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EDITORIAL

I am delighted to be this month's guest editor for The Reasoner. Now that I have been working with Jon Williamson at Kent for over a year, I have had time to appreciate the

wealth of genuinely interdisciplinary resources available here at Kent, and across the UK and even Europe. Contact with researchers not in your own discipline is stimulating, mind-opening and yes, also often very frustrating, but it hugely enriches your work. Ongoing contact with the same researchers is particularly fruitful, as distracting misunderstandings can be cleared away, and real engagement with issues of mutual interest begun. I have finally achieved that with some people, and I would like to take the chance to thank them. Thank you for being patient with my unscientific ('hairsplitting' and 'philosophical') questions!

On that note, if you are interested in interdisciplinary research, and interested in The Reasoner, you might well be interested in The Reasoning Club. This is an international network of departments or research centres interested in 'reasoning', broadly construed. The intention is to facilitate collaboration—particularly the travel of researchers between institutions. We now have an impressive list of members, and we hope to begin applications for funding for Reasoning Club activities, such as workshops. Watch the website for more information.

This month I chose to interview Samir Okasha, a philosopher of biology working at Bristol. I find Samir's work remarkably satisfying, both in its philosophical rigour, and in the quality of its understanding of and engagement with the genuinely scientific issues. In biology, Samir tackles the tricky and important issue of the levels of selection—the question of whether selection only ever operates at the level of the individual. This is of very broad interest, since it affects anyone interested in whether causal processes can operate on multiple levels simultaneously. But Samir is also interested in understanding and developing its biological significance. Not satisfied with understanding only evolutionary theory, Samir is now embarking on a fascinating interdisciplinary project about theoretical parallels between evolutionary theory and rational choice theory. But I will now let Samir explain these issues to you in his own words. It only remains for me, since I am Scottish, to wish you all a Happy New Year.

Phyllis McKay Illari
Philosophy, Kent

§2

FEATURES

Interview with Samir Okasha

Samir Okasha is Professor of Philosophy of Science at the University of Bristol. He has worked at the University of York, the National University of Mexico, and the London School of Economics. Samir has research interests in philosophy of science, metaphysics, epistemology and philosophy of economics. However, he is best known

for his work in philosophy of biology, particularly on the levels of selection debate.

Phyllis McKay Illari: Thank you for agreeing to be interviewed.

Samir Okasha: You're welcome.

PMI: Can you start by telling us how you became interested in philosophy of biology?

SO: My first degree was in economics and philosophy at Oxford, where I went on to do a PhD in philosophy of science. I became interested in social evolution theory as a graduate student, as it was very much in the air in Oxford at the time, thanks to Hamilton, Dawkins and others. Though my PhD was not on biological questions, I attended a lot of biology seminars and also a series of lectures by Alexander Rosenberg on philosophy of biology. I owe him a debt, because he sowed a seed of interest I returned to many years later. Over the years I became increasingly interested in the interface of theoretical biology and philosophy of science. I spent a lot of time as a post-doc studying theoretical biology, grounding myself in it, and later trying to integrate it with philosophy.

PMI: You're probably best known as a philosopher of biology. Your most recent book is *Evolution and Levels of Selection* (Oxford University Press 2006). Why do you think natural selection is so important?

SO: Well, I suppose I endorse the standard cliché that nothing in biology makes sense without evolution. Even though the vast majority of day to day research in, for example, a molecular biology department, has no direct connection with evolution, nevertheless it's the grand unifying theory that makes sense of everything, and as philosophers we're attracted to grand theories.

PMI: Can you summarise your views of natural selection and the levels of selection in a nutshell?

SO: Not easily! Part of what I was trying to do in my book was to avoid presenting an overall philosophical take on the issues, in favour of a more piecemeal approach. My book is more conservative than some work in philosophy of science in that I thought of it as primarily an attempt to clarify conceptual and thematic issues. For example, I spent a lot of time trying to clarify the relationships between different mathematical models of natural selection and different concepts that have been used to talk about levels of selection. I do premise my discussion on the idea that the job of the philosopher of science is to provide the conceptual clarity that will permit the issues to be resolved empirically.

PMI: Why do you think the levels of selection issue is so important? From your book I understood that its main biological importance comes from explaining the major evolutionary transitions.

SO: I think the issue is instrinsically interesting as a piece of science, and also has philosophically significance. For example, it bears on the old question in political philosophy of how you reconcile individual self-interest with the welfare of a group. A close analogue of that is analysed in the biological domain, where you often find individuals in a group with overlapping but non-identical evolutionary interests. Think for example of animals in a social group, or genes in a genome, or cells in a multicellular organism, or partners in a symbiotic union, or mitochondria in eukaryotic cells.

The question is how natural selection can reconcile the good of the group with the self-interest of the individuals within it. So-called 'major transitions' in evolution occur when free-living individuals, capable of surviving and reproducing alone, became aggregated into a larger collective and in most cases eventually lose the ability to survive and reproduce alone. This gives rise to a new level of hierarchical complexity and a new higher-level individual. It's happened again and again in the history of life on earth. From individual genes into networks of cooperating genes, from genes to chromosomes, a number of chromosomes forming themselves into a community in a single cell, the addition of organelles into the cell, the symbiotic union of two bacterial cells to make the modern eukaryotic cell, the move from single-celled organisms to large multi-celled organisms with many single-celled parts, and ultimately the move to group living that we see in many animals. The challenge is to explain these transitions in Darwinian terms. Understanding how selection can operate on multiple levels is crucial here. It's interesting that although the ideas of kin and group selection were originally developed to explain social behaviour in animals, in fact they have far broader application, as they are relevant to virtually all the major transitions. This also undermines the old argument that in practice individual selection is the only thing that matters in evolution.

