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# THE REASONER

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bert, “The physics and metaphysics of primitive stuff”, forthcoming in the *British Journal for the Philosophy of Science*, and a form of structural realism (see e.g., “How to account for quantum non-locality: ontic structural realism and the primitive ontology of quantum physics”, forthcoming in *Synthese*). I spoke to Michael after this year’s Philosophy of Physics summer school in the Black Forest—the third such event that he has run with colleagues from Germany and Switzerland. Previous years were on physics and philosophy of time, and on probability in physics. This year’s theme was Ontology, which offered a fascinating mixture of physicists, philosophers of physics, and metaphysicians.

**GEORGE DARBY**  
University of Oxford

## FEATURES

### Interview with Michael Esfeld

**George Darby:** How did you get into philosophy?

**Michael Esfeld:** I started with history and took philosophy as a minor out of curiosity, then became fascinated by the questions philosophy seeks to answer and the method of answering fundamental questions by argument instead of simply expressing an opinion.

**GD:** How did you get into metaphysics of physics? (Is that the right way to describe your research?)

**ME:** I see myself as doing metaphysics tout court. Metaphysics, in Aristotle, comes after physics and is continuous with physics. Since Newton, we’ve fundamental and universal physical theories at our disposal, that is, theories that are irreducible to other theories and whose dynamical laws apply to everything in the universe. The task of metaphysics then is to spell out what there is fundamentally in the world, if

## EDITORIAL

Welcome to the September issue of *The Reasoner*. This month’s interview is with Michael Esfeld, Professor of Philosophy of Science at the University of Lausanne. For some time Michael has combined distinctive themes in metaphysics with a particular approach to the philosophy of quantum mechanics: A dispositionalist (as opposed to Humean) approach to metaphysics (see e.g., “Humean metaphysics versus a metaphysics of powers”, in G. Ernst and A. Hüttemann (eds.), *Time, Chance and Reduction*, Cambridge University Press 2010), the Primitive Ontology approach to the interpretation of quantum mechanics (see e.g., with Dustin Lazarovici, Vincent Lam, and Mario Hu-



these physical theories are on the right track. I got into the metaphysics of physics, because when studying the history of philosophy and contemporary metaphysics, I realized that neither the ideas developed by the great thinkers of the past nor armchair reflection can on their own deliver answers to the questions of what there is fundamentally in the universe and what holds the universe together: they provide guidelines for the search for answers to these questions, but the answers have to come out of physics.

**GD:** Could you tell us a bit about the key influences on your research direction?

**ME:** I did my PhD on Hobbes. I was fascinated by the early modern natural philosophers—such as Descartes, Hobbes, Newton, Leibniz—who were great scientists and philosophers at the same time, without there being any separation between science and philosophy in their work. A particularly clear example is Newton's *Principia*, where Newton constructs what then becomes classical mechanics on the basis of setting out first an answer to fundamental questions such as what is space, time, matter and motion. The point then is that Newton's answer to these questions has direct consequences for the axioms of his physical theory, which, in turn, has empirically testable consequences. So you get an empirical theory based on first principles about what there is in the universe and how what there is hangs together. To my mind, natural philosophy in this sense is the way in which one should do both physics and metaphysics. Then I wondered how quantum physics, notably quantum entanglement, fits into the picture. That is how I got into holism and then structural realism.

**GD:** You advocate a dispositionalist theory in metaphysics, a form of structural realism in philosophy of science, and a primitive ontology approach to physics. Could you explain for our readers a little about these, and how they interact?

**ME:** The primitive ontology approach identifies the objects physics talks about, such as particles. Recall that all experimental evidence in fundamental physics is evidence of particles—from dots on a display to traces in a cloud chamber. Entities that are not particles—such as waves or fields—come in as figuring in the explanation of the behaviour of the particles, but they are not themselves part of the experimental evidence. So there is a good *prima facie* reason to take the commitment to particles seriously. However, it is not a good idea to regard the particles as being equipped with intrinsic properties. This idea is already debatable in classical physics, and it breaks down completely in quantum physics, for even the paradigm candidates for intrinsic properties such as mass and charge are situated on the level of the quantum state; due to entanglement, it is not possible to attribute a quantum state to the particles taken



individually. However, it would be misguided to conclude that the basic physical objects are Lockean bare substrata. They are structurally individuated, namely by the relations in which they stand. The first and foremost candidates for such relations are the spatial or spatiotemporal ones. Recall again that all measurements come down to position measurements. Thus, the spatial or spatiotemporal relations individuate the basic physical objects, and the dynamical relations—such as the relations of entanglement incorporated in the quantum state—tell us how the spatial or spatiotemporal relations evolve. That is why these latter relations are modal: if one is committed to them, they are dispositions or powers, fixing how an initial configuration of basic physical objects evolves. Hence, in brief, there are basic physical substances such as point particles, but all there is to these substances are the relations in which they stand. There is no need for properties in the sense of intrinsic properties in physics or metaphysics. Some relations individuate these substances, namely the spatial or spatiotemporal ones, while others, namely the dynamical ones, are dispositions or powers in that they fix how the configuration of spatially related substances evolves.

