The Passions of Logic: Appreciating Analytic Philosophy

A CONVERSATION WITH

Scott Soames

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This eBook is based on a conversation between Scott Soames of University of Southern California (USC) and Howard Burton that took place on September 18, 2014. Chapters 4a, 5a, and 7a are not included in the video version.

Edited by Howard Burton

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Table of Contents

Biography

Scott Soames is Distinguished Professor of Philosophy and Director of the School of Philosophy at the University of Southern California (USC).

Following his BA from Stanford University (1968) and Ph.D. from M.I.T. (1976), Scott held professorships at Yale (1976-1980) and Princeton (1980-204), before moving to USC in 2004.

Scott's numerous awards and fellowships include USC's Albert S. Raubenheimer Award, a John Simon Guggenheim Memorial Foundation Fellowship, Princeton University's Class of 1936 Bicentennial Preceptorship and a National Endowment for the Humanities Research Fellowship. His visiting positions include University of Washington, City University of New York and the Catholic Pontifical University of Peru. He was elected to the American Academy of Arts and Sciences in 2010.

In addition to a wide array of peer-reviewed articles, Scott has authored or co-authored numerous books, including *Rethinking Language, Mind and Meaning (Carl G. Hempel Lecture Series)* (2015), *The Analytic*

Tradition in Philosophy, Volume 1, The Founding Giants: Frege, Moore, Russell (2014), *Analytic Philosophy in America, and Other Historical and Contemporary Essays* (2014), *New Thinking About Propositions* (2014, with Jeff Speaks and Jeff King), *Philosophy of Language (Princeton Foundations of Contemporary Philosophy)* (2009), *What is Meaning? (Soochow University Lectures in Philosophy)* (2010), *Philosophical Essays, Volume 1: Natural Language: What it Means and How We Use It* (2009) and *Philosophical Essays, Volume 2: The Philosophical Significance of Language* (2009), *Philosophical Analysis in the Twentieth Century, Volume 1: The Dawn of Analysis* (2003) and *Philosophical Analysis in the Twentieth Century, Volume 2: The Age of Meaning* (2003).

Howard spoke with Scott in USC's Hoose Library of Philosophy in Los Angeles, California in September, 2014.

The Utility of Philosophy

Back in 523 CE, Boethius, the highly erudite and once-mighty advisor to the Ostrogothic King Theodoric the Great, found himself the victim of trumped-up charges of treason by his political enemies, for which he was later tortured and executed. While awaiting trial, however, he took the opportunity to pen what would later become one of the most famous works of the Western literary canon: *The Consolation of Philosophy*.

Aside from detailed ruminations on standard philosophical subjects, such as free will, justice, morality and the existence of evil, Boethius spends considerable time both directly and indirectly addressing the merits of philosophy itself, a meditation made all the more poignant given his current circumstances and imminent fate.

Since personal wealth and political influence are all too transient, he notes coolly, there is little point in feeling sorry for oneself once they evaporate. But the one, true everlasting good is the proper cultivation of one's mind, which is naturally immune to any such external twists of fickle fortune.

This, according to Boethius and scores of his intellectual descendants cascading down throughout the centuries, is the immeasurable consolation that philosophy brings, and thus the principle motivation for turning one's attention to philosophical issues in the first place.

But Scott Soames, one of the world's foremost analytic philosophers and Distinguished Professor of Philosophy at the University of Southern California, looks at things slightly differently. Without diminishing the inherent moral and lifestyle benefits of his field, Scott is much more concerned with pointing out that philosophical thinking has been nothing less than instrumental to the creation of our modern world.

The story, he tells us, begins with the German logician Gottlob Frege in the latter part of the 19th century.

"*Frege took the notion of a function from mathematics, generalized it, and used that idea in logic. This led to a great deal of power, and it also led to a certain kind of general interest in functions. One of the things you can do is write a proof procedure, which can be re-expressed in terms of function-argument terminology. You can basically say that you have an effective, positive test for logical truth.*

"This led to this idea that there is a certain class of computable function, and that there are both computable and non-computable functions. This revolutionized our world. The greatest follower of Frege was Alonzo Church. He was an American mathematician at Princeton, and he was also a philosopher of mathematics. He studied a number of things, including computable functions.

"He had a student named Alan Turing, who developed a very intuitive, simple technique called a Turing machine. It wasn't really a machine. It's a mathematical framework that could compute any computable function in terms of a set of instructions on an imaginary machine, which has a finite number of states and is capable of making a distinction between zero and one.

"And that's where we get the digital age. Every computable function can be computed by a Turing machine. The key thing is that you have to make distinctions between what zero and one could be. It could be an electrical circuit being closed or an electrical circuit being open.

"So anything that you could use a Turing machine for, you could, in principle, compute, using a complex, electrical circuit. And this is the basis for computers, the Internet, and just about everything we use in our modern age."

Impressive though that might be, Scott tells us, the prospects for future philosophical impact are even more tantalizing. Scott's particular research focus is on the philosophy of language, where he sees direct applications and implications of his research ranging from linguistics to the courtroom. But, ever the analytical fellow, he also recognizes that these arguments apply even more generally still to our contemporary world.

"*Every science that breaks off from philosophy and makes enough progress so that it can become solid and non-controversial in a core domain always reaches a frontier. It's trying to advance, and it doesn't quite know how to conceptualize what to do. That is what philosophers do. That's our job: to go out to the edge of some domain that may be partially, but not completely, understood, and see what might come next, what we should be thinking about, what are the alternatives, what concepts we can employ*."

Never one to shy away from getting his philosophical hands dirty, Scott has enthusiastically plunged into the societal fray in his capacity as Director of USC's School of Philosophy.

"*We started a new joint program in Philosophy, Politics and Law about five or six years ago. This is very unusual; and yet, it shouldn't be. It is just one example of how philosophy can connect in meaningful ways to other disciplines, in ways that advance the interests and values of those disciplines themselves, but also the direct interests of undergraduates. It's become enormously popular at a time when humanities majors are dwindling everywhere.*

"I also believe that making connections to philosophy can be extended to other parts of the university. This is the kind of thing that philosophy should be built to do. A discipline that goes back to Aristotle, whose reach was in all aspects of intellectual life, should be continually striving to make these connections and to make contributions that are philosophically interesting, but also interesting to people who have a different take on things."

Not too long ago, most students found themselves faced with a depressingly unpalatable choice of either withdrawing to a monastic life of the mind or sacrificing personal growth to best impact the "real world".

That, today's philosophers tell us, is quite simply a false dichotomy. Yet another thing we owe them.

Howard Burton

The Conversation

Chapter 1

Analytic Sociology

Metaphysics, definitions, and the merits of looking back

Howard: I took some courses in philosophy when I was younger. And I remember this crude idea throughout the Anglosphere that they were the ones who do the analytic, logical, rigorous stuff, as opposed to those flaky continentals who talk about all this metaphysical stuff, who are old-fashioned and haven't fully appreciated the need for logical rigor.

I don't know how true this is as a reflection of the way professional philosophers act, but that was certainly what I was sensing at the time: that the proper way to do things was to roll up one's sleeves and be analytical and rigorous.

Scott: Well, metaphysics used to have a very bad odor at a certain stage of analytic philosophy, roughly up until 1950. Since then metaphysics has taken off.

I was a colleague of David Lewis[1] who was considered one of the leading metaphysicians of the last half of the 20th century. There are a number of people he influenced, and there are many others who are pursuing metaphysics. It's a burgeoning enterprise.

In my mind, there is no question about whether metaphysics is a legitimate philosophical subject in which we can make progress and come to understand some things. *What are the fundamental aspects of reality? What are the most fundamental parts of the universe as we know it? How far can you go in examining that question without simultaneously being a philosopher of physics?* There is certainly an important strain in contemporary analytic metaphysics that says, "You better be pretty well connected with the most basic empirical science of reality in order to try and make sense of it and fit it into what you think might be a larger picture."

That's not universally acknowledged, but it's very widely acknowledged.

Howard: Is that point of view growing in popularity?

Scott: Yes, it's definitely growing.

Howard: Because from a physicist's perspective there is often a sense of frustration with these sorts of things. Perhaps you're a cosmologist and you're trying to understand the origins of the universe – you're looking at very large scale, law-like regularities of the universe and how they evolved, say, and you go to a party and meet someone who pretends to be looking at fundamental questions about space and time, and you think, *Well, that's what **I'm** doing. That's **my** day job. What are **you** actually doing that's any different?*

Scott: My inclination is to favor the idea that philosophers have something to contribute, but only if they know the empirical science of the matter and can raise questions that the people doing the science can at least appreciate.

