An interview with James Ladyman

by Sophia Cho and Nelson Hosley

James Ladyman is the Head of Philosophy Department at Bristol University. His work has primarily been in philosophy of science, especially the philosophy of quantum mechanics and the debate about scientific realism.

SC&NH: One general observation of your book *Everything Must Go* (co-authored with Don Ross; Oxford University Press, 2009) is that the center of gravity of the philosophy discipline has moved too much in the a priori direction, specifically in metaphysics. Could you give us some background on this claim?

It happens periodically in the history of philosophy that people find themselves reacting against scholasticism, by which we mean - addressing issues as they are defined by the tradition, without regard for things that are going on outside of it.

That is by no means universal in philosophy. Lots of people even in metaphysics actually do their best to keep up with science. Its a polemical point to say that I think that the *central gravity of the discipline* has moved a bit too far in the a priori direction; that is, too far in the direction of addressing questions that have been internally set up by the tradition rather than looking in the outwards direction.

At the point that we wrote *Everything Must Go* we thought that things were just overall too much in that direction. And I still think that. I found myself realizing that the questions that I was interested in weren't being discussed and the questions that were being discussed I wasn't interested in. I began thinking "is this because I'm not interested in philosophy or because I'm not interested in metaphysics.". Metaphysics is a question of 'what the world's like' - its some kind of general or basic, special version of that question - and i'm interested in that. The questions that interest me are special science questions: like 'what's a utility function?,' 'whats a market?,' 'what's a species?,' 'what's an atom?' All these questions have to do with the relationship between and compatibility between ontologies at different levels. For example, how can there be heat while having the story we have about the underlying stuff that makes heat. What is the relationship between the physical stuff that we talk about and the stuff in the special sciences?

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When philosophers tackle questions about how everyday material objects arise out of whatever else the little bits are - that's the bit they seem to do the wrong way. Like in saying that a table is a collection of particles. Science always gives us a *dynamical* story about how something like a table is made of particles. Too often when we think about the composition of macroscopic

things by microscopic things, we think about a kind of spacial boundary with a load of little particles inside of it. It is more evasive than that.

So are questions about everyday things, such as tables and baseballs, misguided or distractions?

Insofar as I think people are asking the wrong questions I think they are distracted and misguided. But we could say "didn't they raise a really important question, which is 'what is the principle that governs composition (?)' or a related question of 'when is it true that some simples are composed of something else

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(?)', whereby we mean by 'simples' things that are *not* composed of anything else." This is in contrast to things that are composed out of other things.

What I think is problematic about that is the completely non-contextualized idea of simples, where there's one final set of simples, and one hierarchy of composition out of them. If you ask how a market works you might think that a market is a compositional entity, which is to say that you cannot have it without its parts. But the simples of markets, something like individual transactions for instance, is a very different kind of simple than the simples of, lets say, population genetics where the simples might be individuals (or we may think of an individual as a bundle of heritable traits so the simples may be the heritable traits). This in turn is a very different kind of simple than atoms that compose gases. Here, we don't even think from the point of physics that atoms are simple. Nonetheless any story in thermodynamics is not going to go down to superstrings but to the level of atoms because thermodynamics ultimately comes down to a kinetic theory of gases, particles and collisions at that level, where particles are the molecules of the gas in question.

Somehow the assumption seems to be that there are the ultimate physical simples and everything is composed out of them. So what I want to say is that I don't really see how markets can be ultimately composed out of whatever makes up quarks. The other thing is that it's just not obvious that there *are* simples in physics. So spending so much time is not terribly helpful. Because we end up in a position where we are saying there are really gases and there is really heat, but there aren't really markets.

So really quickly we're going to end up with the idea that most of what the special sciences talk about is not really a general ontology. Only kind of direct aggregates of physical things, spacio-temporally located, can have a proper ontological existence *at best*. You may end up with the conclusion that simples is all there is. Even among the physical stuff only the simples exist. But that is ignoring all the interesting questions that all the special sciences throw up

about ontology. Then you want to say that they aren't really ontological questions. But they sure look like ontological questions.

I don't want to say that it's just conceptual what markets are. That makes it sound like we just define what markets are, but we actually *learned* what markets are. We've *learned* that its useful and possible to describe the world in terms of markets.

