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Editorial

This is my first interview for this fine gazette and being located in Munich myself made deciding on an interviewee very easy. My interview partner for this issue is Stephan Hartmann, and I am very glad that he immediately accepted. Before Stephan came to Munich in 2012, he held professorships at the London School of Economics and at Tilburg University. In addition to his degrees in philosophy (Master's degree 1991, PhD 1995), Stephan also holds a master's degree in physics (1991).

The first time I met Stephan Hartmann was in 2003, at the summer school Philosophy, Probability, and the Special Sciences in Konstanz, Germany. Stephan was one of the organizers and was located in Konstanz back then. The rigour and precision of certain philosophical thinking I came to know at this great summer school considerably influenced my own view on philosophy and its methods. This was one of my first encounters with what is nowadays called mathematical philosophy. Ten years later, mathematical philosophy is at its peak and Stephan Hartmann is one of its leading figures. Since 2012 he is chair in Philosophy of Science at the LMU Munich. In addition to that, Stephan was awarded an Alexander von Humboldt Professorship and teamed up with Hannes Leitgeb (Chair in Logic and Philosophy of Language at the LMU and also Alexander von Humboldt Professor) as a director of the Munich Center for Mathematical Philosophy. His Humboldt Professorship enabled Stephan to double the center's size, which makes for about fifty mathematical philosophers now working at the center.

Stephan Hartmann is very well-known for various work he has done. The book *Bayesian Epistemology* (with Luc Bovens, Oxford 2003) is already something like a modern classic. His philosophical work also includes research on coherence, philosophy of physics, social epistemology, and even more "applied" research like work on voting procedures and descriptive norms. He also is associate member of the Arnold Sommerfeld Center for Theoretical Physics (LMU Munich) and does research in the foundations of physics. One outcome of this is the recently edited a book on *Probabilities in Physics* (with Claus Beisbart, Oxford 2011). Being also a physicist by training, Stephan has a very scientific picture of philosophy. With the following interview we have tried to provide a sketch of this picture.

Albert J.J. Anglberger
Munich Center for Mathematical Philosophy, LMU

Interview with Stephan Hartmann

Albert J.J. Anglberger: With your Humboldt professorship, you are joining an already existing philosophical center, and have already made a number of additional hires. How does that complement (or alter) the previous focus of the Munich Center for Mathematical Philosophy (MCMP)?

Stephan Hartmann: The main goal of the MCMP is to address philosophical problems with mathematical methods, broadly construed. In the first two years, a lot has already been achieved in this respect and the MCMP became quite well known in the philosophical world and beyond. Hannes Leitgeb and his colleagues have done a fantastic job here, and I am delighted to have gotten the chance to join the MCMP. The new group, comprising three Assistant Professors as well as several Postdoctoral, Doctoral and Visiting Fellows, will round off the work done at the MCMP in several respects. First, we will add new methods to the toolbox of the MCMP. We use, for example, computer simulations, which are of great help, especially for the study of agent-based models of various social phenomena. Additionally, we want to use more empirical methods, e.g., experiments similar to the experiments done in cognitive and social psychology, as well as case studies. Second, we address new topics. For example, several of us do technical work in the philosophy of physics and in the philosophy of psychology, philosophy of the social sciences, and philosophy of economics. This research is often done in close collaboration with scientists, and we are fortunate enough to have a lot of scientists here at the LMU who like to work with philosophers like us. A number of us also became interested in formal ethics and various questions from political philosophy. In sum, we want to explore as many fields of philosophy as possible and see how formal (or scientific) methods can be used to make progress here. Third, the additional resources will help us to reach out more, to both the broader philosophical community and the general public. We will organise conferences that we hope will also appeal to non-formal philosophers in order to bridge the gap between different communities and approaches. And we offer public events that reach out to the general public. Julian Barbour's talk about the end of time during our Foundations of Physics conference at the Deutsche Museum is a case in point.

Lastly, let me mention that due to the MCMP's collaborative research style, which we endorse, the integration of the new group has been an effortless and enriching process for all involved. We discuss a lot, collaborate on various projects, run reading groups and organise many events. This, too, resembles the sciences and differs from the traditional style of doing philosophy.

AA: Computer simulations are getting used more and more in philosophy. What are the merits of using simulations in philosophy and how are you using them in your own research?

SH: Computer simulations have much to offer to the philosopher. They allow us to explore the consequences of more complicated assumptions than we would normally make because of our inability to deduce their consequences by pure thinking or by doing calculations by hand. We can then study more realistic scenarios and make fewer idealisations. Agent-based models are a case in point. With software such as Netlogo, it is possible to follow the "life" of a group of agents, who change their state according to a number of specified rules, and see which patterns (such as social or behavioral norms) emerge. These patterns are often unexpected and make you think. How could it be that such a pattern emerges? In my own work I found that analysing the visualisations that result from a computer simulation often leads to rather interesting answers and new ideas.