1 David Lewis (1941-2001), American philosopher.

They may not be able to entirely pursue those questions themselves. A certain amount of quantum mechanics, for example, is about generating the right set of usable predictions about stuff. And they're pretty good at that.

But to figure out what the foundations really are and how they relate to other things in physics – these things are still up in the air. You've got to get some of the scientists to think about those things, and you've got to get some of the philosophers to think about what the science is. You've got to put those two things together. And contemporary philosophy of physics, with an orientation towards metaphysics, has a role to play there.

Howard: So if analytic philosophers do metaphysics, how can they distinguish themselves from philosophers as a whole?

Scott: They don't.

Howard: Does that categorization have any meaning anymore?

Scott: No, it doesn't. There isn't some doctrinaire view (there were at earlier stages of analytic philosophy) about what philosophy *must be* which eliminated whole domains of previous thought. That's not true anymore.

Most analytic philosophers today think that those restrictive doctrines were themselves the product of doctrines that were flawed, and now they have a considerably more open and almost experimental approach.

The idea is that we're not separate from other intellectual disciplines. All we demand is that you pursue whatever you're pursuing with rigor, you articulate some criteria that can be, at least to *some* degree, tested – not to necessarily definitively determine who's correct, but at least provide evidence about who's correct – and that you can be well understood: you can formulate the theses and generate results, which can then be taken to other domains of intellectual life to see if they contribute anything.

Howard: That sounds very tolerant and open-minded.

Scott: That's what we are.

Howard: So I'm led to believe. But are there any members of your profession who still cling to the old divisions? Are there people who say, *I'm not one of those analytic guys. I'm this* or *I'm that*? Do those old divisions hold any meaning for people who define themselves in opposition to what analytic philosophers are or do?

Scott: That's a difficult question to answer. When I started my first job at Yale in 1976, the Yale department saw itself as divided between the analytic philosophers – who were in the minority – and the others, who called themselves the pluralists. What it meant to be a pluralist, was to be *anything but* an analytic philosopher. What it was, in their minds, to be an analytic philosopher was to subscribe to some contemporary version of Carnapian[2] logical positivism[3].

But by the time I started in 1976, there weren't any of those people around anymore. But there was still, at that time, a sense that there was some sort of divide, and that people couldn't talk across the divide.

In 1980, when I moved to Princeton, there wasn't that sort of feeling, though it's a heavily analytic department. Over the two and a half decades that I was there, there were some disputes about the role of the history of philosophy in the pursuit of contemporary philosophy. There were a few members of the department who said, "Look, PhD students in physics, chemistry and biology are not studying the scientists of 300, 200, 100 or, even 50 years ago, so why should we do that in philosophy?"

2 After Rudolf Carnap (1891-1970), influential German-born philosopher and key member of the Vienna Circle.

3 For more on logical positivism in general, see the references at the end of the chapter.

One particular professor said that he thought the rule ought to be that anything that's older than ten years in philosophy is the history of philosophy, and that the history of philosophy was not philosophy. We had some historians of philosophy, who were, for the most part, extremely good, disciplined historians who were also philosophically-minded.

There may still be some sense that we don't understand the relationship between contemporary, systematic philosophy and the history of philosophy very well. In my own field, in my own specialized area, the philosophy of language – I don't go back very far historically. I go back to Frege in 1879, 1884, and 1892. I go back to Bertrand Russell, early Russell, and a bit back to *Wittgenstein's Tractatus*, although I treat that, personally, more as a historical document than something that can contribute deeply to what's going on today.

But I believe we can find, not only a terrific story of how our contemporary projects got started, but also how ideas that Frege and Russell incompletely developed can be used to solve some of the problems we face today, thereby taking their original project much further.

Further References

Scott has written many comprehensive works on the history of analytic philosophy including *The Analytic Tradition in Philosophy, Volume 1, The Founding Giants: Frege, Moore, Russell* (2014), *Analytic Philosophy in America, and Other Historical and Contemporary Essays* (2014), *Philosophical Analysis in the Twentieth Century, Volume 1: The Dawn of Analysis* (2003) and *Philosophical Analysis in the Twentieth Century, Volume 2: The Age of Meaning* (2003).

For more on the work of David Lewis, see *David Lewis (Philosophy Now)* by Daniel Nolan, *A Companion to David Lewis*, edited by Barry

Lower and Jonathan Schaffer (2015), and the Stanford Encyclopedia of Philosophy entry on him by Brian Weatherson.

Additional background on the philosophy of Rudolf Carnap, can be found in, for example *The Philosophy of Rudolf Carnap (Library of Living Philosophers, Volume 11),* which includes selections of his writings, edited by Paul Arthur Schlipp (1963), *Carnap and the Vienna Circle* by Ramon Cirera (1994), and *Carnap Brought Home: The View from Jena*, edited by Steve Awoodey and Carsten Klein (2004).

Additional perspectives on the logical positivism movement, frequently called "logical empiricism", can be found in, for example, *Logical Positivism* by A.J. Ayer (1959), *The Cambridge Companion to Logical Empiricism*, edited by Alan Richardson and Thomas Uebel (2007), *Reconsidering Logical Positivism* by Michael Friedman (1999) and the Stanford Encyclopedia of Philosophy entry *Logical Empiricism*, by Richard Creath (2014).

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Chapter 2

Mathematical Underpinnings

Frege, arithmetic, and the perils of Kantianism

Howard: Let me ask you to back up and tell us a little bit about that story and some of these ideas that they developed, right up until aspects of your research and what some of the contemporary issues and problems are.

I imagine that there will be a lot of people reading this who might have at least a superficial understanding of some of these ideas. They might have heard of logical positivism or the Vienna Circle, they might have heard of Wittgenstein – everybody seems to have heard of him, but few people seem to have read him deeply – myself included, I have to admit.

Scott: He is rather hard to read.

Howard: He certainly was for me. At any rate, let's start at the beginning. What are we really talking about? There's logic, there are syllogisms. As you mentioned earlier, Aristotle talked about some of these ideas, just as he talked about ethics, and physics, and a wide range of other things.

People might have heard of the *Principia Mathematica* and Russell's attempts to rigorously ground all of mathematics. Some people may know nothing and some people may have some rough, perhaps even erroneous, notion of some of these ideas. Perhaps you can just sketch the history of some of these core ideas that led to your current work.

Scott: This is a large set of issues, a large topic, so let me begin by saying that, as I start going through this, if something's being left out that the reader might need to know about, just interrupt and get me to clarify.

The story of analytic philosophy, in my opinion, really starts in 1879 with a German philosopher named Gottlob Frege. We call him a philosopher, though he was actually in the mathematics department – he was trained in mathematics – and his interest in philosophy began as an interest in the philosophy of mathematics. What is the philosophy of mathematics? Well, he wanted to know what the basic, mathematical objects are and how the different aspects of the study of mathematics were connected to each other and to non-mathematics.

To put it very simply, he wanted to know, *What are numbers and what is the nature of mathematical knowledge?* He came up with answers to both of those questions, which proved to be very influential in the development of logic, in the development of mathematics, and in philosophy in general.

Let me just say, basically, what his answers to those questions were. *What are numbers?* Well, let's start with the number zero. Zero is the set of concepts that aren't true of anything. So, for example, the concept "not being identical with itself" is not true of anything; therefore, it's a member of the number zero.

The number one – let me give to an example of one of the concepts that is a member of the number one. The concept "being interviewed by you today in the Hoose Library of Philosophy at USC," is a concept that applies to me and only to me, and that makes it a member of the number one, which is the set of concepts of which the following is true: they're true of some *x* and only *x*.

The number two is the set of concepts true of some *x* and some *y*, where *x* is not identical with *y*, and true of nothing else. Notice that I haven't used one or two or anything like that in the definitions.

Howard: Well, you can't. You're defining those concepts.

Scott: Right. So now we get some sense of what these numbers might be. What is the successor of a number? We'd better have the no-

tion of a successor of a number. Well, if you have a number *n*, the successor of *n* is the set of concepts *f* that are true of at least one object *x*, such that the concept "being in *f*, but not identical with *x*" is a member of *n*.