**GD:** You've defended Humeanism against the charge that it is incompatible with nonseparability, yet reject it for more purely philosophical reasons. Can you tell us something about this philosophical debate, as you see it?

**ME:** The argument from quantum nonseparability or entanglement to a refutation of Humeanism is a paradigm example of a naïve, superficial reading of the formalism of a physical theory: if one subscribes to an ontological commitment to the relations of quantum entanglement, then these are modal as mentioned in the answer to the previous question, thus don't fit into a Humean framework. However, the physics by itself does not impose such a commitment upon us. The reason is that the relations of quantum entanglement are dynamical, they tell us something about the development of any given configuration of quantum objects. But they cannot individuate these objects: the quantum state is defined on configuration space, that is, the mathematical space each of whose points represents a possible configuration of particles in physical space. That is why the quantum state cannot individuate the quantum objects: it presupposes a configuration of quantum objects to which it is applied. The spatial relations are available to individuate these objects. But then the spatiotemporal distribution of the quantum objects can serve as the Humean mosaic, and the quantum state can supervene on that distribution as a whole. So the alleged refutation of Humeanism by quantum entanglement comes down to putting anti-Humeanism in and getting anti-Humeanism out. Although I've argued in favour of dispositionalism, I don't have a firm grip on the issue of Humeanism vs. a stance that endorses objective modality such as dispositionalism. If you defend, as I do, a basic ontology of permanent particles that are structurally individuated, then there are clear physical consequences for what you've to say about classical physics, quantum mechanics, quantum field theory, relativity physics—and if the physics doesn't come out right, then you've to go over the metaphysical books of your basic ontology. However, the story that employs a fundamental ontology of permanent particles in order to make sense of our best physical theories seems to be the same independently of whether you adopt a Humean or an anti-Humean attitude with

respect to the dynamical structure of these physical theories, and then one is back to the usual metaphysical stalemate between Humeanism and anti-Humeanism. That's why I search for physical consequences that can have an impact on this issue. I first thought that quantum entanglement is such a physical consequence, but then realized that the argument is fallacious. I now think that the open physical topic of a relativistic quantum dynamics may turn out to be a field where we can see concrete physical consequences of Humeanism and anti-Humeanism so that we can assess these metaphysical stances in the light of distinct physical consequences that go with each of them.

**GD:** Do you find scientists interested in these kinds of philosophical questions?

**ME:** Those who care about ontology in physics and who take philosophical argument seriously, such as the contemporary Bohmians in quantum physics with whom I collaborate. But many more should care: the quantum measurement problem, for instance, is a physical problem in the first place, not a philosophical one. It is the very problem of having a consistent physical theory of quantum mechanics at one's disposal. That's why everybody doing quantum physics should care about it.

**GD:** You've also written on consciousness and mental causation—what is the connection to your other work? (Is there a 'hard problem' in the philosophy of physics?!)

**ME:** The mind is part of the natural world. Mental causation makes this evident: my mental states cause some of the movements of my body. So mental causation should square with what physics tells us about the motion of objects in space. I don't see an analogy with the hard problem of consciousness. In philosophy of physics, you can set out the issues in a clear manner and work out the consequences. In the consciousness or qualia problem, it is not easy to set out what exactly the issue is and whether there is an issue at all. Nonetheless, there is a sort of holism in both philosophy of mind and philosophy of physics, and the two cases can be usefully compared with each other: in both cases, there's a set of objects and a structure defined on that set of objects in terms of a network of relations among these objects, with the relations being that what individuates the objects in question—inference relations when it comes to thoughts, spatial relations when it comes to physical objects.

**GD:** Do you have any recommendations for those starting out in the area?

**ME:** Start with the relevant entries in the *Stanford encyclopedia of philosophy*, read a companion or introductory book that presents the state of the art in an accurate way, then go to the classics, such as Bell's *Speakable and Unsayable in Quantum Mechanics*. Be sceptical whenever someone claims that physics as such shows this or that: there always is a—debatable—ontological presupposition behind such claims, and it is our task to assess these presuppositions.