PMI: That's interesting, I wanted to ask you about that. It seems to be common now to say that group selection, kin selection, individual level selection and so on are just mathematically equivalent ways of modelling evolutionary change. But you disagree?

SO: Well, if you look at kin selection and inclusive fitness theories, the view that those are ultimately equivalent to group selection is now a standard one, particularly among kin selection proponents. I certainly agree that there are cases where it's merely a matter of modelling convenience or of convention which description we adopt, but that couldn't be true across the board. There clearly are factual issues at stake too. A large part of what I was trying to do in my book was separate cases where it's merely a matter of modelling convenience from cases where the choice is factual.

PMI: On your view, is there a crucial argument for the view that sometimes what level selection operates at is more than mere convention?

SO: I emphasized in my book that there are two different things that group-level selection could be taken to mean. Some people have taken group-level selection to mean groups making more groups, but others have applied the notion of group-level selection to cases where individuals live in groups and their fitness depends on interactions with other group members. In the latter case, no process of group-level reproduction need be going on, and in an evolutionary model of the situation you're tracking the frequencies of individuals over time—individuals who happen to live in groups. In this second case it's at least conceivable that there's room for a conventionalistic argument, given that the evolutionary dynamics can be written either in single-level or in multilevel terms. Nevertheless, I argue in my book that in the first case, where groups produce more groups, the choice cannot be conventional. This is because tracking what happens to group types over time cannot be done without attributing the property of Darwinian fitness to the group. There's no way you can re-describe that as a side-effect of lower-level selection. The groups are themselves the entities whose demography you're interested in tracking across the generations. I think the failure to heed the distinction between these two types of multi-level selection has caused enormous confusion in the literature.

PMI: So this is the kind of conceptual clarification you think can be very useful to empirical work?

SO: Precisely.

PMI: What other issues in philosophy of biology do you think are really important?

SO: A lot. The ongoing debate about how the concept of information should be understood in biology is fascinating, a good philosophical question. A lot of people who have made a serious study of the molecular biology literature are now analysing what the source of these informational concepts is, and whether information in biology is similar to the notions of information used in physics or computer science.

PMI: Can you tell us about your Evolution, Cooperation and Rationality project?

SO: It's an AHRC-funded research project of which I'm the principal investigator. The co-investigator is Ken Binmore, the well known game theorist based here at Bristol. Also involved are members of the Centre for Behavioural Biology in Bristol—a team of empirical biologists, statisticians and mathematicians. We came together because we realised that with my interest in evolutionary biology and Ken's interest in game theory, we have enormous areas of overlap. The project began in October 2008 and will run for three years. The main theme of the project is to understand the relation between evolutionary theory and rational choice theory as alternative paradigms for reasoning about social behaviour, cooperation, decision making, and related topics. There are interesting areas of commonality. For example, in evolutionary biology it's standard to think of natural selection as a kind of optimization process, that maximises Darwinian fitness, and obviously the role of optimization plays a crucial role in economics too, where it's standard to assume that rational individuals will behave as if they are trying to maximise their expected utility. Our aim is to understand the extent of the thematic commonalities or any important disanalogies between the two areas, and the philosophical implications.

PMI: Are there any upcoming events that might interest readers?

SO: We are having a conference titled Evolution, Cooperation and Rationality from September 18th-20th in Bristol. For more information see: https://www.bris.ac.uk/philosophy/projects/evocopratconference. We will also be having a series of workshops and reading groups in Bristol.

PMI: That all sounds very interesting. Thanks very much for the interview.

Supposed Liars, Divine Liars and Semantics

Martin Cooke in 'Liars, Divine Liars and Semantics' (*The Reasoner* 2(12):4–5) argues against Patrick Grim, thinking there is no essential difference between sentential and propositional formulations of his puzzles. Thus he says "Patrick Grim . . . tries to show that no one is omniscient—knows all and only truths—via the following sentence which he . . . called '(4)': God doesn't believe that (4) is true. Let's say (as many do) that a sentence is true insofar as it describes reality. Were propositions (or statements) rather than sentences our truth bearers, we could instead consider (4*) = 'God doesn't believe that (4*) ever expresses a true proposition'.".

The propositional formulation, however, escapes the tangles with the sentential version for a reason that Cooke is prepared to entertain. Discussing Dale Jacquette's views Cooke says, with regard to 'Liar sentences', that 'they do seem to be saying, not only

that they are not true, but also, if less obviously, that they are (therefore) true'. So sentences, he allows, may express more than one proposition, even if they may express one proposition more obviously than another. But if so then one cannot immediately derive, with respect to the previous case that the (one and only) proposition that (4*) expresses is (the obvious one) that God doesn't believe that (4*) ever expresses a true proposition. That propositional identity would certainly get one into a tangle, but since it is not definitely derivable there are not the same problems as with the related sentential identity.

Cooke rightly says, with respect to Jacquette's views, 'Nonetheless such a resolution is, as it stands, insufficient to save God's omniscience from (4)'. But the point is that it is sufficient to save God's omniscience from (4*).

The possibility of sentences expressing more than one proposition in the above way, and the way it resolves many classic problems with Liars, has been the focus of a book that has just been published (2008: *Unity, Truth and the Liar*, E. Genot, S. Rahman and T. Tulenheimo (eds), Springer, Berlin). See especially the papers by Stephen Read, Greg Restall, and myself.