What's that going to give you if you already have, say, the concept "two"? Then you've got to say, "What is the successor of two? There has to be some concept *f* and something that it's true of, such that, if you kick that thing out, you'll have two." So that will be the concept of three things, and so on. We can define all the numbers without using any numerical talk, which is essential. That's what we're doing.

Then what we do is define what a Natural number is. You might think, "Well, a Natural number, that's pretty simple. It's just a number that you can reach by starting at zero and applying successor finitely many times." But then you ask yourself, "What did I mean by 'finitely many times'? What is 'finitely many'? Well, that's some Natural number, *n*." So you can't do it that way, because if you do that you are including the very thing in the definition of what you're trying to define.

So what Frege ended up doing was saying something like this: "A Natural number is a member of the smallest set that contains zero and is closed under successor." That is, if you start with something in the set, and you apply successor, you're still in the set. Being the smallest just means that it's a member of every set of which those conditions hold.

Now we've got that. And now we can define multiplication in terms of repeated addition, addition in terms of repeated counting, counting in terms of successor, and so forth. Now we can build up all of arithmetic. And what did we build it up from? These definitions plus what? Just ordinary, logical reasoning.

So the idea is, if you can formalize logic and address the question, *What is ordinary, logical reasoning?* get a set of axioms, and add

these definitions, you end up with arithmetic, the theory of the Natural numbers.

Now, once you have arithmetic, you can define other parts of mathematics in terms of constructions on the arithmetic. It's the same model. You're always taking a higher theory, finding out what its basic, primitive vocabulary is, defining it in terms of the primitive vocabulary of the lower theory, using the axioms of the lower theory to prove the axioms of the higher theory; and now you've reduced the higher to the lower.

For Frege, the idea was to reduce all of mathematics to logic – except for geometry, he had a special thought about geometry…

Howard: What was that? What was the special thought about geometry?

Scott: Well, it's not something we brag about when we talk about Frege.

Howard: Sure. Because it's the part that doesn't fit, presumably.

Scott: Yes, well, there were already non-Euclidean geometries that were under consideration at that time…

Howard: Sure. You said 1879, right? Lobachevsky[4] had already done his thing, and Riemann[5] was certainly kicking around by then as well.

Scott: Yes. But Frege thought that those were purely abstract interests. What is geometry? Geometry is the study of space *as we experience it*.

Howard: So…a form of empirical space, then?

Scott: You would think so, yes. Then you would think, *If physics turned out to require a non-Euclidean geometry, then that would be the space he was talking about.*

4 Nikolai Lobachevsky (1792-1856), Russian mathematician. See chapter references for more details.

5 Georg Friedrich Berhard Riemann (1826-1866), German mathematician. See chapter references for more details.

Howard: Which it does, as it happens.

Scott: Right, but he didn't think that. He thought that space was a Kantian category: it was something that was contributed by our minds and our minds were built in such a way that the only way we could even *conceive* of space was determined by the category that our mind imposed on it, and that was Euclidean.

Howard: So he was a strict Kantian in that respect.

Scott: He was a strict Kantian in that respect, yes. And that's where he was lagging. But with those other aspects, he was pushing forwards.

Further References

For more general historical background, see Scott's books, *Rethinking Language, Mind and Meaning (Carl G. Hempel Lecture Series)* (2015), *The Analytic Tradition in Philosophy, Volume 1, The Founding Giants: Frege, Moore, Russell* (2014), *Analytic Philosophy in America, and Other Historical and Contemporary Essays* (2014) and references therein, along with *Frege* by Anthony Kenny (1995).

Accounts of the development of non-Euclidean geometry include *Non-Euclidean Geometry: A Critical and Historical Study of its Development* by Roberto Bonola (2010), *The Fifth Postulate: How Unraveling A Two Thousand Year Old Mystery Unraveled the Universe* by Jason Socrates Bardi (2008), *Euclidean and Non-Euclidean Geometries: Development and History* by Marvin J. Greenberg (2007), and *A History of Non-Euclidean Geometry* by Boris A. Rosenfeld (1976).

Chapter 3

What is Logic?

Variables, quantifiers and relations

Howard: So, we're looking at what the foundations of mathematics are. The notion seems to be that we can underpin or undergird mathematics with this logical structure. So logic, in and of itself, I guess you could say, is essential to, is the underpinning of mathematics.

Scott: Look: mathematics *is* logic in this view. Mathematical knowledge *is* logical knowledge.

There is a fundamental question here that we've just been taking for granted as if we understood what it meant: *What is logic?*

At the time that Frege invented this modern symbolic logic, the previous logic was mostly derived from Aristotle and a few other more recent people, but there was no system of logic in existence that was capable of formalizing all the reasoning in mathematics. So Frege had to invent this. And this invention turned out to be one of the great achievements of the last 150 years.

Howard: This is the stuff you analytic guys *do* brag about, as opposed to his misplaced Kantian, geometric ideas.

Scott: Yes, I'm afraid we do a little bragging about this.

Let me try to give you a very simple explanation.

With Aristotle, of course, we have the *syllogism*: All As are Bs; Socrates is an A; therefore, Socrates is a B. Some Bs are Cs; therefore, some As are Cs. Everything had to be fit into that syllogistic form. But a great many things are richer than that. There's an infinite number of valid inference forms. What you want is a language capable of expressing them, and rules that formulate when the inferences are valid.

Let's start with language. For example, think about names, like names of people, places, and things. And suppose we have predicates like "being a philosopher", relations like "being older than," "being taller than", "being north of", "being south of", and so on. We can have relations of any number of things: two-place relations, three-place relations, four-place relations, any number.

So what are the sentences? You just start with an *n*-place relation and *n* names, and then, if you want to make complex sentences – you've got a bunch of these simple ones that you've already made that we call *atomic sentences* – you can conjoin them with "and", "or", "not", "if then", and "if and only if".

Now you have the idea of a sentence. It could be one of the simple ones or one of the more compound ones. Take one or more names out and put in what we call *variables*. Variables are just free-standing, singular terms to which you can assign any object as referent – "*x*" is an example which we're all familiar with from normal algebra.

Now you want to say, "all *x*" or "some *x*" or "at least one *x*" or something like that, so you just put that in front of one of these formulas. Now, what does that say? It says, *This formula is true of all objects, some objects, at least one object* and so on. That's the core.

Howard: And that changes everything.

Scott: That changes everything. We can now express everything that we need to express in mathematics. We can formalize all the proofs. We can write rules telling us when the inferences are guaranteed to preserve truth. Frege did this.

Further References

Additional references include *Frege's Logic* by Danielle Macbeth (2005), *From Frege to Gödel: A Source Book in Mathematical Logic, 1879-1931*, edited by Jean van Heijenoort (1967), *Frege's Conception of Logic* by

Patricia A. Blanchette (2011), *The Rise of Modern Logic: from Leibniz to Frege, Volume 3*, edited by Dov M. Gabbay and John Woods (2004), and *From Mathematics in Logic to Logic in Mathematics: Boole and Frege* by Aliou Tall (2014).

Chapter 4
Creating Modernity

Computability arises

Howard: Somebody reading this might say, "That's very interesting Professor Soames, that there was this German guy in the 19th century who came up with a deeper understanding of how we ground our mathematical knowledge. It seems that it's fundamentally related to logic. And what is this logic? It's this interesting, predicate-based system that involves quantifiers like 'some' and 'all', and all these other things that transcend what Aristotle had done. That's all well and good, but I don't really care that much about mathematics. If I'm not a mathematician, what does it mean for me? For that matter, even if I *am* a mathematician, I may not care because I may not really be worried about the foundations of math; I'm just going to do my math."

There are certainly strong, intellectual arguments why mathematicians might want to ensure that they're on a solid foundation, but if you don't care about mathematics at all, you may wonder how this might apply to other areas.

A few moments ago, we were talking about the breadth of philosophical activity and how it is, to some extent, a continuum, how people are doing all sorts of other things. Is this type of logical framework only related to mathematics? Is there anything else I can say about it other than that it serves as the foundation of mathematics? And, if so, how did that happen and when did that start to develop?

Scott: In addition to developing these formal systems, this formal language with these rules, Frege needed to say, "Well, this is a language. How are we to understand its sentences? What are the ideas that we need in order to understand this particular language that I am using for this particular purpose?"