There are many really interesting phenomena in special sciences. There is enough work keeping an army of philosophers at the special sciences and how they ultimately interrelate, but we're worrying about whether matter is ultimately gunky, made of tiny spacial parts that can't be cut in half anymore. This just doesn't seem to have anything to do with reality to me. I don't want to disparage the work that any individual philosophers do (though we did pick some examples in the book because we had to) - it's more about the centre of gravity of the discipline. If you want to think about how simple physical parts could compose, if there were such things - fine, I don't want to stop you - but if that becomes a dominant question and there is a methodology for answering it...I suppose one of my main worries is that you can open an article or book in metaphysics and can find no indispensable information in it that came out of the advance of science in the past few hundred years. That's a bit of a worry. I cannot imagine any of the founders of metaphysics wanting them to do this; Descartes as an example, but also the Presocratics, Kant...They all thought they were at the cutting edge of what could be known at the time. So, if you brought Kant into the 21st century, I imagine that he would completely ignore what was being done by philosophers in metaphysics. All he would want to do would be to learn about the science. He based his whole metaphysical theory on knowing about Newtonian mechanics, which he used to teach and which was really important to him.

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So if we said, okay, you are now in the 21st century Kant and guess what - we've now got quantum mechanics and relativity - I imagine that he wouldn't want to do anything else until he'd understood them.

But individually, loads of metaphysicians do try to read up on and understand the science. But it's just the *discourse* - what we were complaining about was a certain kind of *discourse* that seems not to be conversant of it. I think that has changed to some extent, but then sometimes the worry is that it is paying lip service to the scientific image and operating a domesticated version of the scientific image.

As a practical question, for students of metaphysics, what type of education program emerges from this? To what extend should philosophers or philosophy students involve themselves with the special sciences and how practical is that?

Many people have some area that they know

about and they do their philosophy informed by it. That's often what we call philosophy of science, but it's really just metaphysics. So many people who do philosophy of mind know about psychology or neuroscience, and they're doing metaphysics of the mind in light of that. There are all those different bits of metaphysics that you can do knowing about something. You don't have to know about everything.

The big integrative project that we try to do for ourselves in philosophy is pretty hard to do. It's something that needs to be done in collaboration. Somehow philosophy has to be slightly more of a social product. If you look at the way science works now you often have to have teams of people with different bits of expertise. You might have one person who knows about genetics and one person that knows about behavior, and another person's really good at doing the stats or something and their producing papers together - because there's so much to know and things are so specialized that it's hard to do.

The advice to philosophy students is [to realize that] it's really difficult. It's hard for me to advise someone who only wants to read about philosophy and isn't interested in anything else. In that case, I would say to do philosophical logic. Or history - some people do really good *a priori* work analyzing concepts but its often semi-historical - that you trace the evolution of ideas and concepts like 'markets' by having gone back and read a load of works with the benefit of hindsight.

Do you see your work as in the spirit of the enlightenment?

We very explicitly say that what we do is in the spirit of the enlightenment, without being pretentious - we think that there is a great unified project of finding out about the world through a combination of both empiricism and the best that is produced by pure thought, which is mathematics, logic, conceptual analysis - the traditional analytic philosophers idea of conceptual analysis is an important part of it. But that should be a kind of unified project. And so we want to inform what we say about metaphysics by physics and behavioral science and everything in between. But yeah, agreeing with Descartes that how things seem to us on the basis of our senses isn't a good clue into how they really are.

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You mention that intuitions are culturally specific and you also mention that a 'domestication of science' is often if not always suited for ethical and political interests. How do you feel that your views compare with those that elaborate on intuitions and operate on a 'domesticated image of scientific theory' in terms of

being value laden?

That's really difficult. I think of materialism and there is a strong current in materialism going back through Lucretius, through Lenin that says that there is a political reason why you should get your ontology right - a political, ethical reason. So Lucretius thinks that you want to liberate people from superstition and religion because it controls people's lives. That is important to him. And there's a strong tradition of people like Lenin saying that religion is the opium of the people... if people believe in all this non-material stuff than they can be suckered into thinking that there's something else other than their material existence that matters. And *that* might stop them from doing something about the fact that we all have one life and, you know, if people grow up in poverty and have really poor life opportunities and then die young because of bad nutrition and environmental degradation - *that's it, that's* there only life, they don't get another go. For some people that's a strong motivation for materialism.