Hartley Slater
Philosophy, UWA

Is Scientific Modeling an Indirect Methodology?

This article was inspired by reading papers of Peter Godfrey Smith and Michael Weisberg, especially, P. Godfrey-Smith (2006: The strategy of model-based science, *Biology and Philosophy*, 21(5):725–740) and M. Weisberg (2007: Who is a Modeler? *The British Journal for the Philosophy of Science*, 58(2):207–233).

Both authors promote the idea that modeling is an "indirect way" of theorizing. Modelers are trying to understand "a complex real world system via understanding of a simpler, hypothetical system that resembles it in relevant respects" (Godfrey-Smith, p. 726). There is another—"direct way" of theorizing—"seek to directly represent the workings of the real-world system" (p. 730). Weisberg tries to elaborate on specifics of the "direct way" calling it ADR ("abstract direct representation", see p. 210).

My first point is that this distinction unnecessarily complicates the picture. In fact, ADR can be better understood as a form of modeling.

As an example of "working directly with the real-world system", Weisberg considers the way in which Mendeleev produced his Periodic Table of chemical elements. "This scientific activity constitutes theory construction, but not modeling. Mendeleev represented chemical phenomena directly, without the mediation of a model. Although his theoretical descriptions of elemental properties and trends were abstract, they were descriptions of properties of the elements themselves." (Weisberg, p. 215). However, Weisberg is ready to accept (p. 215) that the result of Mendeleev's work (the Table) "might be considered as a model".

I would insist that not only the result of Mendeleev's work, but also his *starting point* was not as "direct" as it may seem. Indeed, Mendeleev did not hold in his office

the samples of all 63 chemical elements known at the time! Instead, he used theory and data from books and papers, and this theory and data were produced during a long highly non-trivial history. Aristotle could not create a periodic table of the four "elements" of his time! Could the non-trivial chemical theory of Mendeleev's time be considered as a "direct representation of reality" (i.e., as "finally, true"), and not as an attempt of modeling (i.e., in part, as a hypothetical theory)? At least, the notion of atomic weight used by Mendeleev was not completely "true"—it was refined later by the discovery of isotopes.

Mendeleev may have believed in the partly hypothetical chemical theory of his time as a "direct representation of reality". Perhaps, he did not try to guess in advance, which parts of it were true, and which were not. This is why he did not *feel* himself as a modeler. But, definitely, he was working within a model constructed by the previous generations of chemists! (By the way, who could be the first person in history *feeling* himself as a modeler? Bolyai, Gauss, Lobachevsky? Or, Plato?)

In a similar way, one can analyze other examples of alleged "direct theorizing" mentioned by Godfrey-Smith and Weisberg: Buss' work in evolutionary theory and Darwin's theory of atoll formation. And conclude that, in fact, "direct theorizing" is *undeliberate modeling*, believing that the model (theory) one is working in, is "finally, true".

Perhaps, some objections against the above argument will be raised by referring to some subtleties discussed in the literature: the *model–theory* relationship, and the *model–representation* distinction.

In computer science, we do not regard these subtleties as important. We are used to a simpler picture: there are *models*, and there are *means of building models* (patterns, templates, formal languages, meta-models, ontologies, theories, generic software systems, etc.). For example, one can build a Newtonian model of the Solar system by specifying some initial mass, distance and velocity data of Sun and planets. But one can define also a Newtonian *template* for building models of arbitrary planet systems (a model of an "abstract planet system"). From such a template, by specifying parameters appropriately, one can obtain a particular model of the Solar system. From this point of view, the *theory* of Newtonian mechanics is functioning as a set of *methods* for building models (and model templates) of mechanical systems.

The Newtonian theory allows several different formulations (i.e., representations) that are provably equivalent (traditional, Lagrangian, Hamiltonian). Does this mean that there is some "Newtonian mechanics" that exists independently of these formulations? You may think so, but why do you need to? How do you intend to use such a "theory without formulations"? This is why the *model–representation* distinction might not be taken too seriously. What really counts, are equivalence proofs of different representations.

And now, the main point. It seems, Godfrey-Smith and Weisberg consider models as almost isolated structures that are invented or picked up without serious coordination from one case to another. They do not analyze sequences of models, systems of models, model evolution. I think, this is how they could arrive at their general conclusion about the inherent indirectness of modeling. However, let us consider the cognitive opposite of ADR—a situation when some successful theoretical construct cannot be observed even

in principle—such as, for example, quarks. Do quarks "really exist", or are they only an "indirect" entity introduced by physicists? For the current purposes, this construct works fine, but will this situation continue in the future? If not, quarks will be removed from the picture just as flogiston and aether were removed. But what if quarks will be retained as a construct in *all* future physical theories? Do physicists need more than this kind of *invariance* to claim the "real existence" of quarks and believe in having a "direct representation" of them?

Thus, if we consider modeling not as a heap of contingent structures, but (where possible) as evolving coordinated systems of models, then we can reasonably explain as "direct representations" even some very complicated model-based cognitive situations. Scientific modeling is not as indirect as it may seem. "Direct theorizing" comes later, as the result of a successful model evolution.