I'll tell you a little bit about that – that's what turned out to have a lot of ramifications. The basic idea is that Frege took the notion of a function from mathematics, generalized it, and used that idea in logic. So, predicates and relations stand for functions, which assign their arguments of truth or falsity. You have complex formulas and we can compute what function they must stand for from the functions that the parts stand for. The quantifiers make claims about the functions: they say the functions have certain properties.

This led to a great deal of power, and it also led to a certain kind of general interest in functions. One of the things you can do is write a proof procedure; you can guarantee that, when the premises bear a certain relation to the conclusion, then, if the premises are true, the conclusion is true.

You can re-express that in terms of function-argument terminology, and you can basically say that you have an effective, positive test for logical truth which is encoded in a function which, when you give it any argument and say, "Is this a proof? Does the truth of *this* guarantee the *truth* of that?" – if it does guarantee the truth of that, then the function will always tell you that it does, and it will never tell you something false.

This led to this idea that there is a certain class of computable functions, and that there are both computable and non-computable functions. This was a very interesting difference.

Howard: And once something is computable, you start thinking of a decision procedure, in terms of how to actually go ahead and compute it.

Scott: Exactly. That's how you get to it.

Howard: You can see how this has transformed our world. Everything around us –

Turing's work, computers, and so forth.

Scott: This revolutionized our world. The greatest follower of Frege was Alonzo Church[6]. He was an American mathematician who taught mathematics at Princeton, and he was also a philosopher of mathematics. He was the editor of the *Journal of Symbolic Logic*. He studied a number of things, including computable functions.

He had a student named Alan Turing, and Turing developed a very intuitive, simple technique called a *Turing machine*. It wasn't really a machine. It's a mathematical framework that could compute any computable function in terms of a set of instructions on an imaginary machine that has a finite number of states and is capable of making one distinction between zero and one.

Howard: And there's your analogy to truth and falsehood.

Scott: That's where we get the digital age. Every computable function can be computed by a Turing machine. The key thing is that you have to make distinctions between what zero and one could be. It could be an electrical circuit being closed or an electrical circuit being open.

So anything that you could use a Turing machine for, you could, in principle, compute using a complex, electrical circuit. This was the basis for all these things – computers, the Internet, and just about everything that makes up our modern world.

Further References

Biographies of Alan Turing include *Alan Turing: The Enigma of Intelligence* (1985) and *Turing* (1997), both by Andrew Hodges, and *Turing: Pioneer of the Information Age* by Jack Copeland (2012). There are also two popular movies based primarily on Turing's achievements at Bletchley Park: The Imitation Game (2014) and Breaking the Code (1996).

6 Alonzo Church (1903-1995), American mathematician and logician.

More general accounts of the origins of the digital age include *Computer: A History of the Information Machine* by Martin Campbell-Kelly, William Aspray, Nathan Ensmenger and Jeffrey R. Yost (2014), *The Innovators: How a Group of Hackers, Geniuses and Geeks Created the Digital Revolution* by Walter Isaacson (2014) and *The Information: A History, A Theory, A Flood* by James Gleick (2012).

Chapter 4a

Understanding Language

Syntax and meaning

Scott: That's one vital aspect of the general relevance of this work, but there's also a second. The second aspect of relevance is this question, *How can we develop a science of language? What is language after all?*

There are many aspects of language. Languages have a sound system. Some of them are written.

There's the syntax of language, which is what Noam Chomsky was so interested in, and continues to be interested in. Think of it this way: if you had a dictionary of all the words – forget about their meanings for now – which strings of words would count as sentences of language, and which would count as garbage? You need a set of principles for categorizing things and forming hierarchical relationships and developing transformational rules and so on: that's syntax.

What is meaning? What is it to understand a language, and what do we mean when we talk about a language? I don't think we fully know the answer to that question today, even in outline, but we got our start with Frege and Russell.

Howard: How did that happen?

Scott: I think it can be reconstructed this way: go back to a simple, logical language that they had a particular use for. They wanted to use the language to talk about concepts, numbers, mostly mathematical things. It didn't *have* to be mathematics, it just *happened* to be

Here's the basic insight: sentences are used to talk about things and that's the central, semantic fact that you have to understand about any sentence. You have to ask, "What is that sentence used to talk

about?" and "What does it say about it?" If you understand that, you've gone a long ways towards understanding what it means.

How do we want to construct a theory of meaning for a language? We want to start with what the individual words stand for. We want to say how the individual words can be combined into simple sentences. For example, the word "H" names you; another word, say, "S", stands for me; and "interview" stands for a way that two people can interact, a way a certain pair can be.

What way is that? Well, this guy can be asking questions of this guy who can be answering them. That's how we understand the parts, and when you put them together, we're saying, "This part is interviewing that part" and you understand. What is it for that sentence to be true? Well, it's for those two to be related in the way that "interview" says its arguments are related.

Howard: It seems to me that a really groundbreaking aspect is this notion of making an equivalence between truth and meaning, so that we're looking at how to isolate the meaning of these things.

We talked about the logical framework and what it led to in terms of Alonzo Church and Turing and changing our world and so forth. But when it comes to language, when we're looking at different models, my sense is that you've got this model structure and certain things can be true within this model. But if we can say that a statement is true, then we're somehow saying something about the meaning of that. Is that a fair comment?

Scott: That has been a guiding idea, starting with Frege and Russell and moving into the present day, but that idea has taken different forms and it can be developed in different ways. It may not be the whole story about meaning, but it is the core of what we learned from this approach.

The basic thought is that we can have a language that has finitely many expressions. We can specify the rules that allow infinitely

many sentences. And then we can specify the conditions for each sentence that have to be satisfied by the world if that sentence is to be true.

We can do that in a compact, finite way by understanding what the parts stand for and understanding how putting them together yields a claim of a certain sort. This is called model theory, or model theoretic semantics. It was developed for these logical languages that Frege developed and Russell pursued. Tarski ended up advancing this.

The germ of the idea is that, if we understand the truth conditions of a sentence, what it is saying about the world and what way the world has to be in order for it to be true, then we have the beginnings of a theory of meaning for language. A key, related question is, *How do we make that robust enough to give us everything we're going to need in a theory of meaning?*

Further References

Likely the most famous books by Chomsky on his views of syntax are *Syntactic Structures* (1957) and *Aspects of the Theory of Syntax* (1965).

Scott's books, *Philosophy of Language (Princeton Foundations of Contemporary Philosophy)* (2009), *What is Meaning? (Soochow University Lectures in Philosophy)* (2010), *Philosophical Essays, Volume 1: Natural Language: What it Means and How We Use It* (2009) and *Philosophical Essays, Volume 2: The Philosophical Significance of Language* (2009), explore many of these ideas in greater depth, and a good deal else besides.

Chapter 5
Stumbling Blocks

The troubling link between agents and meaning

Howard: You say, "What does it say about the world?" I'm guessing that this is where this notion of possible worlds comes from, because one can imagine that there are worlds where this is not true, where this doesn't apply. So we're looking at possible environments, possible worlds, possible models, and possible conditions whereby this property, whatever it is, is actually true.

We're getting closer, I think, to the point where there's a problem, where these ideas start to break down. This is where I want to get to for the next stage of our discussion. So far, everything we've spoken about has been, more or less, a raging success story, it seems to me.

This guy Frege comes along and he says, "I'm interested in the foundations of mathematics. Mathematics is equivalent to logic. Here's what I mean by logic." After a bunch more work, model-building, creating proofs, and turning cranks, that leads to the development of computer science which leads to all sorts of other wonderful things that have changed our world.

Then people look at these ideas from within a philosophy of language perspective, making an equivalence between the truth of statements and their meanings in different models and in different possible worlds. Everything seems rosy in that story.

But let me just back up and refer to Russell, where he talks about the relationship of philosophy to science. He says words to the effect of, "Philosophy is what we don't know and as soon as we know something, then it becomes science." There's this sense of philosophy giving birth to science, where philosophers are portrayed as essentially sitting around in the desert asking, "What's

up there?" – and, eventually, through their efforts, people start treating these ideas more rigorously, and then, once it becomes sufficiently rigorous, suddenly you get physics, say.

That's a very crude synopsis of the process, but my understanding is that there's this notion that philosophers are asking these basic, fundamental, questions and then as soon as we start having some very clear, distinct pathway towards developing concrete solutions, it becomes a science.

