THE REASONER

CONTENTS

EDITORIAL

Reasoning is *naturally* multi-disciplinary, inter-disciplinary, inter-sectoral. While those tend to appear as buzzwords in the narrative of funding agencies in Europe and elsewhere, reality's bitterly different. Reasoners struggle a lot when the workings of academia demand comparison with more focussed areas, both in the Natural and the Social sciences. At that moment, our strength is likely to turn into our weakness. Community building and its consolidation are therefore no less than vital to us.

We feed on ideas, results, and techniques developed in neighbouring fields. There's no lack of success stories to be told. The *Journal of Logic and Computation* witnesses the merging of several threads which now coexist indistinguishably under that very heading.

Interactive Epistemology is the term preferred by many game theorists who are more keen to mention succinctly what they do, rather than compiling a long list of theories or disciplines which contribute to their goal. *Computational Social Choice* is a heading that really speaks for itself. Those are the very first names that come to mind from a logical point of view. Many equally bright success stories could be readily mentioned from alternative points of view. Reasoning thrives in a large enough and diverse enough scientific community. By the way, make sure you join us at the Center for Logic, Language, and Cognition in Torino for the Fifth Reasoning Club Conference on 18-19 May 2017.

There is a second, more subtle, role for a strong reasoning community, and it has to do with the great challenge of making our work relevant outside the academia. There are currently great challenges in the epistemological, ethical, legal issues raised by data intensive methodologies in the biomedical sciences, in machine learning and algorithmic governance. Those are mostly *reasoning* challenges with a tremendous impact in policy-making. Think of the enormous amount of delicate work needed for understanding and communicating scientific uncertainties related to climate change, natural disasters and financial risks. Or think of the methodological subtleties of Evidence-Based Medicine especially when it is asked to inform something as delicate and complex as health care policy. Thanks to Michael Wilde's columns, readers of The Reasoner have been reading about this fascinating topic for quite some time.

This brings me to a very important point. To keep up the great work Jon Williamson, the founding Editor of this gazette,

and his collaborators have been doing for the past ten years, we need your help. So please do contribute to The Reasoner and help us serving the community of reasoners. There are many ways to do it, some of which are new and require a brief introduction.

The reasoner speculates

In principle, the multi-disciplinary, inter-disciplinary, inter-sectoral nature of reasoning means that we get a chance to play in everyone's backyard. In practice things turn out to be different.

We are all under a tremendous pressure to publish the largest number of papers in the highest quality journals. This is what one's got to do to get a job after the PhD, then to turn it into a permanent position, then to get a major grant. Those who can, adapt to this pressure, which then becomes normal. So normal one just keeps being under pressure because it's been like this for so long one doesn't even notice any more – why on earth should one *not* aim at the greatest number of least publishable units in the best possible journals? However, striving for the efficient frontier means that, in practice, we don't really play in any backyard at all.

One situation in which this pressure is temporarily lifted is conference dinners. Sometimes with the help of a couple of drinks, speculation kicks in. And under favourable conditions, it may turn into the most interesting part of the workshop. Not that the talks aren't good – they usually are. But there's something different going on in those chats, which is facilitated by not talking on slides, and not being scheduled. It's free range reasoning going on in the conference backyard. *The Reasoner Speculates*, is a new section of this gazette dedicated to sharing ideas in that way.

As some will have already figured out, the heading borrows –well, steals– from statistician I.J. Good who edited in 1962 a volume titled "The Scientist Speculates: A collection of partly-baked ideas". Good's explanation of the key idea behind the project is simple: "It is often better to be stimulating and wrong than boring and right". It seems appropriate that *The Reasoner Speculates* should start with I.J. Good's own initial contribution to the volume. It will also provide very useful editorial guidelines.

Dissemination Corner

Are you leading a major individual or collaborative research project? *The Dissemination Corner* allows you to tell us all about it: the scientific results, the open positions and the events related to the project. By doing this you will also help creating awareness of what's currently going on (and what's been funded) in the wider field of reasoning.

Franz Berto's *Logic of Conceivability* starts off the Dissemination Corner in this issue. By the way, Franz is hiring on this project *right now*, check the details below.