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Karlis Podnieks
Computer Science, University of Latvia

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The Red Herring of Logical Impossibility: Blum on the Immovable Stone

In the Semitic or Abrahamic tradition, it is a conventional wisdom that God is omnipotent. However, the notion of omnipotence has been classically assailed by the so-called paradox of the stone: namely, whether an omnipotent being can create an immovable stone. In response, Thomas Aquinas, for example, attempts to disentangle omnipotence from incoherence by claiming that omnipotence only entails the capacity to bring about anything that is *logically possible* (*Summa Contra Gentiles*, Book II, Chapter 25). Thus, the integrity of omnipotence is secured at the cost of *conceding* that even omnipotent beings *cannot* accomplish the *logically impossible*. Similarly, Alex Blum declares that 'omnipotence does not trump logical impossibility' and the paradox of the stone 'fails at the very first instance for requiring God to create a logical impossibility' (2008: 'The Paradox of Omnipotence', *The Reasoner*, 2(12):3). But, as the following problems show, the "logical impossibility" *constraint* on omnipotence seems to be a red herring.

(I) PHILOSOPHICAL DISSENTIONS   The first problem is that not all fellow theists agree on the logical curtailing of omnipotence. For example, in a letter to Arnauld in July 1648, Descartes writes, 'I do not think that we should ever say of anything that it cannot be brought about by God. For since every basis of truth and goodness depends on his omnipotence, I would not dare to say that God cannot make a mountain without a valley, or bring it about that 1 and 2 are not 3' (1991: *The Philosophical Writings of Descartes*, Volume III, tr. John Cottingham et al., Cambridge: Cambridge University Press, pp. 358–9).

II) CHALLENGING THE CHARGE OF SELF-CONTRADICTION   The second objection that may be levelled against the manoeuvre is that strictly speaking the description of the paradox of the stone does not involve any logical impossibility. The question can be posed vis-á-vis

a human being without generating any self-stultifying consequences. The contradiction surfaces only when the demand for creating an immovable stone is pitched against omnipotence and not in terms of the simple formulation of the task itself. Although Aquinas and Blum may be right in characterizing a task like "drawing a square circle" as contradictory, asking whether an immovable stone can be created is not contradictory. The contradiction only occurs *in relation* to omnipotence and as such it would beg the question if the problem is dismissed on the grounds of self-contradiction. The task *qua* task is certainly devoid of any impossibility.

(III) Refining the Logical Limitation Rule   In response to the preceding problem, it may be claimed that the logical possibility restriction is not only intended to exclude logically impossible tasks but also to preclude tasks that are not in themselves contradictory yet involve a contradiction if performed by an omnipotent being. That is, although attributing omnipotence to an entity entails the statement "An omnipotent being can make it to be that *X* in all cases where making-it-to-be-that-*X* involves no contradiction," it does *not* entail the statement "An omnipotent being can make it to be that *X* where the entity's-making-it-to-be-that *X* would involve a contradiction." But, this second layer of logical restriction is not going to alleviate the problem and, indeed, leads to further erosion of omnipotence such that the concept can be equally applied to all and sundry. Since, as John Mackie rightly points out, any thing can be considered omnipotent if it could only do all that it was logically possible for it to do (1962: 'Omnipotence', *Sophia*, 1, pp. 13–25). On this compounded logical impossibility rendition of omnipotence, logical possibility coincides with practical possibility, and in cases of objects whose logical and practical possibilities are considerably limited, the entities in question are undoubtedly entitled to assume the mantle of omnipotence. Moreover, this extra emendation of logical impossibility itself seems to encourage another paradox: namely, it is logically possible that an omnipotent being is not making anything to be!

(IV) Other Types of Impossibility   Even if omnipotence is circumscribed by logical impossibility, still there is one other type of impossibility that does not fall under the category of logic—namely, mathematical necessity. According to the paradox of mathematical necessity, even an omnipotent being cannot change the truth or falsity of mathematical statements. The paradox can be satisfactorily handled by the logical impossibility constraint only if one subscribes to some heavy-duty Fregean logicism that mathematics in some unequivocal and significant sense is *reducible* to logic. However, should one reject strict logicism, one is forced to admit one other type of impotence in omnipotence.

(V) Reinstatement of the Problem without Violating the Logical Possibility Constraint   Finally, it is possible to reformulate the paradox of the stone without falling foul of the logical constraint imposed by Aquinas and Blum on omnipotence. Instead of interpreting the paradox as posing a competition between a pair of omnipotent beings—represented by God at two different times—the paradox can be reformulated as posing a question about *simultaneous* competition between a pair of omnipotent beings (Alfred

R. Mele and M.P. Smith, 1988: 'The New Paradox of the Stone', *Faith and Philosophy*, 5, pp. 283–90). Suppose Fred, an omnipotent being, wishes to have an omnipotent companion and thus creates Barney. Later, however, there is a conflict between Fred and Barney over the location of a particular stone. Under the circumstances, there are four possibilities: (1) the stone moves because of Fred's will, (2) the stone stays stationary because of Barney's will, (3) the stone moves or stays stationary but not because of Fred's or Barney's will, and (4) the stone neither moves nor stays stationary—it gets destroyed, for example. Now, given that (a) omnipotent beings, *à la* Aquinas and Blum, are not required to do the impossible and (b) it is impossible to thwart the will of an omnipotent being, Mele and Smith conclude that in cases of simultaneous competition between two omnipotent beings, neither can emerge victorious. *The only possible resolution is a stalemate*. That is, the reappearance of the paradox without breaching the logical limitation laid by Aquinas and Blum.

Majid Amini
History and Philosophy, Virginia State University

§3

News

Neuroeconomics: Hype or Hope, 20–22 November

This philosophy-oriented conference on neuroeconomics took place in Rotterdam and provided a nice and productive atmosphere, knowledgeable participants and some weird weather. Some new neuroeconomic research was presented. Franscesco Guala reported on imaging studies exploring whether conventions created during a game-theoretic experiment have independent motivational force. Guala's aim is to empirically test whether there actually are conventions in David Lewis's sense. Paul Zak reported on new experiments in which hormones with relatively well known behavioural effects were introduced into subjects playing various games (ultimatum, trust etc.), thus hopefully shedding some light on the physiological basis of moral sentiments.