In one of your recent essays, you talk about how, under this model structure, with meaning being equivalent to truth within these models, that one might think, *Well, that's it then. Linguistics can take over, we can turn a crank, and we can start understanding everything there is about meaning. The philosophers can then get out of the way, according to Russell, and move on to other things.* But it turns out that that's not the case, right?

Scott: Well, there is a lot of very good crank-turning that continues to go on and there is a lot of progress that is still to be made in that general line. But there are a number of things that are left out. The biggest thing that's left out is the second half of the equation, as you might put it.

What is meaning? Well, we've said that these sentences impose conditions that the world must satisfy if they are to be true. And so meaning must just be the truth conditions that a sentence imposes on the world.

The other side of the coin is that language is not just something that is about things in the world. Language is used by agents, and it's the agents using the language in a certain way that leads to the fact that the sentence has the meaning and carries the information that it does. That, ultimately, is what explains the truth conditions of the sentence. Moreover, the cognitive relation that the agent bears to the sentence is something that imposes conditions – certain meanings impose conditions on those who

entertain them, just as they impose truth conditions on the world that they represent.

Russell and Frege weren't so interested in coming up with a science of language that had both sides of this story covered. They were interested in using a powerful enough language to solve the philosophical problems that they were interested in. But if we are to have a science of language, we must understand both sides of this equation, which we don't yet.

Further References

For a more detailed exploration of some of Scott's ideas, see, for example, his 2015 book: *Rethinking Language, Mind and Meaning (Carl G. Hempel Lecture Series)*.

Chapter 5a

Re-examining Information

Incorporating the agent

Howard: You emphasize this notion of a cognitive act: when we exchange information, there is a "we" who is exchanging information.

Scott: We think there is an agent doing the thinking, and how that thinking is done has important connections with what the information actually is.

Howard: That *itself* contains information. It is a form of meta-information.

Scott: Yes. Up until now, we have not had a model of information that makes that a part of it. What has the model of information been? Very simply put – we'll go back to the possible worlds idea – here's what you can do and here's what lots of people do today, very effectively and well. They take – it used to be these formal, logical languages, but now this is applied to natural languages or fragments of natural languages – and they say, "I will show you how to assign contents to the individual words and phrases and how to interpret the manners of construction that will allow you to derive a theorem of the following kind for every one of the many sentences in this fragment."

And the theorem will be: such and such sentence *S* – now I'm going to use a little terminology that we'll have to explain – is true at a possible world *W*, if and only if, at that possible world *W so and so*. That *so and so* gives the conditions the world must satisfy in order for that sentence, as it's used with this meaning, to be true.

We are very good at that.

And if you say, *Okay, fine. What, then, is the information contained by that sentence S?* Well, clearly it's the set of possible worlds in which the thing is true. That's what the information is. Informa-

tion is, *What do you know when you know that S?* Well, you know the actual world is one of these particular possible worlds. That's the basic story.

Now, what are some of the problems that we run into when we follow this model?

One of the problems is that sentences true in the same possible worlds express the same proposition. That means that every necessary truth – well, there's really only one. There are many sentences that happen to express the one, necessary truth; but it seems like I am able to know that 1 = 1 without knowing every fact of mathematics, all of which are necessary.

That's a fundamental problem: it gives us a conception of representation, which is too coarse-grained. So there must be more to truth conditions than there is to sets of possible worlds in which they are true.

When I was talking informally about truth conditions, what did I say? I said, *Well, what is it to know the meaning of a sentence? It's to know that it's talking about this particular thing and, it's saying of it that it's this particular way; and then, what's truth going to mean? Well, it's going to be true in the case that that thing really is that way.*"

Howard: You give a very concrete example in one of your essays. You examine the question, "What is a proposition?"

Scott: Yes. A proposition: a piece of information.

What is a piece of information? It's something that we can use a sentence to express. We know that. What do we do with sentences? Sometimes we assert things. What are we asserting when we use two sentences that express the same piece of information? We're asserting that information.

Information can be something asserted, something believed, the contents of some sentences. What is it that can play that role?

The first thing you have to ask is, *How tied to language must this be?* It is tied. We use sentences to express information, but we can believe things, animals can believe things, and merely possible agents can believe things, without using the English sentence that we use, and sometimes without using any sentence at all.

A piece of information, what must it do? Perhaps it must do many things, but one thing it must do is represent something as being some way. Then we know what truth is going to be – that piece of information is going to be true if there is such a thing and it is that way. What kind of thing can it be that we bear this relation to it: we can believe it, we can assert it, we can doubt it, but it's something that can be true or false depending on what it represents and whether the thing is that way.

Now, one thing it *can't* be is a set of possible worlds, because what does it represent? What does a set with, say, three worlds in it represent?

Howard: Nothing in particular.

Scott: Right. It doesn't necessarily represent anything. Even if you were to play a game and assign truth conditions to those sets of worlds, we've see that there are many different propositions that you'd assign the same set of worlds to. But they wouldn't mean the same thing. They wouldn't be what you believe, or what you assert. So we know it can't be those things.

What can it be? Russell and Frege thought that there was such a thing. They knew that sentences were, somehow, used to express them, but they couldn't figure out what it was, and they ended up giving up on the idea.

At that point, much of the tradition turned to sentences and truth conditions, which then got augmented to truth relative to a possible world state, and then propositions came back again (as sets of possible worlds), and then we arrived at the prob-

lem that we're talking about right now. That's where we find ourselves today.

We need the notion of something which isn't itself a piece of language, which represents things as being a certain way and so can be true or false and have truth conditions. Where are we going to get this notion of a representational thing? My belief is that we start with the fundamental presupposition that it's *minds* that represent. Minds are the representational entities.

Minds, when they represent things in a certain way, do so by following certain cognitive processes. Let me just give a name – and that's all it is – when I look at this table and I see it as brown, my visual system represents this thing as brown; it, so to speak, *predicates* being brown of that thing that I'm in visual contact with.

Howard: So that's a logical antecedent to the idea of—

Scott: Yes. That is the antecedent to language, but it's a piece of information. Moreover, I can form a perceptual belief that it's brown. If I have the concept of a table, I can form the belief that it's a brown table. All of these things I can do. I can do some of them whether I have any language or not, and as we get more complicated, I can do it with some given language, but it doesn't matter which language I happen to speak.

Howard: Is it that you *can* do it or is it more that you *must* do it, in terms of that being an essential aspect of what we previously called a proposition?

Scott: Let me put it this way: I can predicate brownness of this table simply visually without using any language, or I can close my eyes and say, "This table is brown," and I'm using the language to perform the same predication. The two are both acts in which I predicate something of an object, but they differ in terms of how I'm performing that act: in one case I'm using language to do it, in the other case, my visual system is doing it for me.

Let's take a piece of information to be one of these acts predicating brownness of this thing. Then let's look at the different forms that act can take: using language, using perception, using one's imagination. Those are all propositions as well. They're slightly different cognitive acts, but they have the same representational content because they're all predications of brownness of that object. They have identical truth conditions. They impose the same conditions on the world.

They impose different conditions on the agent who's performing the action: one requires some language, another requires visual perception, another requires imagination. We start from there, the idea that there are two sides. There is this mental operation that I can perform, that any animal with a visual system that can represent colors can perform. Maybe their neurology is different from mine, but somehow their neurology is accomplishing this and my neurology is accomplishing it as well.

Further References

For more detail, see Scott's book *Rethinking Language, Mind and Meaning (Carl G. Hempel Lecture Series)* (2015), or his 2014 book co-authored with Jeff Speaks and Jeff King, *New Thinking About Propositions*, chapters 3, 6, 9 and 12.

Chapter 6

Legal Applications

Implementing philosophical principles

Howard: When I was younger and I wanted to get out of doing a difficult or an unpleasant task at home, I would often invent all sorts of arguments based upon very fine distinctions as to why I really didn't need to be doing those things in the first place. My father, who has practiced law for a long period of time, would turn to me and he would say that I was behaving like a Philadelphia lawyer. I don't know exactly where that came from or if that term meant anything outside of my family, but the clear implication was, "You're playing all these word games, but we really know what you're up to. Just do your bloody work, and stop trying to finagle your way out of it."