If you'd like to contribute to the Dissemination Corner, please send us a 1000 word description of your project. Depending on the size of your project/group you will then submit a bi-monthly or a semesterly update.

The Reasoner Reviews

The Reasoner Reviews introduce a research topic from the point of view of the reasoner who reviews it. It is less comprehensive, more personal, and less history-oriented than an encyclopaedia entry. It is future-oriented to the extent it puts open problems under the spotlight, especially those which will benefit from a multi-disciplinary take. It should be no longer than 2000 words.

Multiple *Reviews* are encouraged for the very same topic. Ideally, but not necessarily, *The Reasoner Reviews* provide the background for regular columns on *What's hot in . . .* the topic.

Reviews from recent PhD graduates are particularly welcome, and will be labelled as such. Do not hesitate to present *your* view of the field, because that's what we are interested in, along with your results (of course!).

What's Hot in. . .

This isn't new at all, it is rather one of the most recognisable feature of The Reasoner. However I'd like to spend the last few words of this editorial on it. Currently running columns include *Evidence-Based Medicine* by Michael Wilde and *Uncertain Reasoning* by Seamus Bradley. *(Formal) Argumentation Theory* by Sanjay Modgil is in the pipeline, as is a regular contribution on *Financial Reasoning* edited by Nicolas Wuethrich. But there are many more topics of interest here, including all things related to Statistics/Machine Learning/Big Data, Legal Reasoning and the Psychology of Reasoning. If you are interested in reporting on *What's Hot in* your area, please send us a *Review*. Columns should be no longer than 1000 words.

How to contribute

Please submit all your contributions, preferably in plain LATEX (which becomes mandatory if your piece requires typesetting formulas) to features@thereasoner.org. Precise editorial guidelines are available on http:\thereasoner.org

HYKEL HOSNI
University of Milan

FEATURES

Forecasting with Information Markets

Recent times have not exactly seen a shortage of events surprising professional forecasters. Ranging from the outcome of UK's referendum on EU membership to Donald Trump winning the presidency in the US, experts and polls have failed to predict highly significant events. So how can we do better?

One good place to start is with information markets, which over the past couple of decades have proven highly accurate in generating predictions in a wide variety of areas. For this reason, the Department of Philosophy at the University of Kent recently brought Mike Halsall, the executive chairman of one information market platform, Dysrupt Labs, to campus to talk to Kent students about the platform and how it might help us make better forecasts.

Halsall's session focused on predicting political events and economic movements. One particularly interesting application of Dysrupt's technology is in collaboration with the proprietary

investment fund Real World Capital, which uses the price signals on Dysrupt's markets to guide investment decisions. The collaboration is still in its early days, having only been ongoing since January, but the data is looking encouraging so far. We hope to bring Kevin Regan, co-founder of Real World Capital, to Kent in due course, when there's more than a couple of months' worth of data available.

How about political events? The mean Brier score of Dysrupt's main, public platform—almanis.com—is about 0.2 for geopolitical events. That said, almanis did not decisively predict Trump winning the presidency until election night. However, the market was quite jittery, regularly dipping below 50% for a Clinton win since June, 2016, suggesting that the market felt that her win was far from a foregone conclusion. Something similar held true for its market on the UK's EU referendum: while the final price landed at 81% for remain, the signal was below 25% several times in the months leading up to the referendum, making for a fairly volatile market.

This suggests that the markets, while far from perfect, nevertheless communicated a greater degree of uncertainty than many experts and pundits, who in many cases saw a win for Remain and for Clinton as a given. And in forecasting, it is of course comparative performance that matters. At the same time, these particular markets also illustrate well that it's far from a trivial matter exactly how to read them, with the price signal at any given time only constituting part of the information that can be gleaned from the price development over time.

The remainder of the session was dedicated to a talk by me on a limitation to current information markets: settling pay-offs requires waiting until the event bet on takes place (or fails to take place), which makes it impossible to bet on events far into the future or on counterfactual events. That is, unless there's a way to set up self-resolving market, which ties rewards, not to the occurrence of some event external to the market, but instead to events internal to the market. For example, a market might settle bets with reference to the market value at some pre-specified time, unknown to the traders. Come that time, whatever the market value is, that?s what determines who gets rewarded.