Not surprisingly, however, most of the presentations proceeded on some meta-level of choice. The project and promise of neuroeconomics was assessed, and usually criticised, on the basis of general philosophy of science (Nagatsu; Fumagall; Mechtenberg and Gerhardt), theory of explanation (Kuorikoski and Ylikoski), pragmatism (Cavallaro, McMaster and Novarese) and philosophy of mind (Levin and Aahron). Alessandro Antonietti reviewed some methodological issues in neuroscience, such as the various localization fallacies. More specific questions probed included whether neuroscience has bearing on the various accounts of the origin of money (Aydinonat), to what extent Hayek's version of methodological individualism is compatible with neuroeconomics (Lindemans) and what policy relevance neuroscience could have in relation to the recent discussion on soft or "nudge" paternalism (Anderson).

John Davis and Don Ross presented their sharply contrasting views on the place of

the human agent (or the self) in economic theory and subsequently provided rather different predictions about the future place of neuroscience within economics. Uskali Mäki offered some general observations about the research programme and praised neuroeconomics for its ability to shake economists out of their methodological slumber and even hoped that this turmoil would create a rare possibility for philosophers of economics to make a real impact on their target profession. Also Ariel Rubinstein commented on neuroeconomics more as a sociological phenomenon within the culture of economics and predicted that it will make a sizable impact and is here to stay (at least for the time being), simply because economic theory has not recently produced anything truly captivating and neuroscience-talk has many alluring qualities. Rubinstein also lamented the lack of methodological rigour and low standards of article acceptance that, according to him, characterize much of neuroeconomic work. Jack Vromen argued that only looking at the mind or brain of the individual decision maker does not suffice, since environmental data on what kind of cues activate these inner processes is also needed. Vromen suggested that neuroeconomics might become relevant for economics by identifying non-standard environmental variables that could improve prediction of choice behaviour.

All in all, although the general attitude seemed to be at least somewhat critical towards the undeniable hype surrounding neuroeconomics, the criticism was (mostly) based on actual methodological problems and inferential constraints concerning neurostudies in general. The idea that economics should proceed as a separate science did not receive much support and any new empirical evidence that could at least help in triangulating cognitive and behavioural phenomena relevant to economic decision making was welcomed.

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Jaakko Kuorikoski
Trends and Tensions in Intellectual Integration, Helsinki

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Inference, Consequence, and Meaning, 3–4 December

The conference "Inference, Consequence, and Meaning"—held in Sofia and organized by the Institute for Philosophical Research of Bulgarian Academy of Sciences—brought together researchers interested in sharing their ideas about the perspectives and the challenges to what is known today as the inferentialist approach to semantics.

The key talk was given by Jaroslav Peregrin (Institute of Philosophy, Czech Academy of Sciences) who promoted two theses: first, the commitment to the view that "having meaning" is equal to "being governed by certain inferential rules" requires seeing language as a social institution; and second, the inferentialist approach to semantics might be seen as an embodiment of the ideas of linguistic structuralism. Nenad Miscevic (Central European University, Budapest) argued for the claim that the referential interpretations of the meanings of pejorative concepts better fit to our intuitions than the inferentialist ones. The next speaker, Dimiter Vakarelov (Sofia University) attacked the inferentialist conception of meaning from a different perspective. He showed that that the standard Scott and Tarski consequence relations do not possess unique adequate

semantics and, therefore, cannot be viewed as bearers of meaning. Rosen Lutskanov (Institute for Philosophical Research, Bulgarian Academy of Sciences) gave reasons why one must doubt the equivalence between implicit material inference and its formal logical explication. Vladimir Svoboda (Institute of Philosophy, Czech Academy of Sciences) showed how Brandom-Peregrin inferentialist approach could be applied to prescriptive expressions. Elia Zardini (St. Andrews University, UK) demonstrated how the meaning of logical words is underdetermined by rules of inference. Anguel Stefanov (Institute for Philosophical Research, Bulgarian Academy of Sciences) showed how the famous Incommensurability Thesis of Paul Feyerabend is viewed from the perspective of inferentialism. Lilia Gurova (New Bulgarian University) presented a view of scientific models as licenses of material inferences.

The first day of the conference ended with a round-table discussion the central issues of which were the questions "What is material inference?" and "How does formal logical inference relate to material inference?". The participants in the conference formed two opposite positions. According to the first one, any kind of "material" inference (whatever it means) could be adequately formalized (i.e., explicated in a logical language); the proponents of the second position defended the principal irreducibility of material inferences to logical ones.

The second day of the conference began with two historical talks. Anita Kasabova (New Bulgarian University) traced the roots of inferentialism back to the philosophical ideas of B. Bolzano. Boris Grozdanoff (Institute for Philosophical Research, Bulgarian Academy of Sciences) suggested a moral drawn from a recapitulation of the Mill-Frege metaphysical controversy about the nature of numbers: the inferential semantics is not enough to reconstruct the referential aspects of meaning. Julia Vasseva (Institute for Philosophical Research, Bulgarian Academy of Sciences) demonstrated how the inferentialist semantic approach could help to find a middle way between objectivism and subjectivism about colors. Ondrej Beran (Institute of Philosophy, Czech Academy of Sciences) discussed the possibility of reconciling the inferentialist ideas about implicit rule-following as constitutive of meaning with our intuitions about creativity and individuality as non-rule-based phenomena. A volume of papers from the conference will be published.