By a somewhat circuitous analogy, I can imagine people saying, "This is all very interesting, Professor Soames. I recognize the fact that you're a very sophisticated guy, and I'll certainly grant you that long ago philosophical speculation eventually gave rise to the computer age. But all this talk about the finer degrees of what propositions are and brown tables and so forth, how can that possibly ever apply to the real world or any aspect of the world as I see it? Maybe it will just make some linguists feel better at the end of the day, but that's about it."

I'm not personally of that view, as it happens, but I feel that it's my duty to represent views of potential individuals. So I'm not asking you to talk about all the possible "real-world" implications of your research, but one thing that was very interesting for me to discover was how aspects of contemporary philosophy of language can inform our legal structure and the way that legal decisions are made.

I'd like you, then, to tack a little bit now and talk about some of your ideas, such as vagueness and deferentialism, in terms of the

law, and how they might be related, either now or in the future, to these fundamental issues that you've been discussing

Scott: I'll talk a little bit about the kinds of implications that I think the philosophy of language can have for one specific aspect of the philosophy of law, what you might call the philosophy of legal interpretation.

What does an interpreter do and how should we understand that? By an interpreter, I mean somebody who takes a law that has been promulgated by a legislative authority – it's already been passed. You may be working for an administrative agency and have to come up with what they'll call rules for implementing the law. You may be a judge who is called upon to render a verdict in some case in which there's a dispute about whether the law applies and what it means.

There's a question about how we should think about that process. The process begins with what one might call the "content" of the law. There's usually a written text, and that written text, as we say, encodes or expresses some content or information. The question is, "What does that written text require? What falls under it and what doesn't?"

The first task of a legal interpreter is to discover what that representational content is. You might think, *Well, the words are there, so it's easy. You just read them and understand the words.* That would be true if the context in which those words were used by the legislative body or authority made no contribution whatsoever to the information that was being asserted or stipulated by the body in question.

That's not true if we look at ordinary uses of language. It's not true that context plays no role in determining the content of what words are used to assert, or to stipulate, or to order. If you look closely at what goes on when judges are looking at some of these legal texts, it's not always true in the law either. The context

does sometimes provide information which is not present in the words that are used.

There was one case that I'll just mention that's probably the easiest way to grasp this. It's a famous case everybody talks about, the Smith case[7], that's about a provision that was passed by Congress which stipulated that, if you committed a felony and you did it using a gun, you would have an extra five years attached to your sentence. It was actually "using or carrying a gun," but for our purposes we'll say "using."

What is "using a gun"? If somebody said to you, "Have you ever used a gun?" At least in some context, people would think they were being asked, "Have you ever used a gun as a weapon?" But if you, for example, inherited an old rifle from your grandfather as part of his estate and you sold it and made profit, and then somebody were to ask you if you had used a gun, you probably wouldn't think, *Well, I used it then,* because you would interpret them as asking the question, "Have you ever used a gun as a weapon?"

So, even though the question doesn't say, "as a weapon," often, the context indicates that that's what was at stake.

And this case came to the Supreme Court. The fellow, Smith, had a gun, but he was trading it for drugs. The question was, "Should he have an extra five years added on to his sentence because he used the gun in a drug trafficking crime?"

The court ruled that he *should* have the extra five years tacked on because the plain meaning of "used a gun," in English, is using a gun as a weapon, a paperweight, or for some other purpose. Of course, Congress could have been more specific, but since they weren't, we must take the plain meaning at its face value and the plain meaning is simply "to use a gun." Period. That happened because they were looking at the meanings of the words instead

7 Smith v. United States, 508 U.S. 223 (1993). See here for more details.

of the intentionality, instead of what the words were used to assert or stipulate. So the first thing we must do is find out what was asserted or stipulated.

Howard: And distinguish between these two, presumably.

Scott: Yes, that's right. Now, suppose you're an interpreter and you've done that. You still have a hard case in front of you. Why? Well, perhaps the language says, *No vehicles in the park*. Well, what's a vehicle? We know cars are vehicles, and motorcycles are vehicles, and trucks are vehicles, but are skateboards? Wheelchairs? Tricycles? Are little red wagons vehicles? Well, it's vague, isn't it?

When a concept is vague, it doesn't clearly fall under what was asserted, nor is it completely clear that it's excluded by what's asserted. It's simply left open – the law is silent about that question. Nevertheless, you have a case in front of you, so you have to do *something*. It may well be impractical to go back to the town council and say, "What exactly did you mean?"

So you need some principle.

Well, what would we do in an ordinary situation – when it wasn't a legal matter – if you told me that we were going to meet up at a certain point, but it's vague exactly where and when. I would try to discern what we were going to *do* when we met. Perhaps we were going to meet for lunch and we had narrowed it down to, at least, a block area, but there was only one restaurant in that area. Then I would go to that place and think, *Well, I should interpret him as having directed me to go there*.

So in a legal context, we look at *why* the law was passed. What was the rationale? What were they trying to accomplish? Were they trying to eliminate noise and pollution, so they were thinking specifically about motor vehicles? Did they have some other motivation in mind? Once you come up with what the rationale was and you say, "Well, it's silent about this case," you make

the minimum modification in the law that best advances the rationale for the original law and apply it to this case; and, if that becomes a precedent, the law has changed to a certain degree – it has become more precise than it was before.

Howard: So there's a decision procedure right there.

Scott: Yes. Of course, it requires judgment because it's not a real algorithm, but it gives you criteria.

Howard: Well, we're not robots. We live in the real world with all sorts of shades of grey, but at least it gives you some sense – if you're a judge or if you're on a jury or what have you – you don't just throw up your hands and say, "Gosh, I don't know what to do." You have some clear sense, difficult though it may be, as to a prioritized sequence of what you should be looking for, where you should go. It gives some sense of direction.

Scott: Yes. And notice that the question wasn't, "What does the judge think the purpose of the law should have been?" or "What's the judge's view on what vehicles should be around?" No, the judge is making the decision, and it takes a certain amount of discretion on his or her part to do so, but what he's trying to do is advance the original rationale for the law, where the rationale is basically the values and arguments that were articulated publicly to advance the law and to explain what it was trying to achieve.

There are certain cases in which the law, which may have been passed at some other time, simply didn't envision a certain situation, but some decision must be made. And whatever decision is made will change the law in some degree.

When the court does this, the court must make new law. The idea that courts never make new law, that they never legislate, is not correct. They sometimes must do so, but they must do so in a deferential way, trying to make the minimum change that would advance the rationale – not *their* particular rationale, but

the rationale that was offered in favor of the law in the first place. It makes sense of this idea in our judicial system that the different branches and powers are separate and confined.

Further References

Relevant references to this chapter include *The Language of the Law* by David Mellinkoff (1963) and *The Oxford Handbook of Language and Law*, edited by Peter M. Tiersma and Lawrence M. Solan (2012).

Further investigations on the overlap of law and philosophy of language include *Philosophical Foundations of Language in the Law*, edited by Scott and Andrei Marmor (2011), which contains Scott's article, "What Vagueness and Inconsistency Tell us About Interpretation", as well as Andrei Marmor's 2014 book, *The Language of Law*.

Scott's book, *Analytic Philosophy in America and Other Historical and Contemporary Essays* (2014), also contains three separate articles on these issues: "Vagueness and the Law", "Toward a Theory of Legal Interpretation" and "Deferentialism: A Post-Originalist Theory of Legal Interpretation".

Chapter 7
Changing the Culture

Philosophy everywhere

Howard: Earlier, you were telling me that there is some level of structural integration between the department of philosophy and the law faculty at USC. Is this sort of structural integration happening more broadly? Is USC taking the lead on this, or is this something that is, generally, a widespread phenomenon?

Scott: It's not widespread. When we started this program – Philosophy, Politics and Law – it was about five or six years ago, and we were not aware of any program like this in the United States. Since we've started it, I think I've heard of one or two similar programs, but I don't remember exactly where they are, and I'm not sure they were all philosophy, politics and law – some might have had economics instead of law, like at Oxford.

This is very unusual; and yet, it shouldn't be. This is one example of how philosophy can connect in meaningful ways to other disciplines, in ways that advance the interests and values of those disciplines themselves, but also the direct interests of undergraduates. It's become enormously popular. In terms of our majors – well, we've revamped our traditional major but this is now part of our major as well – we've gone from, I'd say, 125 majors five years ago to about 260 now – and this at a time when humanities majors are dwindling everywhere.