So far, only a few groups use computer simulations in philosophy. In my view, there is a lot of potential and many areas of philosophy can benefit from them. At the MCMP, I would like to explore to what extent computer simulations can be used in combination with logical approaches. In order to train our students and to show them that computer simulations are just another useful tool in the philosopher's toolbox, we offer regular courses at the LMU in which students learn how to design computer simulations and how to use them to solve philosophical problems.

AA: Is there a common theme underlying your philosophical work?

SH: I consider myself to be a scientific philosopher, which means that I address philosophical problems like scientists address scientific problems. That is, I start with a concrete problem and make (often idealised) assumptions, I consider empirical data, I conduct experiments, and I use all the methods available to solve the problem at hand. The challenge with this style of doing philosophy is that one has to integrate different approaches and methods, which is not a straightforward task. But regarding methodology, I am a pluralist and I believe that it is helpful to know a whole range of methods, indeed as many as possible, to solve various philosophical problems. And I encourage my students to get acquainted with different formal and empirical methods and to learn how to run simple computer simulations.

The problems I address are often interesting from a scientific point of view, but I insist that they are also interesting philosophically. For instance, much of my work is about individual and group rationality. This is obviously an issue of important philosophical concern. At the same time, rationality is also studied by the sciences, and it is clear that empirical data (e.g., from cognitive and social psychology) matter for the way we treat it philosophically.

Of course there are precursors for the kind of work I do. In a way, much of my work and my approach are inspired by the logical empiricists, who I feel were dismissed too fast. In fact, I believe that it is a good starting point to address a problem in the style of the logical empiricists.

AA: How did you get drawn to the philosophical questions you are dealing with now?

SH: I studied physics and philosophy and was first mostly interested in foundational problems in quantum field theory and methodological problems regarding modelling and simulation in the sciences. It took me a while to realise that it is much more fun to model and to run simulations myself rather than to only talk about them! Most of my early work could be described as naturalised philosophy of science. I conducted case studies and compared them with philosophical accounts from the literature.

While this was a refreshing approach to the philosophy of science at the time (compared to earlier work which was often too far away from the actual practice of science), I realised that I did not want to go on with this work. I wanted a more normative approach, and I wanted to do more well-founded constructive work myself. And I always liked to do calculations. Fortunately enough, I met Luc Bovens when I arrived as Assistant Professor at the University of Konstanz in 1998. Luc had a completely different background than I had (in ethics and political philosophy), and got me seriously interested in analytical philosophy and other areas of philosophy that I did not look much into before, such as decision theory and social and political philosophy. Most importantly, however, Luc suggested that we study Bayesian networks together. Luc heard about them and immediately saw their potential for philosophy. He was right. And so Bayesian networks and their applications in epistemology and philosophy of science kept me busy for a number of years. What we did in this work was analytical philosophy assisted by formal methods. That is, we used the Bayesian framework to make progress on issues such as the coherence theory of justification, testimony, and confirmation theory. Our formal results always had to be backed up and confronted with (our) intuitions, on which we heavily relied, especially in our work on coherence measures.

In the last couple of years, I understood that the right way to go in many interesting cases is to combine the two approaches that I used before. The naturalist approach provides the data and the input and it reminds us that we want to arrive at a philosophy for our world. The formal machinery, on the other hand, allows us to integrate everything into a bigger picture and provides a normative account. How to do this in practice is not always straightforward, but I am excited by the idea and hope to arrive at further interesting results.

AA: Are you interested in producing results that can be applied outside philosophy, and have you already done so?

SH: I do not think that philosophy has to be useful to count as good philosophy. It is a contribution to our intellectual culture that does not have to make the world better in any other way, to put it sloppily. Philosophy should be assessed on its own grounds. At the same time, I have no problem if good philosophical work is useful for society and relevant for public debates. And indeed it sometimes is, as examples from ethics, political philosophy, the philosophy of physics or the philosophy of climate science shows.

Personally, I am quite interested in exploring the consequences of certain philosophical positions for complex real-life problems of public policy. With Claus Beisbart and Luc Bovens, for example, I explored how the nations of the European Union should be represented in the Council of Ministers if we adopt utilitarianism or egalitarianism. To address this question, we modeled the situation and then ran detailed computer simulations. The results were surprising and elegant and were also supported by a rather different modelling framework that some political scientists had adopted. In my view, the challenge of doing this kind of applied philosophy is to do it in a way that is also considered to be good philosophy, and this is not always an easy task.