Lilia Gurova
New Bulgarian University, Sofia

Calls for Papers

PRACTICAL REASONING AND NORMATIVITY: Special Issue, *Philosophical Explorations*, deadline 1 February 2009.

REASONING FOR CHANGE: Special issue of the journal *Informal Logic*, deadline 10 February.

Representing, Learning, and Processing Preferences: Theoretical and Practical Challenges: Special issue of *Artificial Intelligence*, deadline 15 February.

Journal of Annals of Mathematics and Artificial Intelligence (AMAI): Special Issue on Commonsense Reasoning for the Semantic Web, deadline 28 February.

Dialectica: International Journal of Philosophy and Official Organ of the European Society for Analytic Philosophy, 1 March.

Just Reason: Special issue of the journal *Studies in Social Justice*, deadline 1 April.

Special Issue "Information and Computation": on "Intuitionistic Modal Logics and Applications", deadline 31 May.

Experimental Philosophy: Forthcoming issue of *The Monist*, deadline April 2011.

§4
Introducing …

In this section we introduce a selection of key terms, texts and authors connected with reasoning. Entries will be collected in a volume *Key Terms in Logic*, to be published by Continuum. If you would like to contribute, please click here for more information. If you have feedback concerning any of the items printed here, please email thereasoner@kent.ac.uk with your comments.

The Identity of the Indiscernibles

The Identity of the Indiscernibles is the principle, first explicitly formulated by Leibniz, according to which there cannot be two things identical in every respect. Differently put, the principle states that if two entities have all the same properties, they are in fact the same entity. Unlike the closely related principle of the Indiscernibility of the Identicals, this principle is not an axiom of logic and is in fact quite controversial. Leibniz took for granted that different things exist at different places and contended that there must be some additional intrinsic difference (for example, two leaves found in different parts of a garden must also differ with respect to at least one other property: for instance, a tiny particular regarding their shapes). Nowadays, a weaker form of the principle, making a difference in location sufficient for non-identity, is commonly assumed. In reaction to certain thought-experimental and actual counterexamples, moreover, some Quinean insights have been revived very recently with a view to formulating an even weaker version of the principle, based on relations rather than monadic properties.

Matteo Morganti
Philosophy, Konstanz

Gottfried Wilhelm Leibniz

Leibniz, Gottfried Wilhelm (1646–1716) was a German philosopher, mathematician and logician, and arguably the founder of mathematical logic. Leibniz's logic, through the

mediation of Bertrand Russell, was the basis of Logical Positivisim.

Leibniz's logic is symbolic and aims at reducing all logical arguments to a combination of signs. For instance, denoting with the letter *a* the category of substance, the letter *b* the category of quantity, the letter *c* the category of quality, and combining the substance with man, the quantity with tallness and the quality with beauty, the sentence "beautiful man" corresponds to *ac*, the sentence "tall man" corresponds to *ab*, and the sentence "beautiful tall man" to *abc*.

Logic is therefore grounded on calculus. In calculus, every concept has a correspondent sign, a universal character that represents it. The combination of the signs brings about a universal language, which accounts for all concepts and their relations. Combining concepts, then, is the tool Leibniz uses to set up all possible inventions.

Leibniz divides all logical truths into two kinds of truths: truths of reason and truths of fact. The former are necessary and their opposite is impossible. The latter are contingent and their opposite is possible. Truths of reason do not derive from experience, for they are founded solely on the principle of identity, and thus on the principle of non-contradiction. Truths of reason are all mathematical demonstrations.

Truths of fact derive mostly from experience and the contrary of their conclusion cannot be demonstrated as contradictory. They are based on the principle of sufficient reason, which says that there must be a sufficient reason for anything to exist, for any event to occur, for any truth to obtain. Nothing happens without a reason. Only by means of an infinite analysis, which God alone can carry out, can truths of fact become truths of reason, i.e., necessary truths.

Analysis provides for clear and distinct cognition. On the intensity of clarity and distinctness is based the difference between sensitive and intellectual cognition. Intellectual cognition is clearer and more distinct than sensitive cognition. However, the difference between the two is not absolute, it is instead graded, for gradation is nothing more that the expression of the law of continuity, which says that nature makes no leaps. The third principle enunciated by Leibniz is the principle of the identity of indiscernibles, which states that two or more objects or entities are identical if and only if they have all properties in common.

Marco Sgarbi
Philosophy, Verona

§5

Events

January 2009

LFCS: Symposium on logical foundations of computer science, Deerfield Beach, Florida, 3–6 January.

SODA: ACM-SIAM Symposium on Discrete Algorithms, New York Marriott Downtown, 4–6 January.

BIOMOLECULAR NETWORKS: FROM ANALYSIS TO SYNTHESIS: Pacific Symposium on Biocomputing, Fairmont Orchid, The Big Island of Hawaii, 5–9 January.

3RD INDIAN CONFERENCE ON LOGIC AND ITS APPLICATION: The Institute of Mathematical Sciences, Chennai, India, 7–11 January.

LOGOS: Barcelona Workshop on Singular Thought, 15–17 January.

GRADUATE CONFERENCE: Second Cambridge Graduate Conference on the Philosophy of Logic and Mathematics, 17–18 January.

VAF: 3th Conference of Dutch Flemisch Association for Analytical Philosophy, Tilburg University, the Netherlands, 22–23 January.

BAYESIAN BIOSTATISTICS: Houston, Texas, 26–28 January.