Can such markets be made to work with anything resembling the accuracy of traditional, externally resolved markets? There's some reason to believe that they can, provided that they develop into a type of coordination game. In light of that, I will over the coming months be setting up a variety of experimental markets on Dysrupt's platform to determine the extent to which betting behaviour is the same on self-resolved markets as on externally resolved markets. As we're currently in the process of recruiting traders for the relevant markets, anyone interested should feel free to get in touch on hka@kent.ac.uk about getting added to the list of participants.

KRISTOFFER AHLSTROM-VIJ
University of Kent

NEWS

Dutch Social Choice Colloquium: Kenneth Arrow, 21 April

The Dutch Social Choice Colloquium (DSCC) regularly gathers together researchers in the area of collective decision making and general enthusiasts in Amsterdam, Maastricht, and Rotterdam. Organizers and participants come from a wide spectrum of disciplines, such as Economics, Mathematics, Political Science, Philosophy, and Artificial Intelligence among others. The most recent meeting of the DSCC on the 21st of April honoured Kenneth Arrow and was hosted by Ulle Endriss at the University of Amsterdam.

Kenneth Arrow (1921-2017) was a prominent American economist and Nobel laureate, who played a central role in the development of Social Choice Theory. The story begins with his famous impossibility theorem in 1951. Arrow brought into light a fascinating yet disturbing result, proving that any voting procedure that satisfies a number of—at first sight—plausible criteria is condemned to be a dictatorship. The meeting in Amsterdam consisted of three talks, which discussed several aspects of Arrow's personality and academic impact, as well as new results in the field.

Salvador Barberà from Barcelona was the first to highlight the human side of the giant of Economics. After reviving some of his own interactions with Arrow in Spain, he noted that the main focus of his work, that is, strategic manipulation in voting, was already pointed out by Arrow in the introduction of the 1951 book "Social Choice and Individual Values". Following this, novel results were presented, concerning the relation between the mathematical structure of the individual preferences (namely, domain restrictions), and the individuals' incentives to misrepresent their preferences.

Afterwards, Herrade Igersheim from Strasbourg took a more historical perspective and centered her talk on the tensions between Kenneth Arrow and Paul Samuelson, which stemmed from scientific disagreements, but also deteriorated due to the intense rivalry between them. Two worlds, a pre-Arrow and a post-Arrow one, were analyzed, representing the fields of Welfare Economics and Social Choice Theory respectively. Lastly, intriguing insights were provided regarding the term "social welfare function", which constituted a scientific battlefield for more than fifty years.

The last talk was delivered by Hans Peters from Maastricht. He examined social choice functions (e.g., voting rules) and correspondences (e.g., voting procedures that elect more than one candidate) that exhibit the property of Condorcet consistency and avoid the participation paradox. The former prescribes the collective selection of Condorcet winners, if any, i.e., those alternatives that win in a pairwise majority competition against every other alternative. The participation paradox on the other hand is realized in collective decision making when there are individuals who are able to achieve a better result for themselves by avoiding to report their preferences. After formulating a hypothesis about the possible Condorcet winner in the recent Dutch elections and illustrating a number of relevant examples, original work was presented.

The meeting in Amsterdam made Arrow's influence evident to younger scholars, and shed light on hidden dimensions of

the history of Social Choice and modern Economics associated with him, to the surprise of the older ones. The next edition of the DSCC will take place on the 9th of June in Rotterdam.