I also believe that making connections to philosophy can be extended – not necessarily with those numbers – to other parts of the university. We'd very much like to have a philosophy and physics program that would get people to combine the study of both. They would come out with both a B.A. and a Master's in it, because it requires pretty intensive training.

This is the kind of thing that philosophy should be built to do. A discipline that goes back to Aristotle, whose reach was in all aspects of intellectual life, should be continually striving to make these connections and to make contributions that are philosophically interesting, but also interesting to people who have a different take on things.

Howard: An obvious point to make is that, not only does it expand the reach of philosophy and thus provide beneficial effects towards these other disciplines – law, physics, what have you – but it also replenishes philosophy itself. The very contact with these other areas, thinking in this particular way, interaction, and interchange, enables philosophy itself to progress by being exposed to different ideas. It's healthy for philosophy. So it's not just the case of applied philosophy; it's this sense of replenishment on both sides.

Scott: It certainly is. I gave some lectures in Germany last year on some of the material about information and language and things like that. The title of the lecture series was something like, "What is the Agenda of 21st-Century Philosophy?"

After my lectures there was a strain of questioning coming from some of the students and even some of the professors, especially as I was emphasizing the way in which philosophy contributes to the study of what is information, which we think is in the process of giving birth to a genuine science.

And they said, "Yeah, but what happens when these things all become science? There won't be anything for philosophers to do anymore."

My first reaction to that, which I still feel the same about, was, "Do you seriously think that there are fewer philosophical questions out there to be investigated now than there were in Aristotle's time? There are surely more."

Every science that breaks off from philosophy and makes enough progress so that it can become solid and non-controversial in a core domain always reaches a frontier. It's trying to advance, and it doesn't quite know how to conceptualize what to do. That is what philosophers do. That's our job: to go out to the edge of some domain that may be partially, but not completely, understood, and see what might come next, what we should be thinking about, what are the alternatives, what concepts we can employ.

Howard: This is a strategy for engagement.

Scott: We are doing more of it, and it will increase over time. When you talked about the fact that this is not just applied philosophy, but a replenishment of philosophy, another way of putting that is, "That's what philosophy is: it's looking over the horizon and discovering how we can expand our reach, understanding what questions we can be asking."

Yes, that takes a different form now because there's so much other knowledge available. Yes, if you're in my department and you're working on quantum mechanics, you and I don't have much overlap in terms of our philosophical expertise. This is how it is in philosophy: philosophy departments are full of specialized researchers. Many of these specialties are specialties in the sense that they *relate* philosophy to linguistics, mathematics, physics, to all sorts of things. And there will be more.

Of course, we have some specialization even within history and within what are more traditionally thought of as core, philosophical problems. But we exist in an age of specialization. Philosophers do not overcome specialization – they're specialized too – but they take a slightly broader, different perspective on law, politics, physical science, mathematics, and so forth. They raise some questions that wouldn't ordinarily be raised. They help make advances. They help expand what we do.

Chapter 7a

Gödelian Challenges

Applying the Incompleteness Theorems to language

Howard: I'd like to return briefly to analytic philosophy, and some aspects of logic in particular. You mentioned a few moments ago that the glossed-over summary I gave – "we've taken care of mathematics, and now we can move on to these other fields" – isn't quite correct.

There may well be some people who are thinking to themselves, *Well, hang on a minute. There was this Gödel fellow with his incompleteness theorems. What does that mean in terms of logical structures that you're talking about? What sort of ramifications does that have for any of your work, be it in the philosophy of language or be it in aspects of the philosophy of mathematics?*

Scott: I'm working on my second volume of the history of analytic philosophy now. I'm just coming up to the chapters on Gödel, Tarski and Church. At that point, the study of logical and formal systems became *itself* a domain of inquiry, and a domain of solid and surprising results. Gödel's results were among the most surprising.

Howard: I know that the incompleteness theorems led to this upheaval of what we know as logical systems, at least potentially. There seems to be some degree of variation as to what they really imply and what they really mean. Do the incompleteness theorems have any clear and obvious relevance for the philosophy of language, in your view? Or might they? And, if so, how?

Scott: There are some certain hard facts that are simply proven, certain hard limitations that we run up against. Do those limitations prevent us from doing things that we'd like to do? No. How could they, possibly?

Gödel demonstrated that certain things are impossible. We don't need a decision procedure for first-order logical truths in order to use first-order sentences to communicate information. To me, what is fascinating is that all these results are really applications of paradoxes, and they are constructive applications of paradoxes.

We can show that, if certain things that you thought might be true were true, a paradox is generated, and you get a contradiction, which indicates that those things can't possibly be true. We are not at all at the end of using that form of reasoning, and indeed, the very paradoxes that provided what was really going on with the Gödel incompleteness theorem. We are still finding more implications. The liar paradox is the key paradox (for example, "What I'm saying right now is not true"). There are, of course, much more interesting and complicated versions of it.

Howard: My sense is that, to a certain extent, things hinge on this idea of the meta-structure – Russell's paradox was also an aspect of that, to the extent that he's looking at the sets of sets, right?

Scott: This is a controversial matter. I don't see it that way myself. There are what are called "semantic paradoxes", but I don't think Russell's paradox is like that.

Howard: So there are different types of paradoxes?

Scott: I think so, although I'm not sure I understand fully what's going on.

One of the things that's interesting about the Gödel incompleteness theorem is that it's very closely related to a theorem called "the arithmetical indefinability of arithmetical truth". That's a Tarski theorem. It's really just Tarski using the Gödel methodology to develop the same thing.

In Gödel, you've got a formal language, which is arithmetic. What does arithmetic talk about? Well, it talks about numbers. But you develop a coding system so that you associate each

sentence of the language with a number, and there's an effective procedure so that, given any sentence, you can figure out what its Gödel number is; and, given any number, you can figure out first *whether* it's the Gödel number of anything and, if it is, *what* it's the Gödel number of. So it's effectively decidable that the numbering system has to be that way.

What you then do is take some of the sentences and formulas of the language, which naturally talk about numbers. Then, since you've set up a coding system, you can take them as talking about expressions in the language. You can even take them as talking about *themselves*. What would it be for arithmetical truth to be definable in arithmetic? That would mean the set of Gödel numbers of true sentences is the Gödel number of some formula in the language of arithmetic. That formula, if there were such a thing, could serve as the truth predicate for the language of arithmetic.

Well, you can prove that, if there were such a formula, then the liar paradox would be reconstructible in arithmetic, and it would either have to be true or not true. But to assume that it's true, you'll get a contradiction that it's not true, and to assume that it's not true, you'll get a contradiction that it is true. So the conclusion people draw is that there is no formula for a language of arithmetic that has those properties.

What makes it seem very puzzling is that what you have to assume about the language of arithmetic in order to prove this, and then prove it can't have its own truth predicate, is a very mild set of assumptions that are obviously satisfied by English. Or it at least *looks like* they are easily satisfied by English.

You find yourself saying, "There is no truth predicate of English." *English doesn't have its own truth predicates*? That's hard to wrap one's head around. After all, there is this word 'true', and there is this phrase, "… is a true sentence of English." You're telling me that's not a truth predicate? It certainly *seems* like a truth predicate of English.

But if it's not a truth predicate, that would have to mean either it applies to something which *isn't* a true sentence of English – well, that couldn't be – or there are some true sentences of English, which are such that, if you say, "It's a true sentence of English", then that sentence is false. And how could *that* possibly be?

In some sense, it couldn't possibly be. So what conclusion do you draw from all of this? This strikes me as still an unresolved question. Yet it appears to be an application of a fundamental theorem. Everybody regards the arithmetical indefinability of arithmetical truth, which is just a simple application of the Gödel methodology, to be a fundamental truth.

I've tried to state the assumptions and apply them to English in one of my books, and it looks pretty persuasive. Now, of course, the result can't be right, and there are different ways you can imagine why it isn't right. But what is the real reason the result isn't right? Here is an issue that's still deep, important, and unresolved, and we've got people working on it.

Howard: Fascinating stuff. Is there anything I have omitted?

Scott: I'm sure there are lots of things.

Howard: Okay, so let me rephrase that question, because it wasn't terribly well-posed. This is the problem with talking to an analytic philosopher: he'll quickly let you know when you're not saying something suitably precisely.

So, let me try again: Have I omitted something particularly significant? Is there anything specific you would like to add at this point?

Scott: Yes, I'd like to have two or three more of these conversations.

