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Editorial

Reasoning well used to be taught by teaching formal logic. Philosophy departments around the English-speaking world taught logic as service subjects to foster good argument and critical thinking, abilities which were and are widely regarded as essential capabilities in well-educated university graduates. Eventually, however, it was noticed that skills in formal logic appeared to offer little in preparing students to become critical thinkers and, indeed, that those skills by and large didn't translate into anything tangible outside the logic classes themselves. Beginning in the 1960s people started searching for a different way of developing argumentative abilities, leading to textbooks and subjects in informal logic and critical thinking. Although the empirical evidence since then has not been as bleak about the value of these newer approaches, with the subjects having at least *some* measurable impact on critical thinking tests, the results nevertheless have been disappointing. In the last ten years, Tim van Gelder has been reporting better success than his predecessors and peers, using argument maps as a key concept for enabling students to analyse and understand argument structure and using computer tools to assist with argument mapping.

I myself have toyed with argument mapping at least since Michael Scriven provided me with early drafts of his book *Reasoning* in the 1970s (which remains, in my opinion, one of the very best texts on the subject of informal logic), and I think they are one of the better tools for making sense of arguments—certainly far more effective than the more common listing and numbering of premises and conclusions. More recently I have been working with Bayesian networks, which can be viewed as more sophisticated argument maps, having not just a structural rendering of how premises and conclusions relate to one another, but also full parameterizations allowing explicit treatment of the subjective probabilities of our conclusions. Beyond that, they readily represent utilities and decisions, supporting explicit consideration of the benefits and costs of our decisions and so detailed risk assessments. These, and many other tools, assist in making the evaluation of decisions and arguments explicit and so assisting us in moving beyond gut-feelings as sources of decision making, a time-honored malpractice which continues to lead many into disaster.

But perhaps the simplest and most important tool for rendering our argumentative ideas explicit just is argument mapping. So, I introduce to you Tim van Gelder and his interesting work with argument maps.

Kevin B. Korb
School of Information Technology, Monash University

Interview with Tim van Gelder

Tim van Gelder is an Associate Professor in Philosophy at the University of Melbourne as well as the founder of Austhink Consulting and Austhink Software through which Tim promotes argument mapping techniques and software to improve argumentation practices in the wider community.

Kevin Korb: When we met you were teaching Computational Philosophy of Mind at Indiana University in 1989. Tell us a bit about how you got to that point, what attracted you to philosophy in general and philosophy of mind in particular.

Tim van Gelder: In 1980 I started studying Computer Science at the University of Melbourne, but after one semester switched to Philosophy. Partly it was due to frustration resulting from sharing one computer with hundreds of other students, writing programs on bubble cards, etc. But also philosophy was much more alluring—more seemingly-profound, and with better social prospects. But the relationship or intersection of computers and philosophical issues has been the focus of my work ever since. By the end of my undergraduate degree I was intensely interested in the mind/body problem and had the naïve view that artificial intelligence could demonstrate a materialist solution. In the PhD program at the University of Pittsburgh I fell under the influence of John Haugeland, and through him Hubert Dreyfus, and had a "road to Damascus" conversion to an anti-classical-AI worldview with Heideggerian elements. My thesis on the nature of distributed representation was an attempt to divine how, at the most abstract level, knowledge is stored in the mind/brain. Specifically, if it is not represented as symbols and rules, how, in the most general sense, is it represented? From Pittsburgh I went to Indiana, which had an excellent cognitive science program, and fell in with a band of dynamically-oriented cognitive scientists, including particularly the linguist Robert Port. This coincided with a shift in interest from representation to processes. If mental processes are not digital computation, what are they? The "Indiana" answer was: state-space trajectories in (typically continuous, nonlinear) dynamical systems. So for about eight years I worked on philosophical articulation of the dynamical approach to cognition. The graduate classes in philosophy of mind I was teaching at Indiana were attempting to cover this broad landscape.

KK: And, tell us a bit about your philosophical trajectory since then. You now concentrate more on critical thinking and argumentation, with a continued reference to computation. How did that happen?

TvG: At Indiana I had also been assigned to teach "baby logic" (informal reasoning, critical thinking). After four years I concluded that although the subject was very valuable—for most students, much more so than introductory formal logic—teaching it was largely a waste of time and effort. I was using a standard textbook (Govier) and a standard pedagogical approach, but students' performance on the final exam seemed

so dismal, it could hardly have been much better than when they started, so no worthwhile gains were being achieved. (It was only much later that I realised that there was an empirical literature on this topic, and that my pessimistic observations were roughly in line with the general conclusions of that literature.) In 1993 I took up an Australian Research Council fellowship concentrating on philosophical foundations of cognitive science, but the problem of teaching critical thinking stayed in the back of my mind. In the late nineties Neil Thomason at Melbourne inspired me to (a) take up the challenge of producing demonstrable gains, (b) perhaps using radically different approaches to teaching, and (c) adopting a rigorous empirical approach to evaluation. An obvious limitation of standard critical thinking subjects, with their high student-teacher ratios, is the near-zero amount of individual coaching students receive. I wanted to explore how computers could help students learn, not as intelligent coaches but rather leveraging the available human intelligence, i.e. that of the teachers and the students. This for me was a pivotal point—a shift from an interest in artificial intelligence (AI) to intelligence augmentation (IA).

KK: What are argument maps and why are they important?

