC. Quite interestingly, it underwent a revolution in the late 19th century and then following that in the hands of people like Bertrand Russell, and Frege and Wittgenstein and others. It was applied to philosophy in a kind of new way and applying logic to philosophy allows you to make real progress in philosophy to really clarify what's at stake in philosophy, and to turn vague ideas into precise claims. So I mean logic by itself isn't going to solve any substantive philosophical questions. But by deploying it judiciously in many areas, it will go a long way towards doing so, to resolving questions, or at least making substantial progress in philosophy. So really in short for me, what fascinates me about logic is that you can apply it so fruitfully to philosophy.

Martin: That's great. Obviously you've now produced a book on this topic, one true logic. What are the main ideas that you're trying to convey through it?

Owen:

So it comes in three parts. The first part is defending logical monism. So the book's called 'One True Logic'. We think that there is one true logic rather than many different systems. I'm sure that that's something that we'll talk about a little bit more. The first part is defending that there is one true logic. Then that throws up the obvious question, but which one is it? So we go some of the way to answering that in the second part of the book, where we argue that the one true logic has a highly infinitary character. Again, I'm sure we'll say a bit more about what exactly that means. And then the third part is defending those first two claims against certain objections.

Martin: That's great. We'll certainly explore those ideas shortly. Before we do so, I do note that the book has a striking cover. Maybe one of you could describe it for our listeners and just comment a bit on how it came about?

Alex: The images is of a semi-draped, bearded, and very toned Moses holding the tablets of the law above his head and about to smash them. And so my partner came up with this image, it's from a 18th century engraving by an Italian artist, and the idea is that those who think there's more than one true logic are worshipping false idols. I hope it goes without saying, though, that the image is fairly tongue in cheek.

Martin: That's great, I'll leave a link to the image in the show notes so listeners can check it out, but let's get to the substance of the book itself. So you said that there are two main claims that you make in the book. 1st is that there's only one correct logic. This kind of mono logic system. Why would anyone think otherwise in the first place? Why are there people who think that there is more than one?

Owen: Well, when we first teach logic to our students, there are various controversial inferences and rules that we that we teach them about. So for example. One of the rules that they learn about in classical logic – that's the first logic that anyone learns – is bivalence. So this is the idea that any sentence is either true or false. That's built into the system and lots of students struggle with that to begin with. They think, "Well now, actually it looks like there's all sorts of claims that I might not want to say are either true or false." Maybe matters of taste like their opinions about a work of art, or whether food is tasty. More philosophically, substantive, maybe something about morality. So you might think that if you make some sort of moral claim, that's not the sort of thing that can be true or false, because there's no kind of moral fact in the world that would make it such. There are also other controversial kinds of principles built into logic as well. So for example, we teach students that contradictions imply absolutely anything. So a principle of classical logical is *ex falso quodlibet:* that if you've got a contradiction, then that explodes and proves absolutely anything. So from contradiction, anything follows. And again, that's something that students struggle to swallow to begin with. That strikes them as very weird.

And so all of these are ways that we might think logic has made controversial assumptions. There is a logic that drops that, so there are lots of non-classical logics. Logics that don't have *ex falso quodlibet,* that t don't assume bivalence and many, many others. So for all of the controversial assumptions built into classical logic, there is a non-classical logic without it. Hence it's a kind of proliferation of logics. And of course, some people are monists and think that there's one true logic, such as us, and you might think that's classical logic. Or you might think it's one of these other non-classical ones I've described. Or you might be a pluralist and say that actually all of these logics are correct, or at least many amongst them are correct. Then you can happily reason with one one day, one the next day and that's a perfectly coherent view.

Martin: Great, so if I'm tracking, you could think of a Logic as kind of like a system of rules, and some systems have different rules than others. Some people claim that lots of these systems are kind of true or correct, and other people like yourselves claim that only one of them is. Is that a reasonable summary?

Owen: Yeah, that's right.