ZOI TERZOPOULOU
ILLC, University of Amsterdam
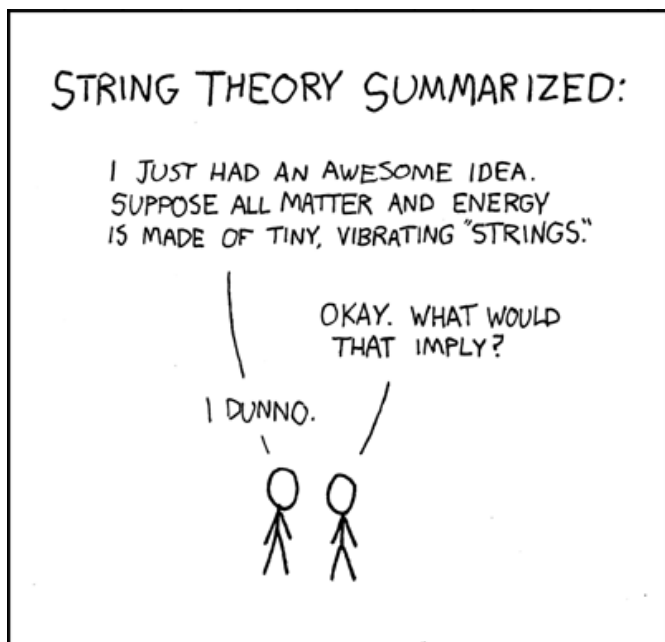
Calls for Papers

FORMAL AND TRADITIONAL EPISTEMOLOGY: special issue of *MANUSCRITO*, deadline 1 July 2017.

LOGIC, INFERENCE, PROBABILITY AND PARADOX: special issue of *Philosophies*, deadline 20 July 2017.

NEW TRENDS IN RATIONAL CHOICE THEORY: special issue of *Topoi*, deadline 27 August.

FOUNDATIONS OF CLINICAL REASONING: AN EPISTEMOLOGICAL STANCE: special issue of *Topoi*, deadline 31 August.

KNOWLEDGE AND JUSTIFICATION: NEW PERSPECTIVES: special issue of *Synthese*, deadline 1 September.

REASON & RHETORIC IN THE TIME OF ALTERNATIVE FACTS: special issue of *Informal Logic*, deadline 1 September.

WHAT IS A COMPUTER?: special issue of *Minds and Machines*, deadline 30 September.

THE REASONER SPECULATES

pbis

A partly-baked idea or PBI is either a speculation, a question of some novelty, a suggestion for a novel experiment, a stimulating analogy, or (rarely) a classification. It has a bakedness of p that is less than unity, or even negative. The bakedness of an idea should be judged by its potential value, the chance that it can be completely baked, its originality, interest, stimulation, conciseness, lucidity, and liveliness. It is often better to be stimulating and wrong than boring and right.

A very rough guide to the maximum length that a pbi should have is given by the formula

$$10^{9px/2} \text{ words}$$

where x, the importance of the topic, is between 0 and 1. For example, the maximum length for a negatively-baked idea is less than one word. An idea can compensate in importance what it lacks in bakedness, and conversely. The formula is applicable to each sentence and to each paragraph, as well as to the whole of a contribution. For the non-specialist, the formula makes sense even when $px = 1$, but in this anthology px rarely exceeds 7/9.

A possible justification for the exponential or antilogarithmic form is that if an idea is developed to a certain length d, then the size of the expository tree increases roughly exponentially with d, if the multifurcation of the tree is the same at every level.

One may conjecture a similar formula for the distribution of ideas among people. The distribution is certainly very skew, perhaps something like that of a Pareto income distribution.[...]

A suggestion for a periodical *Half-Baked Ideas* was published in 1958. As a consequence Mr Alan J. Mayne offered his services as an Associate Editor. Professor Marvin L. Minsky, in a discussion with Mr. Mayne suggested that a book would be easier to organise in the first place. [...]

Two objections have been raised against the publication of partly-baked ideas, both concerned with the murky matter of credit assignment:

1. The man who publishes might get all the credit at the expense of the more diligent later worker who develops the idea, perhaps even in ignorance of the earlier publication.

2. The man who develops the idea might get all the credit at the expense of the more imaginative man who altruistically gave the idea away by publishing it.