TvG: Typically an argument map is a box-and-arrow or node-and-link diagram showing the relationships among propositions in some piece of informal reasoning or argumentation. Argument mapping is thus "semi-formal", blending formal graph structure with natural language. You can think of argument mapping as addressing a design challenge: come up with a maximally transparent way of representing informal reasoning and argumentation for human thinkers, one that makes the reasoning as explicit, rigorous and yet easily comprehensible and communicable as possible. From this point of view, the various forms of argument mapping around today—such as the one embodied in the Rationale software—as particular attempts to come up with that optimal format. No doubt improved schemes, supported by more sophisticated technologies, will arise in coming years.

KK: How does your understanding of their importance relate to what you know about human cognition?

TvG: The diagrammatic format of typical argument maps is useful for humans with cognitive machinery dominated by powerful visual systems. Diagrammatic argument maps complement the idiosyncratic strengths and weaknesses of our evolutionarily-endowed cognitive equipment. For example, argument maps compensate for our limited short-term memory, providing a stable external representation of complex inferential webs. At the same time they facilitate access to this externally represented information by exploiting our powerful visual scanning capacities. In computer terms, our eyes constitute the high-capacity bus connecting the argument map, stored in external RAAM, to our brains as the CPU.

KK: How does argument mapping relate to Stephen Toulmin's approach to argumentation? To other predecessors?

TvG: Clearly his famous argument scheme is an important precursor to contemporary argument mapping. Surrounding his schema was the deep observation that "real world" reasoning is generally not amenable to purely formal treatment. He went wrong, however, in exaggerating the domain-dependence of reasoning. Argument mapping and many other aspects of informal logic are clearly domain-independent devices of

great utility. Other important predecessors include Henry Wigmore in legal reasoning, and more recently Robert Horn with his mega-mapping projects, such as the landmark "Can Computers Think" series. Interesting early predecessors are the medieval philosopher/logicians such as Aquinas, who made great efforts to make their arguments wholly explicit, though they didn't take the step from argumentative prose to argument map. If they'd had contemporary argument mapping tools available to them they surely would have used them.

KK: What are the advantages of argument maps relative to plain written language? To spoken language? To semi-formal layouts of premises and conclusions?

TvG: Argument maps are more effective than ordinary written or spoken language for articulating and communicating complex reasoning and argumentation. This should not be at all surprising; it is what they were designed for. What is surprising is just how much more effective they are. For example, we have done informal studies on the communication of complex arguments in prose versus argument map format. Consider a straightforward case of argumentative prose, such as a good opinion piece from the newspaper. Generally speaking people are very bad at identifying the arguments in such a piece and find the task very taxing. However they find it simple, indeed trivial to identify the arguments when presented in argument map format, and they do so with complete reliability, assuming they understand the basic conventions. Communication of complex arguments is a very important activity. There would be all sorts of benefits to society if we shifted from argumentative prose to argument maps for this task in appropriate contexts. Standard semi-formal layouts, such as the P1, P2 ... C layout so widely used in philosophy and logic classes, *are* argument maps. In this sense argument mapping is quite widely used already. These ways of displaying arguments are simple (good) and can be easily created with generic technologies such as whiteboards (good). However they do not extend well to complex argumentation, and they don't take advantage of representational resources such as line, shape and colour to better exploit our visual machinery.

KK: What are the limitations of argument maps?

TvG: There are of course all sorts of limitations. Argument maps are special purpose tools and can't be used for any other task. Prose on the other hand can be used for an indefinite range of tasks. In prose, argumentation can and usually is embedded in or intertwined with other material, and can be more easily crafted to engage the reader's interest. Another kind of limitation is that, since argument maps blend formal structure with natural language, they are not amenable to computation. That is, without building in general artificial intelligence, you can't have your software helping you by making inferences or updating truth or confidence values. For this, you need to turn to cousins of argument maps, devices such as Bayes nets.

KK: You've reported substantial success in teaching critical thinking skills using argument mapping, two or three times the improvement in measures like the California Critical Thinking Skills Test that others have reported. What is the secret of your success?

TvG: In a phrase, the Deliberate Practice Hypothesis. This is the commonsense empirical conjecture that critical thinking skills, like other sorts of skills, improve through practice. More specifically, it is an application of Karl Anders Ericsson's conjecture that

high levels of expertise in any field come through, and only through, lots of the right sort of practice, known as "quality" or "deliberate" practice. So we designed a way of teaching critical thinking based on lots of deliberate practice, as opposed to typical critical thinking subjects which are based on learning lots of theory. Argument mapping, and the supporting software packages such as Reason!Able and Rationale, were used as a way to improve the quality of practice that students were doing in informal reasoning, which is a core part of critical thinking. This approach had the added benefit that argument mapping provided students with mental schemas to help them organize their thinking on any topic. For the first time, the students could easily and literally see what it was to have a structured argument, or analyse somebody else's argument. So argument mapping helped us pick up "low hanging fruit" in terms of critical thinking skill gains, fruit that other approaches tend to miss.

KK: A significant issue with training in formal logic and statistics is whether the formally taught skills are in any interesting way transferable, that is, whether students, even the better students, can apply what they've learned outside of the conditions in which they've learned them. Is argument mapping any different? If so, how and why?

TvG: Transferability is a critical issue and an immense challenge, not just for formal logic and statistics but for informal logic and critical thinking, and other intellectual skills. Informal logic and critical thinking are by definition general skills, so if they don't transfer outside the context of teaching, then the teaching has failed, period. The problem is that transfer is quite difficult to measure, in the sense of providing rigorous empirical evidence as to degree of transfer. We haven't done any research to substantiate our hunch that if you teach critical thinking properly a worthwhile amount of transfer takes place. We do have the usual sorts of low-grade, anecdotal evidence (e.g. students spontaneously telling us how they apply their skills in other subjects or in their jobs). To get transfer, the problem has to be tackled head-on, what I call "practice for transfer" rather than hoping or assuming it will happen. This means at least two things. Within critical thinking training programs, exercises must require students to practice general skills on exercises drawn from a wide variety of domains (science, literature etc.) and in a wide variety of formats (media, textbooks, internet forums, etc.). Second, the overall educational program should coordinate explicit instruction in critical thinking (as in, e.g., the standard one-semester undergraduate subject) with application of those general skills in particular domains (e.g., a physiology subject). Unfortunately this almost never happens. Even philosophy departments generally make no attempt to coordinate what is taught in "baby logic" classes, if they have them, with other philosophy subjects.