Martin: So you have come out of the closet as monists, you think there's only one correct logic and you think that people who disagree - people who are pluralists who think that there's more than one are wrong? So why are they wrong? Why should we believe you and follow you into this monistic path?

Owen: Very roughly, we think that there's a tension in logical pluralism. It undermines itself somewhat. So I think the best way to illustrate this is by way of comparison with another sort of pluralism, which is about morality. So there are lots of versions of moral relativism in the literature, but generally the thought is that moral claims aren't ever true outright or absolutely. They're only ever true relative to some kind of societal standard or cultural standard or an individual standard, and moral claims are in that way relative. And there's a classic problem for that sort of view, which is that it looks like it undermines itself somewhat because it wants to say, well, moral claims are only ever true relative to some standard, but that very statement - the statement of moral relativism - is itself a moral claim. It looks as moral as anything. So then by its standard it itself should be only true relative to some standard. That's not what moral relativists want. They want the statement of their view to be kind of special to stand outside of the domain of the claims that it rules over, and that's a problem for them, so it it looks like they're kind of cheating. And we think that something similar is going on in the case of logical pluralism, because if you're a logical pluralist by analogy with the moral case, you're going to want to say something like: Arguments are never valid absolutely, they're only valid relative to a particular logic. But of course they want to argue for that view, they want to argue for the view that is logical pluralism, and they want that argument to be valid because typically we want our arguments to be valid if they're to be convincing. So then there's the question of, well, what's the logic there? They sort of want that argument to stand aside from the arguments that it's ranging over in the same way that the moral relativist does. And in the same way that there's that classic undermining quality of moral relativism, we think something similar is going on in the pluralist case.

Martin: OK, so they're kind of caught in their own web, breaking their own rules or breaking their own principles in a way by saying, you know, there isn't this one true correct logic, but in order to argue for that conclusion, they have to appeal to one that is true or exclusive. Is that roughly what you're saying?

Owen: That's the idea, yes.

Martin: OK, that's interesting, but this is Wadcast we're at Wadham College. We have a bit of a reputation for being progressive and inclusive, and some of what you're saying could be interpreted as being kind of the opposite of that. Maybe it's a bit exclusive and intolerant to say that there's only one correct logical system. So how would you respond to this? Do you have to be a a bad person to hold your views?

Alex: I would turn that question around. Logic isn't the same thing as reasoning, but a refusal or an inability to reason correctly can make you a bad person, and we see that today with people who, for example, claim on the basis of no good evidence that the last American presidential election was rigged. We've seen it in the past with Holocaust deniers, and we've seen it at a more theoretical

level with postmodern philosophers who've said some very fatuous and very dangerous things, for instance, that there's no such thing as truth or that reality is just a narrative that can be constructed as you see fit. Now don't get me wrong, the other philosophers who were arguing against who think that there's more than one true logic, they don't fall into one of those categories. As far as we know, they're nice people. But the broader point is that the sort of vague idea that you can have as many logics as you like or reason any which way you like is at least potentially morally dangerous. Not reasoning in the right way is much more likely to make you a bad person than reasoning in the right way is.

Owen: Well, I'm not at Wadham anymore, so.

Martin: Well, I am convinced. Thank you. Alright, well, let's say we accept your first claim that there is one true logic. You go on to try and identify what that logic might look like, and you claim that it is infinite in some particular way. We'll get on to what exactly you mean by that. Why would anyone think that logic is only finite in the first place?

Alex: Yes, so a logic is in many ways like an ordinary language. Philosophers like to call these natural languages, so languages such as English, Arabic, Spanish, Mandarin and so on. It's easiest to explain what it is for a logic to be finite by explaining what it is for a language to be finite. So a language contains some vocabulary and also some rules for how you string together that vocabulary, usually known as the grammar of the language. So an example of a grammatical rule for English is that if A&B are sentences then the conjunction “A and B” is a sentence. So “the cat sat on the mat” and “the horses in the field”. You can combine those to make a longer sentence. Same with the word “or”. If A&B are sentences, then the disjunction, “A or B” is a sentence. But people think, linguists and philosophers think, that natural languages, the languages that we speak, such as English, only have sentences of finite length. So, and that's the same for logic. Normal standard logics have sentences of finite length. So for a logic to be infinite, roughly, is to allow sentences that are infinitely long.