I shall not take refuge in the glib answer that credit does not matter. Since we are not all saints, *our own* credit does matter to most of us, like our own money and our own freedom. I would rather reply that mistakes in the assignment of credit can be made for many different reasons, one of them being that other people's credit might seem unimportant. The obvious thing to do is to award joint credit when joint credit is due. Fewer mistakes would be made if more attention were paid to the theory of credit-assignment, *kudology* (from the Greek [...] *kudos*). The subject could be regarded as a branch of economics, and many books could be written about it. It would depend on the theory of probabilistic causality.

When there is nowhere to publish an idea it is liable to get lost unless its saintly or drunken originator gives it away free in conversation. Thus the lack of a medium of publication acts as a disincentive even to the verbal dissemination of ideas.

IRVING JOHN (JACK) GOOD

The Logic of Conceivability

The Logic of Conceivability (LoC): Modeling Rational Imagination with Non-Normal Modal Logics is a 5-year (2017-2021) research project, funded by the European Research Council (ERC) with a grant of nearly 2 million Euros within the Horizon 2020 programme (ref. 681404). The project is hosted by the Institute for Logic, Language and Computation (ILLC) at the University of Amsterdam. Its aim is to answer the question: What is the logic of conceivability?

To unpack a bit: LoC wants to study how we reason when we imagine non-actual scenarios. We engage in such exercises all the time, for instance, when we speculate about what may happen to us and how we would react: 'What am I to do if I don't get my Green Card?'. Or when we make counterfactual hypotheses about the past, thinking of how things might have gone differently: 'Would he have had the accident, had he stopped when the traffic light was yellow?'. Thought experiments in science work analogously: think of Galileo's thought experiment on falling bodies. It appears that we can form new justified beliefs this way (Galileo *refuted* the Aristotelian theory of motion via pure thought). But how can we know about reality by considering unreal scenarios in our mind? If we understand better how this happens, we may also get better at doing it.

Surely some things follow in the envisaged scenarios, some not. Thus, such exercises of imagination must have some kind of *logic*. What logic? The mainstream logical treatment of representational mental states comes from modal logic's possible worlds semantics. This is a success story of contemporary systematic philosophy: initiated by authors like Hintikka, the modal analysis of knowledge, belief, information, was taken up by fields ranging from formal semantics to game theory and Artificial Intelligence. However, the mainstream approach faces problems. LoC aims to address them systematically.

One logical problem is that standard epistemic logics, while providing very precise mathematical models, usually represent heavily idealized reasoners: agents who are logically omniscient as well as perfectly consistent in their beliefs. A key idea of the LoC project is that logical models can get closer to real reasoners by taking on board results from the psychology of reasoning. An amount of empirical work shows which kinds of fallacies are common, the sort of mistakes people are more prone to make. Combining this with accurate logical techniques may give realistic and enlightening models of human reasoning in so-called 'off-line' mental simulation.

One philosophical problem LoC wants to tackle concerns the entailment from conceivability to so-called absolute possibility in 'thought experiments' of theoretical philosophy: how does conceiving a scenario give evidence of its possibility? Modal rationalists like Chalmers move from a certain kind of conceivability of a functional duplicate of a human devoid of consciousness to its possibility, and from this, via the widely accepted necessity of identity and difference, to the actual distinctness of consciousness from brain functions. Such strategy is at times met with skepticism, as wild speculation, by authors like Dennett. The LoC aims to provide a logical framework within which the connection between imagination and knowledge of absolute possibility can be assessed.

Also, exactly what do 'conceivability' and 'imagination' mean here? Such notions are highly ambiguous and used in different ways in the debates around these issues. LoC wants to say something on this, too, by combining logical rigor with attention to theories of mental representation coming from cognitive science research.

CONCEIVING PEOPLE

I am LoC's principal investigator. LoC already hosts one PhD candidate, Tom Schoonen, a former student of the Master of Logic at the ILLC, and a 4-year postdoc, Peter Hawke, who joined the team after finishing his PhD at Stanford.

The project also has a number of associates who actively participate to the Research Seminar of the project and to various LoC activities: Chris Badura, a PhD candidate at the Ruhr University of Bochum, co-supervised by Heinrich Wansing and me; Ilaria Canavotto, an ILLC PhD candidate co-supervised by Sonja Smets and me; Manuel Gustavo Isaac, a 1.5 year postdoc funded by the Swiss National Science Foundation; and Margot Strohminger, who is officially joining ILLC in 2018 as a two-year Marie Curie postdoc.