**GD:** What is the next project? And the topic for the next summer school?

**ME:** Set out the case for a fundamental ontology of structurally individuated particles and its consequences for the whole of contemporary physics in a book with collaborators from mathematical physics so that it can be clearly evaluated what this ontology achieves and what are its drawbacks. The next summer school in July 2016 will follow up with this year's topic, focusing on the meaning of the wave function in our understanding of quantum physics.

## An Epistemically Modest Response to Disagreement, AGM-ified

AGM belief revision theory—named after the founders Alchourrón, Gärdenfors, and Makinson—provides a formal framework for modeling belief change (Alchourrón et al. 1985: 'On the logic of theory change: Partial meet contraction and revision functions', *Journal of Symbolic Logic* 50(2): 510–530). In the theory, beliefs are represented by sentences from a propositional language  $\mathcal{L}$  that is closed under the connectives  $\neg$ ,  $\wedge$ ,  $\vee$ ,  $\rightarrow$ , and  $\leftrightarrow$ . A collection of belief representing sentences  $B$  is referred to as a *belief set*, which is assumed to be (i) closed under logical consequence and (ii) logically consistent. That is,  $B = Cn(B)$ , where  $Cn(B)$  denotes the set of all logical consequences of  $B$ , and  $\varphi \wedge \neg\varphi \notin B$  for all  $\varphi$ .



One type of belief change studied in the AGM theory is the rational removal of a belief from a belief set without the introduction of any new information. This kind of belief change is modeled by *partial meet contraction* or simply contraction. Formally, contracting a belief set  $B$  by a sentence  $p$  results in the following belief set

$$B \div p := \bigcap \gamma(B \perp p). \quad (1)$$

The contracted belief set in (1) is defined as the intersection of selected maximal subsets of  $B$  that fail to imply  $p$ . The selected subsets are determined by a function  $\gamma$ , which selects a class of the most important maximal subsets of the remainder set,  $B \perp p$  (Alchourrón et al. 1985: 511).

In order to retain as many beliefs from  $B$  as possible while giving up  $p$ , the contraction operator  $\div$  is constrained by a set of *basic* rationality postulates.

$$\begin{aligned} B \div p &= Cn(B \div p) && (\div \text{Closure}) \\ \text{If } p \notin Cn(\emptyset), \text{ then } p &\notin Cn(B \div p). && (\div \text{Success}) \\ B \div p &\subseteq B && (\div \text{Inclusion}) \\ \text{If } p \notin Cn(B), \text{ then } B \div p &= B. && (\div \text{Vacuity}) \\ \text{If } Cn(p) = Cn(q), \text{ then } B \div p &= B \div q. && (\div \text{Preservation}) \\ B &\subseteq (B \div p) + p && (\div \text{Recovery}) \end{aligned}$$

The rationality postulates require an individual to only give up beliefs necessary to ensure (i) and (ii). Consequently, an individual's belief set is minimally changed in contraction.

Belief retraction typically occurs in the instances when an individual loses her faith in a particular belief and when the in-



dividual revises her set of beliefs. But another instance when belief retraction may occur is in a peer disagreement. In the philosophical literature on disagreement, Richard Feldman has claimed that epistemic peers should respond to a disagreement by *suspending judgment* on the propositions in dispute (2007: ‘Reasonable religious disagreements’, in Louise Antony (ed.), *Philosophers Without Gods: Meditations on Atheism and the Secular*, New York: Oxford University Press, 194–214). The modest response may be justified on the grounds that epistemic peers fail to have any basis for thinking that one is less likely to be mistaken than the other (see Christensen 2007: ‘Epistemology of disagreement: The good news’, *The Philosophical Review* 116(2): 187–217; Elga 2007: ‘Reflection and disagreement’, *Nous* 41(3): 478–502). Since neither peer has a sufficient reason for dismissing the other’s opinion, the disagreement ought to prompt both parties to give up their beliefs and suspend judgment for the time being. In the event that peers respond to a disagreement in this epistemically modest way, I suggest that the doxastic adjustment can be modeled, on behalf of each peer, by contraction. But before showing that contraction appropriately represents the belief change that Feldman has proposed, let us first motivate the modest view with a simple example.

Suppose that it is cold and flu season and John is feeling under the weather. He visits his physician, One, who happens to be accompanied that day by an equally competent colleague, Two. The physicians observe that John has symptoms of a mild fever. One believes that if John has symptoms of a mild fever, then he has the flu while Two believes that if John has symptoms of a mild fever, then he does not have the flu. As a result, One believes that John has the flu while Two believes that he does not. Although the physicians share the same evidence on this occasion, they end up with opposing beliefs regarding John’s flu status. Given that One and Two are equally competent physicians, how should they react to their disagreement? A reasonable suggestion is for One and Two to suspend judgment on whether John has the flu.