Martin: So if I am understanding, people would think that logic is only finite because there's maybe this parallel with a natural language, and we tend to think that natural languages only have finite sentences. So if you kind of accept that parallel and move from one to the other, you'll think that logic only has finite as well.

Alex: Yes, that's correct.

Martin: Great so, again, you think people who hold this belief that logic is finite are mistaken. So where have they gone wrong? And why should we believe that logic is infinite instead?

Alex: Take the following argument of English which has infinitely many premises. The first premise is that there's at least one planet, the 2nd, that there are at least two planets, the 3rd that there are at least three planets, and so on. And the conclusion is that there are infinitely many planets, and the conclusion follows from the premises. If there's at least one planet, at least two, at least three, at least four, and so on, for all finite numbers, then clearly there are infinitely many. And a standard logic cannot capture the validity of this argument. An infinite logic, however, can.

So a second type of consideration is based on superhumans. Imagine a superhuman who can utter an infinitely long sentence in finite time. So this infinitely long sentence is A1 and A2 and A3 and A4, etc. They say “A1” in one second, they take half a second to say “A2”, they take 1/4 of a second to say “A3”, and so on. So overall they take 2 seconds to utter an infinitely long sentence. The conclusion is also an infinitely long sentence: the infinitely long sentence “A1 and A3 and A5 and so

on". It drops all the even conjunctions, and that also takes a superhuman 2 seconds to utter in the same way, by speeding up.

What does this show? Well, super humans perform a logical inference that eliminates every other conjunct. This is known as conjunction elimination. But usually in standard logic we only encounter finite forms of conjunction elimination. So for example, we might infer from "A&B", we might infer the conclusion that "A" or infer the conclusion that "B". But here we're moving from a fine conjunct premise to a single sentence. Super humans, on the other hand, can eliminate infinitely many conjunctions. And now when we - if we think about super humans, there is nothing illogical about what they're doing. They're just doing what we can do in a finite setting, but they are able to perform an infinitary version of it. So the third experiment is supposed to convince you that their reasoning is perfectly logical. It just happens to be infinite.

Martin: Great, thank you. So there are a couple arguments there and roughly the first was there seems to be a kind of argument form that intuitively seems correct, but the logics that are only finite can't seem to capture why they are correct, and so we should bring in an infinite logic that can handle it. The second: we can imagine a scenario where someone reasons in a kind of infinite way, and it doesn't seem to be anything impossible about that, and so we should again reach for a logical system that can accommodate that.

Alex: Absolutely right.

Martin: We'll leave it to you, dear listener, to decide what you think. Is there only one true logic? Is that logic infinite? Have you found Alex is and Owen's arguments convincing? You can of course examine these arguments in much more detail and many more they provide in their book, One True Logic, which I'll link to in the show notes. I'll also link to you some articles I've written.

Now Alex Owen, while I have you, I'd love to ask you some more general questions about logic and philosophy. In some of what you've shared this episode, and also in our off-air conversation, you've spoken as if logic and philosophy have made progress over the centuries. That kind of goes against the impression of philosophy as being this field where no one ever gets any answers, no one ever makes any progress. People are just doing the same things they've been doing for 2000 years or more. Do you have a different view of how philosophy work?

Alex: I think there's a lot of progress in philosophy. There's if you like, two types of progress. There's conditional knowledge; we now know that if you believe certain things, you should believe other things. So that sort of knowledge is much easier to accrue than sort of unconditional knowledge, and that we certainly made a lot of progress in that way, but I think there's just more outright sort of unconditional knowledge that we now know that certain things are true, that we didn't know before, and logic is a case in point. Logic has made huge strides and underwent a revolution at the end of the 19th century, so certainly in logic we have a much more sophisticated understanding of validity than, say, the ancient Greeks had.