The LoC also has an Advisory Board of top-level scholars: Catarina Dutilh Novaes, Graham Priest, Bjorn Jespersen, Greg Restall, and Heinrich Wansing.

Besides, we're hiring! There are two more LoC full-time positions currently being advertised: a 4-year postdoc on the psychology of reasoning and another 4-year postdoc on mathematical logic and AI – both are 100% research positions for people who will help us with the core LoC theory. Thus, apply (details in the two links above), and come to work with us!

EARLY RESULTS

The first project year is to be devoted to the *foundations* of the theory: what is the best logical framework to model the phenomena LoC aims to model? How do we fine-tune the notions of conceivability and imagination we are going to work with when we develop the core theory? We have a couple of interim reports in this area: a *Synthese* paper by Tom and me, called *Conceivability and Possibility: Some Dilemmas for Humeans*, and an *Erkenntnis* paper by me, called *Impossible Worlds and the Logic of Imagination*. Both are available for free at these links (all of the LoC project outcomes will be open access). So-called non-normal or impossible worlds are my favorite framework for the logical modeling of intentional notions, and I am also working on a book on them, together with my friend Mark Jago. The book is under contract with Oxford University Press and, if things go as planned, it should come out in 2019.

FRANZ BERTO
Institute for Logic, Language and Computation (ILLC),
University of Amsterdam

Uncertain Reasoning

Hykel Hosni has been elevated to the role of editor in chief of this august publication, and I am taking over as arbiter of what's hot in uncertain reasoning. My name is Seamus Bradley and I am an Assistant Professor in the Philosophy department at the university of Tilburg. I've been working on formal epistemology and decision theory since my PhD, mainly on imprecise probabilities. To set the tone for my tenure as "What's hot..." writer, I thought I'd start with a grumpy rant about terminology.

I want to ban "Bayesianism".

I want to get rid of it completely. Not the idea or practice, but the term "Bayesianism" and "Bayesian" and all its cognates. And why do I want to do this? Because it's such a vague term that describing someone or something as "Bayesian" tells you almost nothing about that person or thing. This is a topic that Hykel discussed in this very column on a couple of occasions (April 2012, February 2016). To be clear, I really have in mind the use of "Bayesian" in philosophy: maybe statisticians know what they mean when they talk about "Bayesian statistics" (although I have my suspicions even here). I think what I say here will also apply to the use of "Bayesian" in psychology and economics, although I don't feel confident enough to say so for sure.

So, what might someone mean by asserting that they are a Bayesian, or that their model is Bayesian? Well, they at least mean that they think rational agents' degrees of belief conform to the axioms of probability. What else? Learning through conditionalisation? Choice through maximisation of utility? Many people might accept either or both of these as part of what it is to be a Bayesian, but not everybody does. Our erstwhile editor in chief Jon Williamson describes himself as an "Objective Bayesian" but does not think learning proceeds through conditionalisation but rather through maximising entropy subject to the new constraints imposed by your new total evidence (see his *In Defense of Objective Bayesianism* (2010, OUP)). Alternatives to maximisation of expected utility as a means of decision making abound, and sometimes they are described as "Bayesian" and sometimes not. Lara Buchak's *Risk and Rationality* (2013, OUP) develops an alternative to standard expected utility theory. She sensibly avoids using the term "Bayesian" completely.

Even on the question of whether Bayesianism commits you to the view that rational credences are probabilistic, there is controversy. Are those who endorse some sort of "imprecise credence" view – rational agents' degrees of belief are represented by a set of probability functions – Bayesians or not? Richard Jeffrey and Isaac Levi both endorsed something like this, and both took themselves to be Bayesians of a sort.

So ban "Bayesianism". Whenever you feel yourself reaching for the word, find some other way of speaking that actually says what you want to say. Do you mean that someone is a probabilist about credences? Do you mean that your agent updates through conditionalisation? Are you saying something about the decision rule in place? If that's what you mean, say so. Or, if you want to use "Bayesian" as a label, start by explaining what it is you mean by your use of the term.