KK: You've taken a different direction from most academics, setting up a consulting firm (Austhink Consulting) to aid in critical thinking endeavors in the wider community. What led you to that and how has it gone?

TvG: A number of factors pointed towards the private path: a degree of boredom with the academic lifestyle, the need to earn enough to afford to live in a city like Melbourne, and a desire to "make a difference". Creating a niche consulting firm created a whole new set of challenges, and has had lots of ups and downs. However a decade down the road we're on a solid footing and the outlook is very good. There's a growing market for our speciality, which is applying argument mapping to complex issues, and plenty of room for others to do similar sorts of work. More broadly Austhink Consulting

is in the "applied epistemology" business. We look at fields such as psychology, informal logic and philosophy of science for insight into how knowledge is achieved, then we try to bring those insights to bear in helping organisations improve their knowledge-generation capacities. Argument mapping is our main tool in this. A related endeavour was setting up Austhink Software to develop good argument mapping software. We needed far better tools both for education (to help drive higher gains more cheaply) and for Austhink Consulting's activities. The problem was that developing quality, commercial-grade software required much more funding than was available through standard academic channels. We managed to persuade venture capitalists that there was a large potential market for such tools, and developed Rationale (for educational argument mapping) and bCisive (for various applications of structured argumentation in the workplace). Whether there is a large exploitable market remains to be seen, but at least we got the tools built, and they are being used worldwide.

KK: Do you see much opportunity for critical thinking to increase its role in public policy, the media?

TvG: There is of course a great need for this. I doubt there is any way to increase the quality of critical thinking in general; rather, all we can do is chip away at the problem however we can. Interesting opportunities will continue to arise. For example, David Price and Pete Baldwin at Debategraph are doing excellent things, both in terms of applying structured argumentation to matters of public importance, and getting into the eye of the media. Austhink does "behind the scenes" work for organisations, both government and corporate, helping teams organise and improve their thinking on matters that of real practical significance.

KK: Thanks for your time!

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Notes on Gaifman's Solution of The Liar Paradox

Several papers on the topic of the Liar have appeared in *The Reasoner*. Martin Cooke (*The Reasoner* 2(12):4) brought up the two line puzzle. It is the launching point for the solution proposed by Haim Gaifman (2000: *Pointers to Propositions, Circularity, Definition, and Truth*, pp. 79–121). I pointed out (*The Reasoner* 3(2):7) that it was more plausible to read two different meanings in two different sentence-tokens, as Gaifman suggests, rather than reading two different meanings in the same token, as Hartley Slater suggests (*The Reasoner* 3(1):3.) Martin Cooke (*The Reasoner* 3(3):7) formulated a paradox that "knocks out" all the sentence-tokens at once (below). It opens some new perspectives.

Focusing on the first two lines in the example below we find that the sentences (1) and (2) are two different sentence-tokens of the same sentence-type.

Line 1 The sentence on line 1 is not true. (1)

Line 2 The sentence on line 1 is not true. (2)

Line 3 The sentence next to the label 'Line 1' is not true. (3)

How do we evaluate a sentence of the form "The sentence on line x is not true"? Paraphrasing Gaifman:

> Go to line x and evaluate the sentence written there. If that sentence is true, then "The sentence on line x is not true" is false, else the latter is true. Gaifman (Pointers to Propositions, Columbia University, p. 3)

When we evaluate the sentence on line 1 we are instructed to evaluate the sentence on line 1—we enter an infinite loop, and no truth value will be assigned to (1). Hence (1) is neither true nor false. When we evaluate (2) we already know that the sentence on line 1 is not true, hence (2) is true. Thus (1) and (2) are assigned different truth values although their grammatical subjects have the same referent and their predicates the same extent.

I find Gaifman's evaluation procedure quite convincing. He further says that "One infers that, in this and in similar situations, truth-values should be assigned not to sentence-types but to their tokens." Gaifman (Pointers to Propositions, p. 4). However, this inference requires some qualification. When using a natural language we indeed tend to interpret (2) as true. Nevertheless we do obtain a consistent system even if we take the sentence-types to be the truth bearers. For example the construction of formal languages is greatly simplified when we adopt the convention that the sentence-types are the truth bearers.

Let us conduct a thought experiment and replace the grammatical subject of sentence (1) with a *synonym*. An example is the sentence on line 3. It is a different token than the sentence on line 1, but it is also a different type. Its grammatical subject has the same referent as the subject of (1), and its predicate has the same extent as the predicate of (1). Synonyms by definition have the same referent but they alter the sentence-type. Let us now assume that the sentence-types are the truth bearers, i.e. that all the sentence-tokens of the same sentence-type have the same truth value. Then (2) and (1) must have the same truth value, namely neither true nor false. But the sentence on line 3 is still true. It succeeds in expressing our conclusion, that sentence (1) is not true, without a contradiction. If we accept Gaifman's thesis that (1) and (2) are not equivalent when the sentence-tokens are the truth bearers then we also ought to accept that (1) and (3) are not equivalent even if the sentence-types are the truth bearers.