In modeling the belief states of the peers in the above scenario, let  $B_1 = Cn(\{s, s \rightarrow f, f\})$  and  $B_2 = Cn(\{s, s \rightarrow \neg f, \neg f\})$  be the belief sets of One and Two, respectively, and let  $s$  stand for ‘John has symptoms of a mild fever’ and  $f$  stand for ‘John has the flu’. Assuming that each peer is epistemically modest in her response to the disagreement over John’s flu status, then  $B_1$  is contracted by the sentence  $f$  and  $B_2$  is contracted by the sentence  $\neg f$ , leading to new belief sets,  $B_1 \div f$  and  $B_2 \div \neg f$ . By contracting  $B_1$  and  $B_2$  in the described ways, One and Two abandon their opposing beliefs regarding John’s flu status.

It appears that belief contraction is appropriate for modeling epistemic modesty in the face of disagreement, but is it the case that the contracted belief sets in the example actually satisfy Feldman’s proposal—that is, do the peers suspend judgment on  $f$  and  $\neg f$  after contracting? With the following definition of suspended judgment, I will show that belief contraction in response to a disagreement does indeed satisfy the proposal.

**Definition 2.** (Suspended Judgment) *For any belief set  $B$  and non-tautological sentence  $p$ , judgment is suspended on  $p$  iff  $p, \neg p \notin B$ .*

Now, we propose the following.

**Proposition** *Let a pair of belief sets  $B_i$  and  $B_j$  be opposing*

*with respect to some non-tautological sentence  $p$  such that  $p \in B_i$  and  $\neg p \in B_j$ . If  $B_i$  is contracted by  $p$  and  $B_j$  is contracted by  $\neg p$ , then the belief sets  $B_i \div p$  and  $B_j \div \neg p$  satisfy (Suspended Judgment) with respect to  $p$  and  $\neg p$ .*

*Proof.* Assume that  $B_i$  is contracted by  $p$  and  $B_j$  is contracted by  $\neg p$ . We want to show that the contracted belief sets  $B_i \div p$  and  $B_j \div \neg p$  satisfy (Suspended Judgment) with respect to  $p$  and  $\neg p$ . By the ( $\div$ Success) postulate, contracting a belief set  $B$  by a non-tautological sentence  $x$  when  $x \in B$  entails that  $x \notin (B \div x)$ . So,  $p \notin (B_i \div p)$  and  $\neg p \notin (B_j \div \neg p)$  given ( $\div$ Success). Furthermore,  $\neg p \notin B_i$  since  $B_i$  is consistent and  $p \in B_i$ . By the ( $\div$ Inclusion) postulate,  $\neg p \notin (B_i \div p)$ . Similarly,  $p \notin B_j$  since  $B_j$  is consistent and  $\neg p \in B_j$ . By ( $\div$ Inclusion),  $p \notin (B_j \div \neg p)$ . It follows that  $p, \neg p \notin (B_i \div p)$  and  $p, \neg p \notin (B_j \div \neg p)$ . Thus, the belief sets  $B_i \div p$  and  $B_j \div \neg p$  satisfy (Suspended Judgment) with respect to  $p$  and  $\neg p$ .

I now have shown that the contracted belief sets in the physicians’ example satisfy (Suspended Judgment), but do the belief sets satisfy the postulates for contraction? Yes, but with the following caveat. In order for the contractions to go through in the above case (and presumably in a number of other cases that are similar in structure), each peer must give up at least one other belief together with the belief used in contraction. This is a necessary requirement because of the closure condition. If the peers fail to give up at least one other belief in the belief change, then the belief sets  $B_1 \div f$  and  $B_2 \div \neg f$  violate ( $\div$ Success) since  $f \in Cn(\{s, s \rightarrow f\})$  and  $\neg f \in Cn(\{s, s \rightarrow \neg f\})$ .

Note that logic alone cannot determine which additional belief each peer should give up in the above instance. But it is clear which beliefs should be given up if the peers abide by the epistemic modesty principle. One should abandon belief in  $s \rightarrow f$  and Two should abandon belief in  $s \rightarrow \neg f$ . This is because the peers disagree about what John’s symptoms of a mild fever imply, and consequently the disagreement provides both with a reason to give up the believed conditionals whereas neither one has an apparent reason to throw out the belief that John has symptoms of a mild fever, provided their agreement. By giving up the conditionals, the contractions turn out to be successful and, on this occasion, both peer disagreements are resolved.