Owen: Logic's got this kind of interesting quality that there's formal logic or kind of mathematical logic. And then there's philosophical logic and formal mathematical logic can make progress in just the same way that any mathematics can. Theorems being proved, and theorems that have been proved, they're not up for grabs. Of course, the philosophical reflection on those things is, and we draw various philosophical lessons from it. But there's that part of logic, at least, that's making progress in a very straightforward way.

Martin: Interesting. Has the progress in logic spilled out and affected other fields at all?

Alex: There are plenty of examples of progress in logic spilling out and affecting other fields. As I mentioned earlier, logic is applied in all sorts of ways in philosophy. But there's an even more famous use of logic. Alan Turing was very influenced by modern logic when he came up with a mathematical model of computation in the 1930s. This is what is now known as a Turing machine. Now to what extent Turing's theoretical work on computability influence the development of computers is a delicate question. Obviously Turing didn't singlehandedly bring about the information age. But what's pretty clear is that in the hands of Turing and others, modern logic gave birth to computer science.

Martin: That's great. If you could plug a introductory logic course for students, why do you think they should take it?

Owen: Well, I think it comes down to that general character of logic. Again, really whatever kind of area of philosophy they're interested in, whether it's ethics or aesthetics or political philosophy, they're going to be coming across arguments. That's the the currency of philosophy. And if they're going to engage with those arguments properly, then they're going to need to ask questions like are these arguments valid? Should I believe these conclusions based on these premises? And that's why logic is such an essential part of the philosophical toolkit.

Alex: So there was an empirical study done which showed that professors of moral philosophy are not particularly moral. They're no more moral than other professors. But professors of logic, I think it's fair to say, are more logical and can reason better than many other professors. And so I think unlike the study of moral philosophy, for example, the study of logic can make you a better reasoner.

Martin: Shots fired. Great, thank you. As we draw to a close, maybe you could share one thing you like about Wadham.

Owen: Yes, I was only at Wadham for a year a few years ago now so I don't have the extensive knowledge that Alex has, but I found it an extremely friendly college, both amongst the fellowship and amongst the students. So even in the year I was here, I got to know the philosophical community in the college very well. For example, I'd only been at the college for a couple of weeks when some of the students having learned that I liked RuPaul's Drag race invited me along to their regular RuPaul's Drag Race watching party that happened. A very Wadham event so that was great. Towards the end of my year at Wadham, because at one point I'd mentioned Taylor Swift in one of my classes, they presented me with a Taylor Swift calendar, which Alex did not let me put up in our joint office. And so yeah, the students are the best thing.

Martin: I have to ask, what do you think about Taylor's new record, Midnights?

Owen: I think it's good, yeah, I've been enjoying it. I'm disappointed that I don't think we're going to get the the UK leg of the tour coming anytime soon. But yeah, enjoy the album.

Martin: Very good.

Alex: One thing, OK, well there's so many to choose from. OK, I suppose one of the things I like about Wadham is that we have a female co-founder - in many ways, our main founder - Dorothy Wadham. We commemorate her at the yearly Dorothy dinner and in many other ways as well. Very few Oxbridge Colleges can say the same given that we are a 17th century institution. You could say that diversity is written into our DNA.

Martin: Great so if people want to get in touch with you or engage further with your work, where should they go?

Alex: They should get in touch by e-mail. They can easily find my address online by looking at my departmental homepage on my college page. I'd be happy to hear from past or present Wadham philosophy students or any other listeners.

Owen: Yeah, and if anyone wants to get in touch with me. Best thing to do is look on my website at owengriffithsphilosophy.com and you'll find links to all my articles on there as well as contact details.

Martin: Thank you for listening. If you have any comments or feedback about Wadcast, we'd love to hear from you and continue improving the show. You can leave your feedback by heading to www.wadham.ox.ac.uk/wadcast Bye for now.