Note that we can replace the grammatical subject of

> This sentence is not true. (4)

with a synonym. E.g.:

"This sentence is not true" is not true. (5)

'This sentence' in (4) and "'This sentence is not true"' in (5) have the same referent, namely the sentence (4). But the former is self-referential and the latter is not analogically to (1) and (3). The former is not true but the latter is. We have reached the same conclusion through different means in 'Van Fraassen on Presupposition and Self-Reference' (*The Reasoner* 2(12):5.) A similar result has been obtained by Laurence Goldstein (1992: 'This Statement Is Not True' Is Not True, *Analysis*, pp. 1–2).

Let us now paraphrase Cooke's paradox.

Def 1: 'C*' is the name of the sentence-type of the following sentence-token: "All the sentence-tokens of the sentence-type C* are not true."

Is the following sentence true or false?

All the sentence-tokens of the sentence-type C* are not true. (4)

It is neither. We avoid a contradiction by using a *different sentence-type*, e.g.:

All the sentence-tokens of the same type as "All the sentence-tokens of the sentence-type C* are not true" are not true. (5)

(5) succeeds in expressing that all the sentence-tokens of the same type as (4) are not true. Let us now take this paradox to the next level and define a *sentence-category* as the set of all the sentence-types such that their grammatical subjects have the same referent and their predicates have the same extent. For example sentence (4) and (5) belong to the same category. The following is not a paradox.

Def 2: 'Z*' is the name of the sentence-category of the following sentence-type: "All the sentence-types of the sentence-category Z* are not true."

Is the following sentence true or false?

All the sentence-types of the sentence-category Z* are not true. (6)

Here we enter an infinite loop when we attempt to evaluate Def 2. As a result 'Z*' does not denote anything. We can safely conclude that

"All the sentence-types of the sentence-category Z* are not true" is not true. (7)

In this case (7) does not belong in the same sentence-category as (6) because the subject of (6) does not have any referent while the subject of (7) refers to (6). It is unlikely that a paradox can be formulated.

X.Y. Newberry

§3
News

Abductive Cognition

Lorenzo Magnani (2009). Abductive Cognition. The Epistemological and Eco-Cognitive Dimensions of Hypothetical Reasoning. Springer.

This volume explores abductive cognition, an important but, at least until the third quarter of the last century, neglected topic in human reasoning. It integrates and further develops ideas already introduced in a previous book, which Lorenzo Magnani published in 2001 (*Abduction, Reason, and Science. Processes of Discovery and Explanation*, Kluwer/Plenum, New York). The status of abduction is very controversial. When dealing with abductive reasoning misinterpretations and equivocations are common. What are the differences between abduction and induction? What are the differences between abduction and the well-known hypothetico-deductive method? What did Peirce mean when he considered abduction both a kind of inference and a kind of instinct or when he considered perception a kind of abduction? Does abduction involve only the generation of hypotheses or their evaluation too? Are the criteria for the best explanation in abductive reasoning epistemic, or pragmatic, or both? Does abduction preserve ignorance or extend truth or both? How many kinds of abduction are there? Is abduction merely a kind of "explanatory" inference or does it involve other non-explanatory ways of guessing hypotheses?

In 1998 Jaakko Hintikka had already contended that abduction is the "fundamental problem of contemporary epistemology". The aim of the book is to combine philosophical, logical, cognitive, eco-cognitive, neurological, and computational issues, while also discussing some cases of reasoning in everyday settings, in expert inferences, and in science. The interdisciplinary character of abductive reasoning is central and its fertility in various areas of research is evident. The book also addresses the central epistemological question of hypothesis withdrawal in science by discussing historical cases (chapter two), where abductive inferences exhibit their most appealing cognitive virtues. An interesting and neglected point of contention about human reasoning is whether or not concrete manipulations of external objects influence the generation of hypotheses, for example in science. The book provides an indepth study of what Lorenzo Magnani has called manipulative abduction, showing how we can find methods of constructivity in scientific and everyday reasoning based on external models and cognitive and epistemic mediators. The book also illustrates the problem of "multimodal abduction", recently pointed out by Paul Thagard, which refers to the various aspects of abductive reasoning, neurological, verbal-propositional, sentential, emotional and manipulative. Multimodal abduction is also appropriate when taking into account the dynamics of the hybrid interplay of the aspects above and the semiotic role played by what I call "semiotic anchors". These anchors constitute ways of favoring hybrid reasoning in various cognitive and epistemic tasks and they play an important role in that event of "externalization of the

mind", ultimately resorting to the idea of the importance of the external cognitive tools and mediators in cognition. Finally, the book provides some case studies derived from the history of discoveries in science, logic, and mathematics, also taking advantage of an agent based perspective. A central target has been to further study the concept of non-explanatory and instrumental abduction, introduced by Gabbay and Woods in their *GW* model of abduction.

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Logic, Rationality and Interaction, 8–10 October

The event, which was held at Southwest University in Chongqing municipality, China, from October 8th to 10th 2009, featured seven invited and twenty-four contributing speakers, as well as a poster session with eight posters. Altogether there were over 120 participants from 17 countries. A brief summary of the invited talks follows.

The talk "Modeling change of awareness and knowledge" was given by Hans van Ditmarsh (University of Sevilla, Spain), who provided a logic of public global awareness and a logic of individual local awareness to describe the procedure of becoming aware of a fact or an agent, using a refinement of bisimulation, called "awareness" bisimulation, for the semantics.