In sum, I have shown that AGM belief contraction is appropriate for modeling an epistemically modest response to a disagreement with an epistemic peer.

LEE ELKIN

Munich Center for Mathematical Philosophy

## NEWS

### Epistemology Workshop, 11–12 August

The Academy of Finland funded project Sociality of Knowledge, led by Markus Lammenranta, hosted an epistemology workshop at the University of Helsinki. The speakers were Benoit Gaultier, Michael Hannon, Jaakko Hirvelä, Jonathan Jenkins Ichikawa, Jennifer Lackey, Markus Lammenranta, Maria Lasonen-Aarnio, Alan Millar, Ram Neta and Baron Reed.

The workshop began with Jennifer Lackey’s talk “Group Assertion”. Lackey argued for an authority-based model of group assertion, according to which a spokesperson can make a group

assertion just in case she has the authority to do so. Alan Millar's talk "The Social Dimensions of Knowledge" focused on perceptual-recognitional abilities. Millar defended the view that perceptual-recognitional abilities are exhibited just in case the subject succeeds in recognizing something as such-and-such, and that such abilities aim at knowledge.

After the lunch Ram Neta gave a talk entitled "The Basing Relation". He defended the view that the basing relation is a normative relation that can be understood in terms of its relation to defeat. Michael Hannon proceeded with his talk "Knowledge Ascriptions: A User's Guide". Hannon developed a unified account of knowledge ascriptions, according to which they serve to identify reliable informants, signal the end of inquiry and to indicate that the epistemic standards that govern assertion and practical reasoning are met.

The first day ended with Markus Lammenranta's talk "How to Be a Disjunctivist?" Lammenranta argued that epistemological disjunctivism should be understood as an account of defensible belief rather than responsible belief or rational belief. Lammenranta argued that when disjunctivism is understood in such a way it is supported by our ordinary epistemic practices.

The second day started with Baron Reed's talk "Norms of Doubt". Reed argued that doubt should be understood as a connotative attitude rather than as a doxastic attitude. On the connotative attitude account doubting that  $p$  is wanting to know whether  $p$ . Benoit Gaultier continued with his talk "There Are No Authoritative Epistemic Reasons to Believe". Gaultier argued that we cannot account for the distinctive compelling force that evidence has when it comes to belief-formation in normative terms. He painted an alternative account, which didn't feature normative terms, according to which recognizing that one has clear evidence for  $p$  is just to believe that  $p$ .

In his talk "Basic Knowledge First" Jonathan Jenkins Ichikawa argued that the knowledge first program would benefit from letting basic knowledge play some of the theoretical roles that knowledge has had, where basic knowledge is understood as knowledge that is not dependent on any other piece of knowledge for its knowledge status. Maria Lasonen-Aarnio gave a talk entitled "Victims of Deceit and the Virtue of Reasonableness". Lasonen-Aarnio argued that subjects in hostile epistemic environments can practice epistemic virtues (which she understood dispositionally) since the abilities are merely masked, not lost, in such circumstances. This allowed Lasonen-Aarnio to vindicate the internalist intuitions regarding the new evil demon thought experiment while still advocating an externalist theory.

Jaakko Hirvelä ended the workshop with his talk "Knowledge, Virtue and Safety". Hirvelä argued that the satisfaction of a virtue-theoretical condition doesn't entail the satisfaction of the safety condition. Hirvelä defended a weaker formulation of anti-luck virtue epistemology that was not committed to any kind of attribution principle.

**JAAKKO HIRVELÄ**  
University of Helsinki

## Calls for Papers

**PROBABILISTIC BELIEFS:** special issue of *Theory and Decision*, deadline 1 October.

**UNCERTAIN REASONING:** special issue of *Journal of Applied Logic*, deadline 15 October.

**CONNEXIVE LOGICS:** special issue of *IfCoLog Journal of Logics and their Application*, deadline 15 October.

**REASONING, ARGUMENTATION, AND CRITICAL THINKING INSTRUCTION:** special issue of *Topoi*, deadline 30 October.

**LOGICAL PLURALISM AND TRANSLATION:** special issue of *Topoi*, deadline 30 April.

## WHAT'S HOT IN . . .

### Uncertain Reasoning

Abner E. Shimony passed away on 8 August 2015, aged 87. As the [PSA obituary](#) points out Shimony is mostly remembered for his work on the connections between physics and philosophy, two disciplines which he considered as intimately related.