DISABILITY AND CHRONIC ILLNESS: One-day workshop of Multidisciplinary Research Network on The Concepts of Health, Illness and Disease, UWE, Bristol, 30 January.

VERY INFORMAL GATHERING OF LOGICIANS: UCLA Logic Center, 30 January–1 February.

FEBRUARY

ACM INTERNATIONAL CONFERENCE ON INTELLIGENT USER INTERFACES: Sanibel Island, Florida, 8–11 February.

AIA: IASTED International Conference on Artificial Intelligence and Applications, Innsbruck, Austria, 16–18 February.

COLLOQUIUM: PhD's in Logic, Ghent, 19–20 February.

CICLING + LEXICOM: 10th International Conference on Intelligent Text Processing and Computational Linguistics; pre-conf event: Lexicom-Americas workshop, 24–28 February.

INTERONTOLOGY: 2nd Interdisciplinary Ontology Conference Tokyo, Japan, 27 February–1 March.

MARCH

MODELS AND SIMULATIONS 3: Charlottesville, Virginia, 3–5 March.

&HPS2: Integrated History and Philosophy of Science, University of Notre Dame, 12–15 March.

ADS: Agent-Directed Simulation Symposium, Part of the Spring Simulation Multiconference, San Diego, California, 22–27 March.

EVIDENCE, SCIENCE AND PUBLIC POLICY: Sydney Centre for the Foundations of Science, 26–28 March.

EACL: Computational Linguistic Aspects of Grammatical Inference, Athens, 30 March.

CSIE: World Congress on Computer Science and Information Engineering, Los Angeles/Anaheim, 31 March–2 April.

APRIL

FOUNDATIONS OF MATH: New York University, 3–5 April.

MATCHING AND MEANING:: Automated development, evolution and interpretation of ontologies, Edinburgh, 9 April.

EUROGP: 12th European Conference on Genetic Programming, Tübingen, Germany, 15–17 April.

AISTATS: Twelfth International Conference on Artificial Intelligence and Statistics, Clearwater, Florida, 16–19 April.

ESANN: 17th European Symposium on Artificial Neural Networks Advances in Computational Intelligence and Learning, Bruges (Belgium), 22–24 April.

PHILOSOPHICAL METHODOLOGY: AHRC Project on 'Intuitions and Philosophical Methodology' at the Arché Philosophical Research Centre, University of St. Andrews, 25–27 April.

MAY

FOUNDATIONS OF MATHEMATICS: Philosophy and Foundations of Mathematics—Epistemological and Ontological Aspects, Uppsala, 5–8 May.

LOGIC OF JOHN DUNS SCOTUS: 44th International Congress on Medieval Studies at Western Michigan University, 7–10 May.

AAMAS: The Eighth International Joint Conference on Autonomous Agents and Multi-Agent Systems, Budapest, 10–15 May.

PHILOSOPHER'S RALLY: University of Twente campus, Enschede, the Netherlands, 12–13 May.

PHILOSOPHY AND COGNITIVE SCIENCE: The XIXth edition of the Inter-University Workshop, Zaragoza, 18–19 May.

BENELEARN: 18th Annual Belgian-Dutch Conference on Machine Learning, Tilburg University, 18–19 May.

UR: Uncertain Reasoning, Special Track of FLAIRS, Island, Florida, USA, 19–21 May.

AI: The twenty-second Canadian Conference on Artificial Intelligence, Kelowna, British Columbia, 25–27 May.

SCIENCE AND VALUES: THE POLITICISATION OF SCIENCE: Center for Interdisciplinary Research (ZiF), Bielefeld, Germany, 25–30 May.

CSHPS: The Canadian Society for History and Philosophy of Science, annual conference as part of the Congress of the Humanities and Social Sciences (CFHSS), Carleton University, Ottawa, 26–28 May.

JUNE

ARGUMENT CULTURES: Ontario Society for the Study of Argumentation, Windsor, Canada, 3–6 June.

O-BAYES: International Workshop on Objective Bayes Methodology, Wharton School of the University of Pennsylvania, Philadelphia, PA, 5–9 June.

CNL: Workshop on Controlled Natural Languages, Marettimo Island, Sicily, 8–10 June.

NA-CAP: Networks and Their Philosophical Implications, Indiana University in Bloomington, 14–16 June.

NAFIPS: 28th North American Fuzzy Information Processing Society Annual Conference, University of Cincinnati, Cincinnati, Ohio, 14–17 June.

ICML: The 26th International Conference On Machine Learning, Montreal, Canada, 14–18 June.

Second Biennial SPSP Conference: Society for Philosophy of Science in Practice, University of Minnesota, Minneapolis, 18–20 June.

Formal Epistemology Workshop: Carnegie Mellon University, 18–21 June.

UAI: The 25th Conference on Uncertainty in Artificial Intelligence, Montreal, Canada, 18–21 June.

WoLLIC: 16th Workshop on Logic, Language, Information and Computation, Tokyo, Japan, 21–24 June.

LOGICA: The 23rd in the series of annual international symposia devoted to logic, Hejnice (northern Bohemia), 22-26 June.

July

Two Streams in the Philosophy of Mathematics: Rival Conceptions of Mathematical Proof, University of Hertfordshire, Hatfield, UK, 1–3 July.

ECSQARU: 10th European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, Verona, 1–3 July.

E-CAP: Computing and Philosophy, Universitat Autònoma de Barcelona, 2–4 July.

Metaphysics of Science: University of Melbourne, 2–5 July.

TARK: Twelfth Conference on Theoretical Aspects of Rationality and Knowledge, Stanford University, 6–8 July.