Ming Xu (Wuhan University, China) proposed two theories of STIT logic equipped with actions, one with particular actions and the other with sets of actions, in a talk entitled "Combination of STIT and actions". He also discussed their formal connection to certain dynamic logics of action. Fangzhen Lin (Hong Kong University of Science and Technology, China), in a talk entitled "Computer-aided theorem discovery and verification", introduced a general method for discovering useful theorems with the help of computers. After a motivating example of sums of polynomial terms, he argued that a simple generate-and-test approach goes a long way towards discovering theorems about classes of two-person games with at most one Nash equilibrium, state invariants in planning domains and strongly equivalent logic programs.

Henry Prakken (Utrecht University, Netherlands) spoke on "Argumentation in logic and interaction", showing that argument games can be used to verify the status of arguments (or even single statements) given a background theory or knowledge base, while real argumentation involves dynamics over distributed information. He argued that games for grounded semantics are unsound in the distributed setting and that other speech acts are needed. Rohit Parikh (City University of New York, USA) talked about "The use of knowledge in social algorithms". He emphasized the need to develop theories of social functioning which do not assume logical omniscience and a full theory of mind, using many interesting examples. He then outlined the Parikh-Krasucki result on connected graphs with private information.

Jeremy Seligman (University of Auckland, New Zealand, also visiting professor at South West University) gave a talk on "Looking for a unified theory of information and communication", in which he surveyed various approaches to the philosophy of infor-

mation, in an attempt to draw out the key features that any formalization should account for. He briefly indicated how the Barwise-Seligman theory of information channels can act as a framework within which those features can be unified. Leon van der Torre (University of Luxembourg, Luxembourg) in "Norm change" drew on the AGM approach to belief revision to consider changes in norm systems, one of the current research topics in deontic logic. An operational semantics for input/output logics are used to extend the AGM framework in a "more semantic" way to characterize norm contraction.

The contributed talks covered such topics as dynamic epistemic temporal logic, dynamic testimonial logic, dynamic context logic, dynamic logic of questions, coalition logic for resource games, cooperation logics, preference-based dyadic deontic logic, epistemic dynamic logic of agency, epistemic foundations for game solution concepts, and a first-order logic formalization of Arrow's theorem. Full details of the programme, including slides of the presentations, can be found here. The contributed papers have been published in the conference proceedings: *Logic, Rationality and Interaction—-Second International Workshop, LORI 2009, Chongqing, China, October 8-11, 2009* (edited by Xiangdong He, John Horty and Eric Pacuit) published by Springer.

Before the workshop, three tutorials provided a background for the main topics of LORI: Eric Pacuit (University of Tilburg, Netherlands) on "Reasoning about rational agents", Rohit Parikh (City University of New York, USA) on "Belief revision, language splitting and information", and Jouko Väänänen (University of Helsinki, Finland and University of Amsterdam, Netherlands) on "Logic and games".

In addition to the main events of the workshop, there was a special one-day meeting of LogiCCC, on October 7, sponsored by the European Science Foundation and the Institute of Logic and Intelligence (ILI) of Southwest University, at which invited speakers from Europe and China presented their current research projects.

Overall, the series of events was a lively and enriching experience. A variety of activities were organized to promote understanding, cultural exchange and academic cooperation, including visits to the 7th century rock carvings at Dazu, an evening cruise on the Yangtze river, and the sampling of a variety of local specialties such as Ma La Huo Guo, the notoriously firey hot pot of Chongqing.

LORI-II led to great advances in mutual understanding, both academically and culturally, between Chinese and foreign logicians.

Meiyun Guo
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Australasian Joint Conference on Artificial Intelligence, 30 November–4 December

The 2009 annual Australasian AI conference was co-located at the University of Melbourne with two other conferences, Artificial Life and Data Mining, as well as a new two-day Summer School on Computational Intelligence, organized by Xiaodong Li (RMIT).

"Computational Intelligence" in the AI world means non-symbolic methods for

intelligence, such as neural networks and evolutionary algorithms. Although non-biological neural networks didn't show up at the Summer School, it nevertheless covered a wide range of techniques, including particle swarm optimization, genetic programming, Bayesian networks and CI for computer games. An entertaining presentation by Eamonn Keogh (UC Riverside) dealt with how to get published and cited. Apparently the former is not a strict precondition for the latter, as one "paper" cited repeatedly was never written, let alone published! (This case illustrated the shoddy practice of not checking sources when writing, of course.)

Keynote speakers were shared between the conferences and came to an ambitious total of seven. Mark Bedau (Reed College) got things started by discussing the accelerating work on producing "wet" artificial life, that is synthesizing living entities in the laboratory. According to Professor Bedau these techniques are rapdily coming together and breakthroughs are imminent. Ross Gayler (Veda Advantage), Kate Smith-Miles (Monash University), Jian Pei (Simon Fraser University), Eamonn Keogh, and Ian Witten (University of Waikato), the inventor of the Weka machine learning testing platform, all gave well-received talks on different aspects of data mining and machine learning. Andries Engelbrecht (University of Pretoria) discussed his work developing a common software platform for particle swarm research.

At the AI conference the most popular areas (judging by the number of papers) were "data mining and statistical learning" and evolutionary computing. The Best Paper Award went to Cesar A. Astudillo and B. John Oommen for "On Using Adaptive Binary Search Trees to Enhance Self Organizing Maps", while the Best Student Paper was "Unsupervised Elimination of Redundant Features Using Genetic Programming" by Kourosh Neshatian and Mengjie Zhang. Since I was busy running the Artifical Life conference, I was unable to attend those sessions and so have little more to say, unfortunately.