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Whether or not you then agree on some version of materialism is a separate question. Of course lots of people are completely opposed to Marxist Leninism say exactly the same thing and then say that its actually the best way of lifting children out of poverty.

In fact Don Ross (the co-author of *Everything Must Go*) works in development economics - its what he really cares about is lifting the people in Africa out of poverty, or anyone out of poverty, and he thinks that somehow the materialism is part of what informs the fact that there isn't any other project to care about - the salvation of your soul and of other people's souls is not a genuine project for him. The salvation of their material conditions, is.

Then at the same time, there are people in theistic traditions who would freak out if you tried to suggest that there is anything contradictory between theism and caring about child poverty. Fom the *Old Testament* prophets that are massively concerned with justice, onwards.

I'm not very confident about making a direct connection between values here by saying something such as "well, if you're doing analytic metaphysics then you're not living in the real world and therefore you don't care anything about child poverty." It's just not that direct. At the same time, I definitely have noticed, one can definitely notice the coincidence of the rise of theism within mainstream analytic philosophy and the rise of analytic metaphysics - I mean those are two noticeable trends of the last two decades. I mean the fact that first of, metaphysics came back on the agenda, and

now theism is back on the agenda in a way that it wasn't before. But those two things may have nothing to do with each other - it could just be that theism has something of a resurgence in intellectual circles independently. So it's really difficult. I'd be very wary of making any real links here.

Is there any place you feel that your views have been misunderstood?

It's a common misrepresentation that *Everything Must Go* is an attack on metaphysics. Its not. It's an attempt to do metaphysics.

Another misunderstanding, and maybe we're responsible for this - is that we were so polemical [arguing against *a priori* or *analytic* metaphysics]. No one would have talked about it if we'd been much more mild about it so the situation did justify a kind of interpretation that was a little bit polemical and a little bit extreme - but our views are a more nuanced than the kind of polemic. I think it's really to do with shifting the center of gravity and getting us to think about it. And also about what the methodology is. Just get those questions talked about rather than completely eliminating everyone doing something *a priori* and suggesting that everyone has to be a scientist or something. And people have been going around for years saying that I say there are relations without *relata* which I never said.

One very important misrepresentation is one that we ourselves are responsible for when we say that 'everything must go,' because the slogan [for our work then becomes] that "there are no things," but actually if you read what we say, we say there are things like tables, there are markets, there are utility functions, but what we end up saying that a thing is is just the real patent idea of 'what a thing is' rather than "it's some little material like extended stuff or something made of little parts like that." It's more against a philosophical conception of a material thing or individual applied to physics and science than actually - in that sense. In that sense, we're really kind of Moorian idealists, right. We don't want a philosophy that says there are no hands and that baseballs can't break windows. And then we try to work out a metaphysics compatible with science that allows us to say that there isn't anything more to 'being hands' than there being phenomena that go together in a way that makes quantifying over hands massively reduce your information task. You can track the dynamics of the world at a level that those degrees of freedom rather than all the little parts' degrees of freedom and that's what we say about everything that exists. It's on that basis that everything exists.

What's the best decider of what exists?

Usually science, but often it's just folk practice. If the folk are immersed in doing something and getting around in the world - if you think about cooking or something, it has its own ontology. For example from a botanical point of view, a lilly, a leek, and an onion are exactly the same thing, but from a culinary point of view they're not. That has to do with indispensable parts and ones explanatory grip of the world and that's a matter of degree. Its domain relative and scale relative. There are scales at which tables don't exist and scales at which atoms don't exist. You can't make sense

of a market as existing from one iteration of transactions - it just wouldn't be a market.

There is an argument that structural realism is really misguided and what we really need to look for is invariance over the history of scientific theories and entities. Do you see the relative merits of this type of argument?