TABLEAUX: Automated Reasoning with Analytic Tableaux and Related Methods Oslo, Norway, 6–10 July.

SPT: Converging Technologies, Changing Societies, 16th International Conference of the Society for Philosophy and Technology, University of Twente, Enschede, The Netherlands, 8–10 July.

ARCOE at IJCAI: The IJCAI Workshop on Automated Reasoning about Context and Ontology Evolution, 11–13 July.

IJCAI: 21st International Joint Conference on Artificial Intelligence, Pasadena, CA, 11–17 July.

ISHPSSB: International Society for the History, Philosophy, and Social Studies of Biology, Emmanuel College, St. Lucia, Brisbane, Australia, 12–16 July.

Logic and Heresy in the Middle Ages: Leeds Medieval Congress, 13–16 July.

DMIN: The 2009 International Conference on Data Mining, Las Vegas, USA, 13–16 July.

ICAI: The 2009 International Conference on Artificial Intelligence, Las Vegas, USA, 13–16 July.

ISIPTA: 6th International Symposium on Imprecise Probability: Theories and Applications, Durham University, 14–18 July.

ViC: Vagueness in Communication, Bordeaux, France, 20–24 July.

Logic and Mathematics: University of York, 3–7 August.

Meaning, Understanding and Knowledge: 5th International Symposium of Cognition, Logic and Communication, Riga, Latvia, 7–9 August.

LICS: Logic in Computer Science, Los Angeles, CA,, 9–11 August.

Practice-based Philosophy of Logic and Mathematics: ILLC, Amsterdam, 31 August–2 September.

September

Mechanisms and Causality in the Sciences
University of Kent, Canterbury, UK, 9–11 September

Phloxshop II: Humboldt-Universität, Berlin, 9–11 September.

MoS: Grand Finale Conference of the Metaphysics of Science AHRC Project, Nottingham, 12–14 September.

ISMIS: The Eighteenth International Symposium on Methodologies for Intelligent Systems, University of Economics, Prague, Czech Republic, 14–17 September.

October

Joint Attention: Developments in Philosophy of Mind, Developmental and Comparative Psychology, and Cognitive Science, Bentley University, Greater Boston, 1–3 October.

The Hugh MacColl Centenary Conference: Boulogne sur Mer, 9–10 October.

Breaking Down Barriers: Blackwell Compass Interdisciplinary Virtual Conference, 19–30 October.

EPSA: 2nd Conference of the European Philosophy of Science Association, 21–24 October.

November

ISKE: The 4th International Conference on Intelligent Systems & Knowledge Engineering, Hasselt, Belgium, 27–28 November.

§6
Jobs

Lecturer: Philosophy / Critical Thinking / Informal Logic, Department of Philosophy, University of Auckland, New Zealand, 5 January.

Junior or Senior Level Faculty: Machine learning or statistics, the Gatsby Computational Neuroscience Unit at UCL, 5 January.

Lecturer: Critical Thinking/Informal logic, Faculty of Arts, University of Auckland, 5 January.

VISITING FELLOWSHIPS SCHEMES: British Academy, 12 January.

NEWTON FELLOWSHIPS: The Fellowships enable researchers to work for two years with a UK research institution, thus establishing long-term international collaborations, 12 January.

TWO FACULTY POSITIONS: Statistics for Life Sciences and Statistics for Stochastic Processes, Institute of Statistics, Université catholique de Louvain, Belgium, 12 January.

2 ASSISTANT PROFESSOR POSITIONS: Cyber-Physical Systems, University of Colorado at Boulder, 15 January.

5 TENURE-TRACK FACULTY IN COMPLEX SYSTEMS: Faculty Position in Intelligent Systems at the University of Vermont, 16 January.

ASSISTANT PROFESSOR: Mathematics & Statistics, College of Engineering and Mathematical Sciences, University of Vermont, 16 January.

POST-DOCTORAL FELLOWSHIP: Irish Research Council for the Humanities and Social Sciences, 23 January.

PROFESSORSHIP IN PHILOSOPHY: Department of Philosophy at the Norwegian University of Science and Technology, Trondheim, Norway, 1 February.

§7
COURSES AND STUDENTSHIPS

Courses

MASTER PROGRAMME: Philosophy of Science, Technology and Society, Enschede, the Netherlands.

MSC IN MATHEMATICAL LOGIC AND THE THEORY OF COMPUTATION: Mathematics, University of Manchester.

MA IN REASONING

An interdisciplinary programme at the University of Kent, Canterbury, UK. Core modules on logical, causal, probabilistic, scientific, mathematical and machine reasoning and further modules from Philosophy, Psychology, Computing, Statistics, Social Policy and Law.

MSC IN COGNITIVE & DECISION SCIENCES: Psychology, University College London.

MASTER OF SCIENCE: Logic, Amsterdam.

SUMMER SCHOOLS IN LOGIC AND LEARNING: Australian National University, Canberra, Australia, 26 January–6 February 2009.

SUMMER INSTITUTE ON ARGUMENTATION: University of Windsor, Canada, contact H.V. Hansen or C.W. Tindale, 25 May–6 June 2009.

ACAI: Advanced Course in Artificial Intelligence, School of Computing and Mathematics, University of Ulster, Northern Ireland, 23–29 August.

Studentships

4 YEAR PHD PROGRAMME: Gatsby Computational Neuroscience Unit, UCL, deadline 11

January.

Two PhD Studentships: The AHRC Project on 'Intuitions and Philosophical Methodology' in the Arché Philosophical Research Centre at The University of St Andrews, 15 January.