The Artificial Life conference included more or less traditional areas, such as game theory (there's still new work being done on the iterated prisoners' dilemma, all of which involved evolutionary methods) and complexity theory, but also newer or less explored areas. Aside from game theory, evolutionary methods were investigated for the development of communication (Nguyen and Skabar), computational efficiency (Xie and Zhang), and were used to investigate Punctuated Equilibrium theory in evolution (Woodberry et al.). Artificial Art was addressed by me and Alan Dorin in an attempted redefinition of creativity explicitly opposed to the standard treatments, such as Margaret Boden's, which insist on folding in elements of cultural value. An immediate application of our definition to generative art was also presented (T Kowaliw et al.). The range and interest of applications of individual-based modeling (aka agent-based modeling) continue to grow, with reports here of applications to architectural design (Shukla), economics (Hassani-M and Parris), controlling criminal behavior (Scogings and Hawick), as well as the development of resistence to Hepatitis B treatment (Bernal et al.). A session on Swarm Intelligence revealed that investigations of the exploration/exploitation tradeoff continue.

The proceedings of the Artificial Life and the Artificial Intelligence conferences are available through Springer Verlag in their Lecture Notes in Artificial Intelligence, as

volumes 5865 and 5866 respectively.

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Formal Models of Norm Change, 18–19 January

After the first successful edition held in 2007 at the University of Luxembourg, the workshop "Formal Models of Norm Change" has been held this year at the University of Amsterdam, on 18th-19th January, in the distinguished location of the Doelenzaal of the University Library. This second edition of the workshop has brought together, for two days, several researchers interested in norms and active in neighboring research fields such as philosophy, computer science, artificial intelligence, theory of law. The aim of the workshop was to foster the interaction between these research fields on the common topic of norm change and, in general, on topics related to the dynamics of evaluative and deontic notions such as preferences, obligations, permissions, rights.

The program of the workshop has been structured in four groups of talks. The first group of talks have focused on a comparison, highlighting similarities as well as differences, between the dynamics of norms and the dynamic of mental attitudes such as belief and knowledge, this latter being a well-established object of research in the fields of belief revision and dynamic epistemic logic. So, after the first talk "What is Norm Change?" by Leon van der Torre (University of Luxembourg), Gabriella Pigozzi (University of Luxembourg) and Guido Boella (University of Turin), which set the stage for the workshop, Richard Booth (University of Luxembourg) has tested the application of the AGM postulate-based methodology to provide an abstract high-level framework for the analysis of norm change. Still in line with established research on the dynamics of knowledge and belief, Alexandru Baltag (University of Oxford) has provided a fascinating insight into norm change by looking at how agents change policies for interpreting incoming information when confronted with a belief-change process: "Dynamic-Doxastic Norms versus Doxastic-Norm Dynamics".

The second group of talks has focused on issues relating norm change to argumentation and to the dynamics of legal codes. Henry Prakken (Universities of Utrecht and Groningen) has argued for the incorporation in the design of argumentation procedures of social-theoretic aspects of multi-agent procedures such as fairness and efficiency. Guido Boella (University of Turin) has looked at the interesting problem of the dynamics of the interpretation of legal rules. The interpretation of the law varies as it is confronted by new cases: e.g., (from a real legal case!) if it is forbidden to fish, does this mean that it is also forbidden to fish frogs? Finally, Antonino Rotolo (University of Bologna) has offered a thorough logical analysis (in the framework of defeasible logic) of the sort of subtleties involved in the dynamics of legal provisions, a dynamics dictated by changes concerning not only the validity and existence of the provisions themselves, but also of their scope and time of force, their efficacy, and their applicability.

The third group of talks has tackled issues related to deontic logic proper and to the logic of normative systems and institutions. Emiliano Lorini (Université Paul Sabatier,

Toulouse) has presented an extensive logical analysis of multi-agent institutions based on the notions of acceptance (roughly, what is true in the context of an institution is what all agents in that institution accept / agree to be true) and has formally captured a number of operations of "acceptance ", accounting for a bottom-up perspective on institutional change. Dov Gabbay (King's College) has provided an original new analysis of a traditional theme in deontic logic, the issue of contrary-to-duty norms, by means of reactive Kripke models. Remaining in the field of deontic logic, Davide Grossi (University of Amsterdam) has proposed an analysis of norm change by interfacing standard preference logics with dynamic context logic, pointing then at a number of open issues concerning the application of preference logics to deontics.

The last group of talks has focused on applications of modal logic techniques to the study of norm change. Paolo Turrini (University of Utrecht) has proposed an analysis, within coalition logic, of the standard deontic notions of permission, prohibition and obligation, in terms of a game-theoretic notion of optimality. Guillaume Aucher (University of Luxembourg) has presented a system of dynamic deontic epistemic logic in which issues of knowledge dynamics are put side by side with deontic notions, allowing for the formal analysis of concepts such as "being obliged to know". The last talk was given by Johan van Benthem (Universities of Amsterdam and Stanford) who contoured the problem of norm change from the point of view of the general program of logical dynamics, giving to it a precise place concerned with the dynamics of agents' preferences and evaluations: norms and, more generally, evaluations are essential ingredients of the decision-making of rational agents in social contexts.

All in all, the workshop has given a lively snapshot of the interests of a growing research community working at the interface of several disciplines, an sharing a common trust in logic-based methods.

For the abstract of the talks, as well as the slides, please visit this website.

Davide Grossi
Institute of Logic, Language and Computation, University of Amsterdam

Calls for Papers

Empirical Evaluations in Reinforcement Learning: special issue of *Machine Learning*, deadline 26 February.
Evolutionary Neural Networks: Theory and Practice: special issue of *Journal of Intelligent & Fuzzy Systems*, deadline 28 February.
The Methods of Applied Philosophy: special issue of the *Journal of Applied Philosophy*, deadline 1 April.
The Extended Mind: special issue of *Teorema*, deadline 1 October.
Philosophical History of Science: special issue of *The Monist*, deadline 31 October.
Experimental Philosophy: special issue of *The Monist*, deadline 30 April 2011.
Formal and Intentional Semantics: special issue of *The Monist*, deadline 30 April 2012.