Uncertain reasoners however will readily associate Shimony's name to a criticism and a refinement of the Dutch Book Argument. More precisely his A. Shimony (1955: "Coherence and the axioms of confirmation", *The Journal of Symbolic Logic* 20(1): 1–28) introduces what will become known in the literature as "strict coherence" and provides the first half of the characterisation result for regular probability functions—a result which was to be refined shortly after by John Kemeny. Strictness and regularity continue to provide interesting research questions to date.



Shimony's 1955 paper presents the key results of his PhD dissertation, written under the supervision of Rudolf Carnap. After a short historical note on the origins of the axiomatisations which eventually led to probability logic, Shimony points out how most authors either relied on a dubious appeal to intuition or resorted to rather ad-hoc considerations to justify their axioms. He then discusses two exceptions, to this lack of foundational robustness, namely R.T. Cox's axiomatisation and the de Finetti-Ramsey approach to coherence. The paper, however, only deals with the latter.

The main motivation for Shimony's work is his dissatisfaction with de Finetti's identification of coherence with avoiding sure loss. Whilst necessary, Shimony contends that the de Finetti-Ramsey notion of coherence falls short of providing sufficient constraints for the intuitive notion of rational belief. He puts it as follows:

There are sets of beliefs which are classified as coherent by their definition, but which intuitively we should classify as incoherent. Specifically, suppose X's beliefs are such that an opponent can propose a series of bets acceptable to X on the basis of his beliefs, and such that (i) X does not suffer a net loss in every eventuality, yet (ii) he makes a net gain in no eventuality, and in at least one possible eventuality he suffers a net loss. X's beliefs in this example are coherent, according to Ramsey's and De Finetti's notion of coherence, although intuitively we are inclined to say that they are incoherent.

Shimony contends that a more adequate notion of coherence should guard a rational agent from sure loss while allowing them to bet in such a way as to possibly suffer a “positive loss”. Hence Shimony’s coherence arises as a rather minimal strengthening of the classical notion, and an intuitive one at that. Then the central result of the paper follows, namely that a necessary condition for an agent’s degrees of belief to be strictly coherent is that they satisfy the usual axioms for probability logic with one essential modification, that is the usual axiom to the effect that *if  $\theta$  logically implies  $\phi$  then the probability of  $\phi \mid \theta$  must be one*, is strengthened to a biconditional. An immediate consequence of this stronger axiom is that extreme probabilities can be assigned coherently only to tautologies and contradictions. So, strict coherence provides the appropriate foundation to regular probability functions. Now whether those provide a *better* formalisation of the intuitive notion of rational degrees of belief than classical probability functions, is still an unsettled epistemological question.

As a sociological aside, it can be observed that since the publication of Shimony (1955) and the subsequent paper by J. Kemeny (1955: “Fair bets and inductive probabilities”. *The Journal of Symbolic Logic*, 20(3): 263–273) much exciting work has been done in probability logic. However not much of it seems to have found the space it deserves in mainstream logic. Recent important exceptions exist, notably J. Paris, and A. Venkovska (2014: *Pure Inductive Logic*. Cambridge University Press.) which we hope will serve to revive the logicians’ interest in the foundations of uncertain reasoning.

HYKEL HOSNI

Marie Curie Fellow,  
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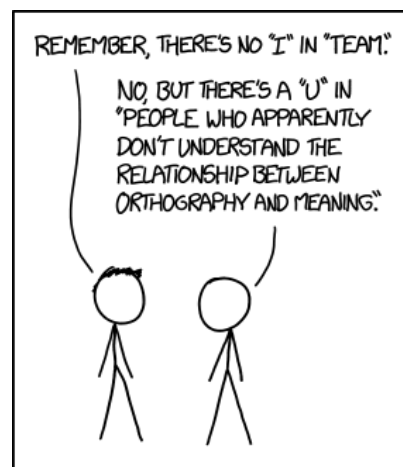
## Evidence-Based Medicine

Antibiotics play a crucial role in modern medicine by controlling bacterial infection. For instance, much surgery would be life-threatening without an ability to control infection. However, antibiotics are becoming less effective due to antimicrobial resistance. The overuse of antibiotics gives bacteria that happen to be resistant a greater chance of spreading. In the words of a [Public Health England report](#): ‘Antibiotics are unlike other drugs used in medicine, as the more we use them the less effective they become.’

Antimicrobial resistance would not be a great a problem, were new antibiotics being discovered and made available. Unfortunately, recent decades have seen a so-called [discovery void](#). The [reason](#) behind this void may be that the development of new antibiotics is not as profitable as targeting chronic diseases, so far as pharmaceutical companies are concerned.

Now, the [Longitude Prize](#) is offering a £10 million incentive to help tackle the problem. This prize will reward the development of a diagnostic test which would allow for a more targeted use of antibiotics. News relating to the prize is available at [the prize blog](#).