AA: What can we expect to see in your new book, and how does it compare to *Bayesian Epistemology*, which you wrote with Luc Bovens?

SH: This book, which I co-author with Jan Sprenger from Tilburg University, aims to develop Bayesianism into a full-fledged philosophy of science. While Bayesianism is traditionally assumed to be only a confirmation theory, we want to show that it can be used to address a whole range of problems and questions from philosophy of science. We do take the empiricist starting point that philosophy of science is always about the relation between theories and data. But confirmation is not the only concept that can be illuminated by this relation. So we go on to discuss issues such as scientific explanation, intertheoretic relations, and the role of theories, models and idealisations. We also study various non-deductive argument types that scientists use, such as the no-alternatives argument (click here for a popular account of it), and respond to challenges to Bayesianism such as the old-evidence problem. We might also add a chapter on social Bayesian epistemology to explore the important social aspects of science from a Bayesian perspective. In my view, Bayesianism is a wonderful modelling framework, and I am curious to see how far it can be pushed to make sense of the practice of science and its normative standards.

AA: How does your version of Bayesianism differ from more traditional accounts?

SH: I consider Bayesianism to be a rather flexible modelling framework that we adopt to address various problems. Bayesianism makes a number of serious idealisations (such as omniscience and sharp probabilities), which may be acceptable for some applications, but not for others. And yet, I would like to see what we can do with Bayesianism, before discussing its limits.

In line with the empiricist spirit that underlies Bayesianism, people have focused on direct evidence such as the black raven that confirms the hypothesis that all ravens are black. Evidence of this kind was considered to be certain. Later, Richard Jeffrey relaxed the assumption of certainty, but kept on focusing on direct evidence. I am interested in exploring other types of evidence that we find in science and in ordinary reasoning. In my recent work with Richard Dawid (Vienna) and Jan Sprenger on the no-alternatives argument, for example, we looked at 'social' evidence of the form "The scientific community has not yet found an alternative to H". How can this kind of evidence be integrated in the Bayesian framework? And is it evidence at all? With Soroush Rafiee Rad (Tilburg), I am also working on learning indicative conditionals, which are, as we know from the literature on conditionals, not events and therefore need to be modeled rather differently. In all these cases we showed that it is crucial to represent the underlying causal structure properly. This is in line with the work of Judea Pearl, who argued that the causal structure comes first, followed by the probability distribution that is defined on top of the causal structure. To sum up, there are a number of respects where I feel forced to deviate from the traditional Bayesian framework in order to make it better fit to contemporary science. But these are still rather minimal changes.

AA: Together with Hannes Leitgeb you are currently teaching the massive open online course Introduction to Mathematical Philosophy on Coursera. Tons of people enrolled already in this course and its online availability will certainly promote mathematical philosophy. What will be covered in this class and what do students need to know about mathematics in order to understand it?

SH: We are very happy to have the chance to do this. The idea of the course is to convince a large audience of non-experts that challenging philosophical problems can be successfully addressed with the help of a little bit of mathematics. We will,

for example, talk about truth, belief, conditionals, confirmation, and individual and collective decision-making. The mathematics is always introduced on the way, and only in the depth necessary for the issue at hand. So we do our best to make sure that novices to the field can follow the course with ease. To follow the course, one only needs to be acquainted with some bits and pieces of high-school mathematics, and that's it. Mathematical philosophy is accessible, and we want to show how it can be part of an introductory philosophy curriculum—just as it has become an important part of academic philosophy.

On the Cause of the Unsatisfied Paradox

According to Peter Eldridge-Smith (2012: "The Unsatisfied Paradox", *The Reasoner* 6(12), 184–5), the cause of the following paradox is unlike that of other semantic paradoxes:

> My favourite predicate just happens to be 'does not satisfy my favourite predicate'. Crete satisfies 'does not satisfy my favourite predicate' iff Crete does not satisfy my favourite predicate. Therefore, Crete satisfies my favourite predicate iff Crete does not satisfy my favourite predicate.

There was nothing special about Crete, the same goes for any other object. So, insofar as any object satisfies Eldridge-Smith's favourite predicate, it does not satisfy it, but insofar as it does not, it does. That is clearly paradoxical if satisfaction is an all or nothing affair. But, why should we assume that it is?