§4
What's Hot in ...

We are looking for columnists willing to write pieces of 100-1000 words on what's hot in particular areas of research related to reasoning, inference or method, broadly construed (e.g., Bayesian statistical inference, legal reasoning, scientific methodology). Columns should alert readers to one or two topics in the particular area that are hot that month (featuring in blog discussion, new publications, conferences etc.). If you wish to write a "What's hot in ... ?" column, either on a monthly or a one-off basis, just send an email to features@thereasoner.org with a sample first column.

...Logic and Rational Interaction

Logic and Rational Interaction offered a late Christmas present to its visitors: *Clark Glymour's colorful interview in Epistemology: 5 Questions* is now fully available on the website! We also announced a new pre-publication with a no less colorful title: Junhua Yu's *Prehistoric phenomena and self-referentiality in realization procedure*.

On the report side, the Christmas vacations were rather quiet. We posted two reports: one on the *Workshop on Structural Aspects of Rationality* held in Kanpur (India); and one on the *Conference which needed no title*, held in honor of Raymond Smullyan at the CUNY Graduate center.

At the moment of writing this piece, Logic and Rational Interaction was down for more than 24 hours, due to technical problems of our web host. We hope to get back online as soon as possible. In the meanwhile, you can address directly any inquiry to our web manager, Rasmus Rendsvig.

Olivier Roy
Philosophy, Groningen

...Formal Epistemology

What's hot (and what's not) in formal epistemology. Handy tips and helpful advice from the Formal Philosophy Seminar series at the Formal Epistemology Project, University of Leuven.

Toby Meadows provided a tableau system and a completeness proof for a revised version of Carnap's semantics for quantified modal logic. Recall that for Carnap, a sentence is possible if it is true in some first order model. This is a fundamentally semantic conception of modality. As with second order logic, no sound and complete proof theory can be provided for this semantics. Arguably this contributed to the disappearance of Carnapian modal logic from contemporary philosophical discussion. The proof theory proposed by Toby comes much closer to Carnap's semantic vision and provides an interesting counterpoint to mainstream modal logic.

Marie Duzi took us from extensions, via intensions, to hyperintensions! The procedural semantic framework that she develops (Tichy's Transparent Intensional Logic) makes procedures first-class entities. The point was to concretely realise Frege's Modes of Presentation, and give us a way to semantically individuate necessary, a priori truths. In this presentation, Marie concentrated on the phenomena of definite descriptions, as framed by the debate between Russell and Strawson. Marie mounted a careful argument for Donellan's claim that sentences of the for "The *F* is a *G*" are ambiguous. However, she argued that theory ambiguity does not concern a shift in meaning of the definite description 'the F', but that it concerns different "topic-focus" articulations of such sentences. This analysis was parsed in terms of differing suppositions involved in the relevant interpretations, but where the one and the same meaning occurs. In case anyone thought that such a distinction turns on pragmatic as opposed to semantic considerations, Marie had some careful arguments for why it is that topic-focus articulation is a concretely semantic beast.

Photos of our fun may be found here.

The full FPS program is available here. Next time: Katya Tentori and Jan Sprenger!

Sebastian Sequoiah-Grayson
Formal Epistemology Project, University of Leuven

§5
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 have feedback concerning any of the items printed here, please email features@thereasoner.org with your comments.

Bayesianism

Bayesianism is a viewpoint originating in the work of Thomas Bayes (but mostly developed in the 20th century) stressing the usefulness of probabilistic reasoning in settling many debates in philosophy and in the sciences. It is often characterised by a commitment to two theses: (1) probabilities represent (rational) degrees of belief; (2) degrees of belief are rationally revised according to Bayes' theorem (they are 'conditionalised'): an agent's beliefs after she has learned something new should be equal to her old beliefs, conditional on the newly-acquired fact. Through (1) and (2), Bayesians seek to develop a formal apparatus that sharpens various complex debates, and thereby makes them theoretically tractable.

Important areas that Bayesianism has been applied to include the philosophy of science, statistics, logic and cognitive science. In the philosophy of science, Bayesianism

has mostly been used to explain when a theory is empirically confirmed: this is said to happen when the evidence leads scientists to (rationally) increase their degree of belief in the theory being true. Other applications of the account comprise improvements in the testing of statistical hypotheses, extensions of traditional logic into the realm of beliefs (see doxastic logic), and models of actual thought processes.

However, the account is not without its critics. Firstly, some argue that it gets many important facts wrong: for example, many instances of scientific confirmation, hypothesis testing and ordinary thought do not seem to be captured well by Bayesian models. Secondly, some critics are worried about the key role that beliefs play in the theory: they think that science and logic are concerned with objective relationships among facts and propositions, not with beliefs (rational or otherwise). Despite these worries, though, Bayesianism is currently the dominant theory in most of the philosophy of science, and also of considerable importance in many other areas of science.

Armin Schultz
Philosophy, Wisconsin

Kurt Gödel (1906–1978)

Kurt Gödel was a seminal figure in mathematical logic. Born in Brünn, Moravia, Gödel received a PhD in 1930 from the University of Vienna. After Austria was annexed by Germany, he and his wife Adele emigrated to Princeton, where he was a member of the Institute for Advance Study and where he remained until his death. Amongst Gödel's many achievements are consistency proofs for both the Axiom of Choice and the Generalized Continuum Hypothesis with the other axioms of set theory and also a relative consistency proof of arithmetic. Only his most famous results, Completeness and Incompleteness, are discussed here.