SEAMUS BRADLEY
Philosophy, University of Tilburg

Evidence-Based Medicine

Recently, there was a debate held at the University of Oxford on the question: "Are mechanisms necessary to establish treatment effects?" The debate was held as part of a module on the History and Philosophy of Evidence-Based Health Care, which is one module on MSc in Evidence-Based Health Care offered by the Department of Continuing Education at the University of Oxford. The debaters were Jeremy Howick (Oxford) and Jon Williamson (Kent). And it was chaired by Jeffrey Aronson (Oxford).
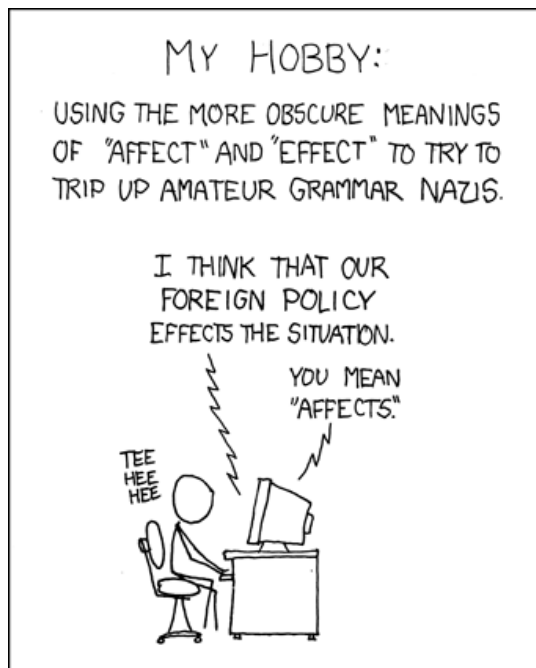
Williamson began by claiming that establishing the effectiveness of some treatment requires not only establishing a correlation between the treatment and a positive health outcome but also requires establishing the existence of a mechanism that can explain the extent of this correlation. He pointed out that an established correlation between a treatment and some health outcome may have many non-causal explanations. And he argued that it is evidence of mechanisms that helps to rule out these explanations and thereby establish the treatment effect. Accordingly, he answered the question positively: Evidence of mechanisms is required to establish treatment effects.

Howick then responded that it was too extreme to claim that establishing treatment effects requires evidence of mechanisms. He cited a number of examples intended to show that in some cases treatment effects were established without having established the existence of a mechanism. In particular, he argued that it was established that lemon juice was an effective treatment for scurvy even though there was no evidence of the mechanism by which lemon juice was effective in this respect. However, Howick also argued the current evidence-based medicine is too extreme in the other direction by downplaying the role of evidence of mechanisms in establishing treatment effects. He argued that sufficiently high-quality evidence of mechanisms can help to establish treatment effects.

The floor then opened for questions. One question was whether there was a compromise between the controversial claim that evidence of mechanisms is necessary for establishing treatment effects and the controversial downplaying of evidence of mechanisms by current evidence-based medicine. Williamson argued that such a compromise is possible in the form of the EBM+ project. He explained that the goal of this project is intended to be relatively uncontroversial, namely, simply to help improve the way that evidence-based medicine deals with evidence of mechanisms.

MICHAEL WILDE
Philosophy, Kent

MY HOBBY:
USING THE MORE OBSCURE MEANINGS OF "AFFECT" AND "EFFECT" TO TRY TO TRIP UP AMATEUR GRAMMAR NAZIS.

I THINK THAT OUR FOREIGN POLICY EFFECTS THE SITUATION.

YOU MEAN "AFFECTS."

TEE HEE HEE

Events

May

FM&SɪP2: Formal Methods and Science in Philosophy 2, Inter-University Center Dubrovnik, 4–6 May.

ReaDoubt: From Reasonable Doubt to Undue Scepticism Interdisciplinary Conference, Birkbeck College, London, 4–6 May.

M-ODM: Workshop on Multi-Objective Decision Making, Brazil, 8–9 May.