Other steps are also being taken. Antimicrobial stewardship is defined as ‘an organisational or healthcare-system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness’. Last month, [NICE](#) released [an antimicrobial stewardship guideline on the use of antibiotics and antimicrobials more generally](#). This new guideline aims ‘to change prescribing practice to help slow the emergence of antimicrobial resistance and ensure that antimicrobials



xkcd.com

remain an effective treatment for infection.’ The guidance puts forward best practice recommendations on the effective use of antibiotics, and the evidence for the recommendations is detailed in the [full guideline](#).

The recommendations include reviewing prescribing practices and using feedback to change these practices where necessary. It was reported in the BBC as a [call to punish GPs over antibiotics](#). Readers might be interested in the lively debate this sparked in the [comments section](#).

MICHAEL WILDE

Philosophy, Kent

## EVENTS

### SEPTEMBER

- [EV](#): Epistemic Vices, Durham University, 2–3 September.
- [DA](#): Conference on Data Analysis, University of Essex, 2–4 September.
- [RSS](#): Royal Statistical Society Conference, University of Exeter, 7–10 September.
- [ITA](#): 6th International Conference on Internet Technologies & Applications, Wrexham, North Wales, 8–11 September.
- [EPC](#): Buffalo Annual Experimental Philosophy Conference, Buffalo, New York, 11 September.
- [MoS](#): Metaphysics of Science, Rutgers University, 17–18 September.
- [MICE](#): Methods to Identify Causal Effects, Edinburgh, 21 September.
- [EPSA](#): 5th conference of the European Philosophy of Science Association, Heinrich Heine University, Düsseldorf, 23–26 September.
- [NCL](#): Non-Classical Logic—Theory and Applications, Torun, Poland, 24–26 September.
- [ADT](#): Conference on Algorithmic Decision Theory, Lexington, Kentucky, 27–30 September.

### OCTOBER

- [CPK](#): Workshop on Capturing Scientific Knowledge, Palisades, New York, 7 October.



**URSW:** Uncertainty Reasoning for the Semantic Web, Bethlehem, Pennsylvania, October 11–12.  
**NOR:** Is There No Objective Reality? Ripoll, Spain, 13–15 October.  
**DBD:** Conference on Defining the Boundaries of Disease, Macquarie University, 15–16 October.  
**P&N:** Pluralism and Normativity, University of Bologna, 22–24 October.  
**LORI:** 5th International Conference on Logic, Rationality and Interaction, Taipei, Taiwan, 28–31 October.

#### NOVEMBER

**SSE:** 50 Shapes of Scientific Explanation, Ghent University, 13–14 November.  
**EN:** Epistemic Norms Conference, KU Leuven, 9–11 November.  
**AMBN:** Advanced Methodologies for Bayesian Networks, Yokohama, Japan, 16–18 November.  
**WoK:** Ways of Knowing: Feminist Philosophy of Science and Epistemology, Dublin, Ireland, 27–28 November.

## COURSES AND PROGRAMMES

### Courses

**COMBINING PROBABILITY AND LOGIC:** University of Kent, 20–21 April.  
**EPICENTER:** Spring Course in Epistemic Game Theory, Maastricht University, 8–19 June.  
**EPICENTER:** Mini-course on Games with Unawareness, Maastricht University, 22–23 June.

### Programmes

**APHIL:** MA/PhD in Analytic Philosophy, University of Barcelona.  
**MASTER PROGRAMME:** MA in Pure and Applied Logic, University of Barcelona.  
**DOCTORAL PROGRAMME IN PHILOSOPHY:** Language, Mind and Practice, Department of Philosophy, University of Zurich, Switzerland.  
**HPSM:** MA in the History and Philosophy of Science and Medicine, Durham University.  
**MASTER PROGRAMME:** in Statistics, University College Dublin.  
**LoPHiSC:** Master in Logic, Philosophy of Science & Epistemology, Pantheon-Sorbonne University (Paris 1) and Paris-Sorbonne University (Paris 4).  
**MASTER PROGRAMME:** in Artificial Intelligence, Radboud University Nijmegen, the Netherlands.  
**MASTER PROGRAMME:** Philosophy and Economics, Institute of Philosophy, University of Bayreuth.  
**MA IN COGNITIVE SCIENCE:** School of Politics, International Studies and Philosophy, Queen's University Belfast.  
**MA IN LOGIC AND THE PHILOSOPHY OF MATHEMATICS:** Department of Philosophy, University of Bristol.  
**MA PROGRAMMES:** in Philosophy of Science, University of Leeds.  
**MA IN LOGIC AND PHILOSOPHY OF SCIENCE:** Faculty of Philosophy, Philosophy of Science and Study of Religion, LMU Munich.  
**MA IN LOGIC AND THEORY OF SCIENCE:** Department of Logic of the Eotvos Lorand University, Budapest, Hungary.