For a simple intuition-pump, imagine that Homer is being treated for his baldness by having hairs added to his head one by one. If each and every addition leaves Homer in a state of baldness, then he will still be bald even after a full head of hair has been added. That is paradoxical—it is an example of the Sorites paradox—because hardly anyone thinks that with the addition of a single hair Homer can go from being bald to not being bald. A few people think that he can, but for any addition for which such a change is at all plausible it is at least as plausible that Homer was already as bald as not. At such times Homer would seem to satisfy 'is bald' as much as not. In other words, 'is bald' would seem to be about as true as not of Homer. 'Homer is bald' would seem to be (making a claim that is) about as true as not.

The problem with that is that truth seems, intuitively, to be an all or nothing affair. Statements are true when they describe how things are, as opposed to how they are not. For subjects S and predicates *p*, 'S is *p*' is true if, and only if, S is *p*. But, descriptions are not always that good, or that bad. We will usually tidy up a poor description, so that it is simply true, or else false, because we reason most naturally with such descriptions. But the semantic paradoxes concern given descriptions, which we cannot simply tidy up. And while we naturally want a bivalent logic, it seems that satisfaction is not necessarily an all or nothing affair. So I would say that 'S is *p*' is true insofar as S is *p*, which coheres with 'S is *p*' being as true as not insofar as S is *p* as not. (I am reluctant to define 'as true as not' more formally, e.g., as a third truth-value, because of the problem of higher-order vagueness.) Of course, one could instead conclude that satisfaction is an all or nothing affair. For good introductions to the debate see J.C. Beall (2004: *Liars and Heaps: New Essays on Paradox*, Oxford: Clarendon Press) and Roy Sorensen (2012: "Vagueness", in Edward N. Zalta, *The Stanford Encyclopedia of Philosophy*).

Anyway, if truth and satisfaction are not, in general, all or nothing affairs, then it follows logically, from Crete satisfying Eldridge-Smith's favourite predicate insofar as it does not, that Crete satisfies it as much as not. That is, his favourite predicate is satisfied as much as not by everything. To put it another way, his favourite predicate is as true as not of everything. And that is like what happens with the other semantic paradoxes. E.g., if 'L is not true' expresses L, then L is true if, and only if, L is not true; and if truth is not an all or nothing affair, then from L being true insofar as it is not, it follows that L is as true as not. (For details see my "The Liar Paradox", *The Reasoner* 7(4).)

The example considered by Eldridge-Smith was the version of Russell's paradox (1902) that is commonly known as Grelling's paradox (it originally concerned the following predicate: to be a predicate that cannot be predicated of itself). To begin with, note that 'is short' is short, for a predicate expression. By contrast, 'is bald' does not describe itself. What about 'does not describe itself'? Well, it describes itself if, and only if, it does not, so it is paradoxical if satisfaction is an all or nothing affair. But if satisfaction is not necessarily like that, then it follows logically, from 'does not describe itself' describing itself insofar as it does not, that it describes itself as much as not. In other words (following Quine), 'not true of self' is as true as not of itself, if truth is not an all or nothing affair.

Incidentally, the paradoxes of denotation are semantic paradoxes of a different kind—they concern reference, rather than satisfaction and truth—but they do serve to underscore the above. E.g., what is the denotation of 'the things that are not now being referred to'? That expression refers to Crete, for example, only if it does not, but it only fails to refer to Crete if it does refer to it. But, if reference is not necessarily an all or nothing affair, then 'the things that are not now being referred to' refers as much as not to everything.

For an intuition-pump, suppose that Moses is wandering in a desert. He sees a mirage, which he takes to be a pool, and coincidentally there is a pool, just where he takes one to be, but it is obscured from his view by the mirage. As Moses approaches the pool, the image of the pool gradually replaces the mirage. Now, Moses is hot and thirsty, so he keeps thinking 'that pool looks cool', and as he approaches the pool, the denotation of 'that pool' gradually changes to the pool. So it will probably, at some point, have referred as much as not to the pool.

MARTIN COOKE

Two concepts of completing an infinite number of tasks

Is it logically possible to complete an infinite number of tasks, sequentially, in a finite time? James Thomson (1954, 'Tasks and Super-Tasks.' *Analysis*, 1–13) attempted, via his lamp example, to argue that it is logically impossible. A lamp begins off, and the button (that toggles the lamp between off and on) is pressed in one minute, then a half minute, then a quarter minute ... Thomson believed he had arrived at a contradiction by considering the state of the lamp at two minutes. Most people believe that Paul Benacerraf successfully replied to Thomson (by arguing that the story does not determine the state of the lamp at two minutes), and so believe that it is logically possible to complete an infinite number of tasks in a finite time. However, note that to answer the question—Is it logically possible to complete an infinite number of tasks in a finite time?—it is necessary to