Howard: That would be wonderful. But for the moment, anyway, I sense we should bring this one to a close. Thank you very much, Scott, for your time.

Scott: You're welcome. My pleasure.

Further References

For more on Gödel's Incompleteness Theorems see, for example, *Gödel's Incompleteness Theorems* by Raymond M. Sumullyan (1992), *Gödel's Theorem: An Incomplete Guide to Its Use and Abuse* by Torkel Franzén (2005), *Incompleteness: The Proof and Paradox of Kurt Gödel* by Rebecca Goldstein(2005).

Tarski's original 1933 paper that put forward the theorem mentioned here (1936 in English translation) was "The Concept of Truth in Formalized Languages".

Aspects of Scott's views on the potentially confusing nature of truth predicates in English associated with these theorems are explored in more detail in various works, including his 1999 book *Understanding Truth*.

Questions for Discussion

Chapter 1: Analytic Sociology

1. Do you agree with the claim that, *anything in philosophy that's older than ten years should be regarded as the history of philosophy and not philosophy*? Is philosophy in any way intrinsically different than physics or chemistry when it comes to appreciating past ideas?
2. Do you agree with Scott that philosophers of physics are well placed to make unique contributions towards scientific understanding beyond what physicists can do? Why or why not?

Chapter 2: Mathematical Underpinnings

3. Are you surprised at the notion of a philosopher being a member of the mathematics faculty? Why or why not?
4. What was the Vienna Circle?

Chapter 4: Creating Modernity

5. Could modern computers have arisen without the previous work in formal logic?
6. What is the difference between "digital" and "analog" approaches, and how does that relate to this discussion?
7. What is the "argument" of a function?

Chapter 4a: Understanding Language

8. Is it possible to develop a rigorous science of language in the way that Scott seems to intend? If not, why not?
9. How might we concretely apply any rigorous theory of meaning for language?

Chapter 5: Stumbling Blocks

10. Do you agree with Russell's characterization that the role of philosophy is to eventually "give birth" to specific sciences? Why or why not?
11. What other fields of scientific inquiry would naturally be involved in exploring how, specifically, language is used by agents?
12. What assumptions, if any, is Scott invoking about the fundamental equivalence of all human languages throughout this chapter? How might these assumptions be eventually tested?

Chapter 5a: Re-examining Information

13. What does Howard mean by "meta-information" here?
14. Do you think that it is possible to have information that is somehow completely independent of language? If so, what might that look like? If not, why not?

Chapter 6: Legal Applications

15. Do you agree with the decision in *Smith v. United States* that "using a gun" should include trading it for drugs?
16. Are there any arguments for legislators being *less* specific in the wording of the laws they are creating? If so, what might those arguments be?
17. Are there any judges who might disagree with Scott's "operating principle" of interpreting the law by focusing on the legal rationale behind a given piece of legislation to resolve ambiguities? If so, what might their positions be?
18. Who is more in need of a more rigorous education in the philosophy of language: judges or legislators?
19. How might these ideas lay the framework for a broader means of assessing the proper functioning of a modern society in terms of the balance of powers of the different branches of government?

Chapter 7: Changing the Culture

20. Do you believe that there any potential negative aspects associated with creating joint academic programs, such as philosophy and law or philosophy and physics?
21. Do you agree with Scott that, "there are no fewer philosophical questions to be investigated now than there were in Aristotle's time"?
22. Does philosophy make "progress" like physics or biology? If so, how exactly? If not, why not?
23. Do you think that philosophy is underappreciated in our society? Do some countries appreciate it more than others? If so, where is it most appreciated?
24. Is this conversation too Western-centric? Are there important philosophical ideas from other traditions that have been overlooked in this discussion?

Chapter 7a: Gödelian Challenges

25. Describe the liar paradox in detail and sketch out how it is related to the ideas discussed in this chapter.

Topics for Further Investigation

Chapter 1: **Analytic Sociology**

1. Describe some of the principle research contributions of David Lewis.
2. What does Scott mean by "some contemporary version of Carnapian logical positivism"?
3. When Scott says, "Most analytic philosophers today think that those restrictive doctrines were themselves the product of doctrines that were flawed", what, specifically, is he referring to?

Chapter 2: **Mathematical Underpinnings**

4. How, if at all, does Frege's work relate to concepts such as mathematical Platonism, formalism, nominalism and other approaches in the metaphysics of mathematics?
5. What does Scott mean by space being "a Kantian category"?

Chapter 3: **What is Logic?**

6. Is there a difference between the two statements *Mathematics is logic* and *Mathematical knowledge is logical knowledge*? If so, what is it?

Chapter 4: **Creating Modernity**

7. How, precisely, did Frege generalize the notion of a mathematical function to apply it to logic?
8. For what types of cases can we determine in advance if functions are computable and thus susceptible to a Turing machine?
9. Could Turing's work be concretely applied without electricity? How?

Chapter 4a: **Understanding Language**

10. Summarize Noam Chomsky's views on language and syntax. Have they evolved appreciably since 1957, when *Syntactic Structures* first appeared? What are the opposing views?

11. Describe, in greater detail, the model, or truth, theoretic semantics of Frege, Russell, and Tarski.

Chapter 5: Stumbling Blocks

12. Might the constraints on various linguistic models necessitate a further meta-structure of models? If so, where would that appropriately come from?

13. Are the "two sides of the equation" as Scott puts it, equivalent in impact? Does understanding how specific agents use language affect meaning to the same degree as assessing truth conditions models?

Chapter 5a: Re-examining Information

14. What role, if any, might advances in mathematical information theory have to play in this discussion?

15. When Scott maintains "It's minds that represent", is he making a clear scientific distinction between "mind" and "brain", or is he merely using a figure of speech?

16. More generally, how might future advances in cognitive science impinge on Scott's notion of "cognitive acts"?

17. Do some philosophical approaches deny Scott's distinction of "two sides", between conditions on the world and conditions on the agent? If so, which approaches would those be?

18. Summarize Scott's arguments from this chapter, along with his essay "Why the Traditional Concepts of Propositions Can't be Correct" in *New Thinking about Propositions* (Chapter 3).

Chapter 6: Legal Applications

19. Do you agree or disagree with the following statement: *It's never possible to have a complete understanding of the context of any legal claim.*

20. How might courts best ensure that they are making "the minimum change that would advance the rationale"?

21. Is there a difference in the impact of these arguments for countries that use Common law, as opposed to Civil law? Why or why not?

Chapter 7: Changing the Culture

22. Do you agree with Scott that the job of philosophers is to "go out to the edge of some domain that may be partially understood and see what might come next"?

23. Is there a difference between a philosopher of physics and a philosophical physicist? If so, what is it? If not, what, if anything, does this imply about modern philosophy as an academic discipline?

Chapter 7a: Gödelian Challenges

24. What is Russell's Paradox, and how, if at all, does it relate to the ideas in this chapter?

25. Describe, in detail, Tarski's theorem on the arithmetic indefinability (often called undefinability) of arithmetic truths and how it related to Gödel's theorems and Gödel numbering.

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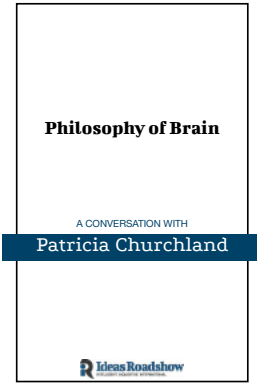

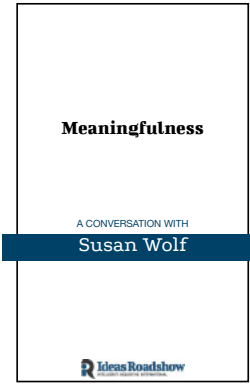

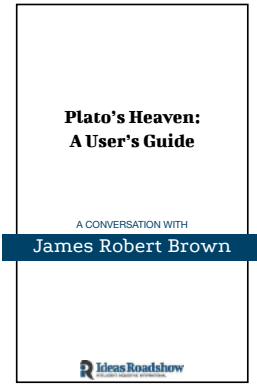

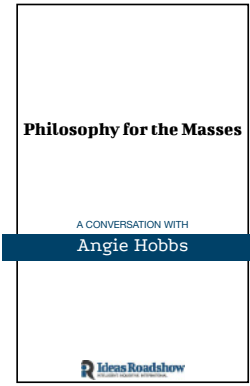

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