**MA IN METAPHYSICS, LANGUAGE, AND MIND:** Department of Philosophy, University of Liverpool.  
**MA IN MIND, BRAIN AND LEARNING:** Westminster Institute of Education, Oxford Brookes University.  
**MA IN PHILOSOPHY:** by research, Tilburg University.  
**MA IN PHILOSOPHY, SCIENCE AND SOCIETY:** TiLPS, Tilburg University.  
**MA IN PHILOSOPHY OF BIOLOGICAL AND COGNITIVE SCIENCES:** Department of Philosophy, University of Bristol.  
**MA IN RHETORIC:** School of Journalism, Media and Communication, University of Central Lancashire.  
**MA PROGRAMMES:** in Philosophy of Language and Linguistics, and Philosophy of Mind and Psychology, University of Birmingham.  
**MRES IN METHODS AND PRACTICES OF PHILOSOPHICAL RESEARCH:** Northern Institute of Philosophy, University of Aberdeen.  
**MSc IN APPLIED STATISTICS:** Department of Economics, Mathematics and Statistics, Birkbeck, University of London.  
**MSc IN APPLIED STATISTICS AND DATAMINING:** School of Mathematics and Statistics, University of St Andrews.  
**MSc IN ARTIFICIAL INTELLIGENCE:** Faculty of Engineering, University of Leeds.

#### MA IN REASONING

A programme at the University of Kent, Canterbury, UK. Gain the philosophical background required for a PhD in this area. Optional modules available from Psychology, Computing, Statistics, Social Policy, Law, Biosciences and History.

**MSc IN COGNITIVE & DECISION SCIENCES:** Psychology, University College London.  
**MSc IN COGNITIVE SYSTEMS:** Language, Learning, and Reasoning, University of Potsdam.  
**MSc IN COGNITIVE SCIENCE:** University of Osnabrück, Germany.  
**MSc IN COGNITIVE PSYCHOLOGY/NEUROPSYCHOLOGY:** School of Psychology, University of Kent.  
**MSc IN LOGIC:** Institute for Logic, Language and Computation, University of Amsterdam.  
**MSc IN MIND, LANGUAGE & EMBODIED COGNITION:** School of Philosophy, Psychology and Language Sciences, University of Edinburgh.  
**MSc IN PHILOSOPHY OF SCIENCE, TECHNOLOGY AND SOCIETY:** University of Twente, The Netherlands.  
**MRES IN COGNITIVE SCIENCE AND HUMANITIES: LANGUAGE, COMMUNICATION AND ORGANIZATION:** Institute for Logic, Cognition, Language, and Information, University of the Basque Country (Donostia San Sebastián).  
**OPEN MIND:** International School of Advanced Studies in Cognitive Sciences, University of Bucharest.

## JOBS AND STUDENTSHIPS

### Jobs

**POST DOC:** in Causal Analysis in Economics, Sant'Anna School of Advanced Studies, open.  
**PROFESSORSHIP:** in Science Studies, Aarhus University, open.  
**ASSISTANT PROFESSORSHIP:** in Philosophy of Physics, Munich Center for Mathematical Philosophy, deadline 3 September.  
**PROFESSORSHIP:** in Mathematical Logic, University of Oxford, deadline 7 September.

**RESEARCH FELLOWSHIP:** in Model Uncertainty, Monash University, deadline 15 September.

**POST DOC:** in Philosophy of the Social Sciences, Munich Center for Mathematical Philosophy, deadline 15 September.

**ASSOCIATE PROFESSORSHIP:** in Probability Theory, University of Copenhagen, deadline 25 September.

**LECTURESHIP:** in Machine Learning, University of Glasgow, deadline 30 September.

**RESEARCH FELLOWSHIP:** in Historical & Philosophical Studies, University of Cambridge, deadline 1 October.

**ASSOCIATE PROFESSORSHIP:** in Statistics, University of Bath, deadline 11 October.

**POST DOC:** in Justifying Intuitive Judgments, Aarhus University, deadline November 1.

## Studentships

**PHD POSITION:** in Theoretical Philosophy, University of Oslo, deadline 1 September.

**PHD POSITION:** in Logic and Computation, University of Liverpool, deadline 7 September.

**PHD POSITION:** in Justifying Intuitive Judgments, Aarhus University, deadline November 1.