Of course we're interested in what is invariant in our understanding. For example, when we think of 'light' with Maxwell's or Fresnel's optical aether theory of light and even like the particle and ray theory of light, we might as what's invariable? - Everyone thought that 'light' is a thing that defracts and there's interference, reflection phenomena and polarization phenomena, refraction phenomena - these theories have been better and better descriptions of all of those optical phenomena. And we can further ask what is optics? We can say it's the behavior of *this* thing, *this* entity - 'light' - it's a bit of the world. So if you're a structural realist and you're saying that there's no such thing as light, then I'm going to say "no, I'm not saying that there's no such thing as light." So if that's what I take to be advocating when I advocate structural realism then I must not do a very good job of explaining myself.

No 'light', we can say, is an entity and our theories try to tell us more and more about it. So insofar as structural realism says "no, we only know about structures," that means structuralism is denying that obvious fact. But that's not right. I think the point is supposed to be "whatever particular account we've got right now, considering that the ultimate constituents of the nature of light are quite likely to be modified and further developed, then the thing that we can be most confident about is that the mathematical structure that we arrive at in our descriptions of it become more and more defined such that we can recover ray optics from wave optics and Fresnel's optics from Maxwell's electromagnetism and Maxwell's electromagnetism from quantum field theory, and so on. Well it's changing our mind quite a lot about what the ultimate nature of light is. And we should expect that to go on in the future.

We shouldn't believe that necessarily there is an ultimate nature to light. We just should assume that that this process will ever end. Maybe it will but will we be able to describe within the resources manifest in its image the nature of that thing and almost certainly not. Already now if you want the best story of what light is you have to read quantum electrodynamics. According to my friend Mark Dennis, he used to give a certificate to people who he thought were qualified to use the word 'photon', because what a photon *is* is really difficult to understand. It's *not* just a kind of little particle, like a little thing: it's just not. That's what structural realism is about.

One might say "that's not structural realism if you believe in entities" - I say fine, I don't care about the name. Call it "structural realism," call it whatever you'd like, I just want to get clear about what we should believe about the world. We shouldn't believe that the view of realism that arose out of the failure of logical positivism wasn't a kind of "there are these

entities, we have these terms, they refer to them..." - no, it's much more complicated than that. How the term 'photon' refers is much more complicated than that. It's not really analogous to how names refer.

There was something right about the reaction against realism that says that it's too naive, it's not taking account of how much ontology would change. I still think that's right.

I also think it's right that most entities, although they might be entities, they're scale relative. Let's move from light to atoms - they don't exist now at the quark scale. There's nothing like that there. They're low energy approximations that you only get by coarse graining and leaving out details.

... We can only say what's been invariant up until now. So maybe the argument you mentioned against structural realism is about how structure changes too when there's theory change - which is true. The totally wrong way to think of this (and another common misunderstanding to continue from above) is to think that that we're saying that structure doesn't change and nature does. That's not what we're saying. Of course structure changes. The structure of Newtonian mechanics is not the structure of Special relativity.

For instance, I can see how the equations of Fernel are recovered in Maxwell's theory. I can see how Maxwell's theory is recovered in a theory of quantum thermodynamics. I *can't* see how the kind of *entities* are recovered in the limits of other entities - that doesn't really make sense.

I don't really know the best way of getting the idea of structural realism across is. You've got to look at example and see that, look, theory change can be like *that* and we could be just as wrong about that kind of thing, but we can be sure about our equations. We've got limited cases. And basic causal regularities and phenomenological laws. It's always going to be true that water dissolves salt. The theory is that you're not going to have an completely different understanding of what the ultimate nature of 'salt' is. It's not very satisfactory.
Take Newton's metaphysics. There's clearly a bigger gap between Newton's metaphysics and ours with him having absolute space as one thing, time as something completely different, material particles different again, moving around in absolute space - that's completely different than whatever we think the world is like with quantum fields, etc. But yet there's a much closer connection between Newton's mathematics and ours now in the sense that we can recover all his laws of limited cases - they're still there implicit in the structure that we have now. Though with all of this extra-complicated further structure.

Is it because we like simplicity? - no, I don't think that it is because we like simplicity. Even in principle we can't recover higher level stuff without higher level descriptions: you have to coarse grain. So if you just describe everything in the terms of quantum theory you won't ever get 'baseballs break windows' - there won't be any baseballs, there won't be any windows. And it's not up to us which coarse grainings are the ones by which you can then state laws and equations that describe change of state.