ADVERSE: Adversarial Reasoning in Multi-agent Systems, Brazil, 8–9 May.

Brazilian Logic Meeting: Pirenópolis, GO, Brazil, 8–12 May.

RUaCS: Risk, Uncertainty and Catastrophe Scenarios, University of Cambridge, 9–10 May.

CɪPM: Causality in Psychological Modeling, University of Groningen, 15 May.

RCC: Reasoning Club Conference, University of Turin, 18–19 May.

ARɪS: Ampliative Reasoning in the Sciences, Ghent University, 18–19 May.

CwU: Coping with Uncertainty: Normative Approaches, Current Practice, Ecole Normale Superieure, Paris, 22–24 May.

RoTE: The Requirement of Total Evidence, University of Edinburgh, 29–30 May.

E&EK: Expertise and Expert Knowledge. What is it? Where do we find it?, University College Dublin, 29–30 May.

CɪG: Cognition in Groups, Milan, Italy, 31 May.

Be&SA: Beliefs and Subdoxastic Attitudes, University of Antwerp, 31 May.

R&AɪS: Reasoning and Argumentation in Science, Center for Advanced Studies, LMU Munich, 31 May–2 June.

June

Prfs: International Workshop: Proofs, Paris, 1–2 June.

P&JB: Perception and Justified Belief, Ruhr-University Bochum, Germany, 1–2 June.

PoP: Philosophy of Probability Graduate Conference, London School of Economics, 2–3 June.

IɪSW: Imagination in Science Workshop, University of Leeds, 6 June.

TaCɪTS: Time and Causality in the Sciences, Stevens Institute of Technology, 7–9 June.

STE: Simulation and Thought Experiment, University of Geneva, 8–9 June.

PɪS&S: Progress in Science and Society, Workshop with Philip Kitcher, Leibniz University Hannover, 14 June.

E&DMɪL: Evidence and Decision Making in the Law, King's College London, 16 June.

FW&AtDO: Free Will and the Ability to Do Otherwise, Campus Belval, Esch-Belval, Luxembourg, 16–17 June.

LearnAut: Learning and Automata, Reykjavik, Iceland, 19 June.

CEC: Causation, Explanation, Conditionals, LMU Munich, 21–23 June.

GT&DT: Workshop on Algorithmic Game Theory and Data Science, Cambridge, Massachusetts, 26 June.

CCC: Continuity, Computability, Constructivity—From Logic to Algorithms, Nancy, France, 26–30 June.

SoML: 17th Latin American Symposium on Mathematical Logic, The Benemérita Universidad Autónoma de Puebla, 26–30 June.

EoM: Epistemology of Metaphysics, Prague, 29–30 June.

LCɪCT: London Conference in Critical Thought, London South Bank University, 30 June–1 July.

Courses and Programmes

Courses

Computer Simulation Methods: Summer School, High Performance Computing Center Stuttgart (HLRS), 25–29 September.

Programmes

APhɪl: 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.

LoPhɪSC: Master in Logic, Philosophy of Science and 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

Lecturer: in Philosophy of Science, University of Bristol, deadline 3 May.

Lecturer: in the History of Philosophy/History of Science, University of Bristol, deadline 3 May.

Post-doc: in Psychology of Reasoning, University of Amsterdam, deadline 7 May.

Teaching Associate: in History and Philosophy of Science, University of Cambridge, deadline 8 May.

Senior Research Associate: in Statistical Modelling, University of Bristol, deadline 14 May.

Assistant Professor: in Statistics, Pontificia Universidad Católica de Chile, deadline 15 May.

Professor or Reader: in Philosophy and Medicine, King's College London, deadline 21 May.

Studentships

PhD: in Engineering and Ontology at the Politecnica University of Marche, Ancona, and the Laboratory for Applied Ontology of the CNR Institute for Cognitive Science and Technology, Trento, deadline 15 May.

Four PhD: positions in the project "Integrating Ethics and Epistemology of Scientific Research", at Leibniz Universität Hannover and Bielefeld University, deadline 28 May.

So far, the empirical approach to Zeno's Paradox has been inconclusive.