Completeness of First Order Axiomatic Systems. In 1930 Gödel published his dissertation, proving the completeness of first-order logic. The Completeness Theorem states that for every proposition A in a (classical) first-order axiomatic system, either there is some interpretation of the system in which A is true or there is a proof of $\neg A$ in that system. This means that every first-order tautology has a proof in first-order logic. Another consequence is that given a classical first-order system, we can always determine its consistency or inconsistency. If it is consistent, then it has an interpretation that is either finite or denumerable. If it is inconsistent, then there is a finite proof of a contradiction in that system. Part of the significance of the Incompleteness Theorems is that they show that there are important systems for which these criteria do not hold.

The Incompleteness Theorems. In 1931 Gödel published the Incompleteness Theorems in 'On Formally Undecidable Propositions of Principia Mathematica and Related Systems I.' Both theorems apply to axiomatic systems, such as that developed by Russell and Whitehead in the Principia Mathematica, that contain a certain amount of elemen-

tary arithmetic and that use methods of reasoning known as "finitary". Consider such a system S.

The First Incompleteness Theorem states that there are undecidable propositions in S. A proposition A is said to be undecidable if A is a well-formed formula in the language of S, but neither A nor $\neg A$ is provable in S. A is of the form $\forall(x)F(x)$, where F is a well-defined predicate. That is, A makes a claim about whether a certain, clearly defined property holds for all of the natural numbers. Such a property holds for all of the natural numbers or it does not, but S itself cannot produce a proof one way or the other.

The Second Incompleteness Theorem states that, if S is indeed consistent, some propositions expressing the consistency of S are undecidable. In other words, a proof that S is consistent requires inferences that cannot be formalized in S itself.

These theorems have had a wide influence on the development of mathematical logic. For instance, they show that the modes of reasoning envisioned by Hilbert to establish the veracity of mathematics are not sufficient to do so. They have also stimulated large swaths of research in various sub-disciplines of mathematical logic.

Amanda Hicks
Philosophy, University at Buffalo

§6
Events

February

Statistical Modelling and Inference: Conference to celebrate Murray Aitkin's 70th birthday, Brisbane, Queensland, Australia, 1–4 February.
Dublin Intentionality Workshop: Royal Irish Academy, 4–5 February.
Utterance Interpretation and Cognitive Models: Brussels, 5–7 February.
IUI: ACM International Conference on Intelligent User Interfaces, Hong Kong, China, 7–10 February.
Lattice-Valued Logic and its Applications: 31st Linz Seminar on Fuzzy Set Theory, Linz, Austria, 9–13 February.
IWCogSc: ILCLI International Workshop on Cognitive Science, Donostia-San Sebastian, 10–12 February.
ICMLC: 2nd International Conference on Machine Learning and Computing, Bangalore, India, 12–13 February.
Mind in Nature: Humboldt-University of Berlin, 15–17 February.
Logical Approaches to Barriers in Computing and Complexity: Alfried Krupp Wissenschaftskolleg, Greifswald, Germany, 17–20 February.
PhD's in Logic: Tilburg University, The Netherlands, 18–19 February.
Causality and Explanation in Physics, Biology and Economics: Barcelona, 18–20 February.

AILACT: Association for Informal Logic and Critical Thinking, Central APA Meeting in Chicago, Illinois, 19 February.
ICMSSC: International Conference on Mathematics, Statistics and Scientific Computing, Penang, Malaysia, 24 February.
Ontology of Ordinary Objects: 2nd Annual Auburn Philosophy Conference, Auburn, Alabama, 26–27 February.
BCPS: International Conference on Behavioral, Cognitive and Psychological Sciences, Singapore, 26–28 February.

March

STACS: 27th International Symposium on Theoretical Aspects of Computer Science, Nancy, France, 4–6 March.
Relational versus Constituent Ontologies: University of Notre Dame, South Bend, Indiana, 5–6 March.
AGI: 3rd Conference on Artificial General Intelligence, Lugano, Switzerland, 5–8 March.
Methods in Philosophy: Dublin Graduate Conference in Philosophy, Trinity College Dublin (TCD) and University College Dublin (UCD), 6–7 March.
Consciousness, Other Minds and Naturalizing the Mind: Ruhr-University Bochum, Germany, 9 March.
PGSA: Philosophy Graduate Student Association, University of Waterloo, Canada, 11–12 March.
Philosophical Implications of Second-Order Modal Logic: International Graduate Workshop at the Centre for Logic and Language, Institute of Philosophy, University of London, 11–13 March.
Thought Experiments and Computer Simulations: Same End, Different Means?: IHPST, Paris, France, 11–13 March.
ICKD: 2nd International Conference on Knowledge Discovery, Bali Island, Indonesia, 19–21 March.
SEP: 38th annual meeting of the Society for Exact Philosophy, Kansas City, Missouri, 19–21 March.
Propositions, Context, and Consequence: Arché Research Centre, University of St Andrews, 20–21 March.
CICLing: 11th International Conference on Intelligent Text Processing and Computational Linguistics, Iasi, Romania, 21–27 March.
SW: Operational Research Society 5th Simulation Workshop, Worcestershire, England, 23–24 March.
Justification Revisited: University of Geneva, Switzerland, 25–27 March.
MIDiSoVa: Modelling Interaction, Dialog, Social Choice, and Vagueness, ILLC, Amsterdam, 26–28 March.
INFOS: 7th International Conference on Informatics and Systems, Cairo University, Egypt, 28–30 March.
NorMAS: 5th International Workshop on Normative Multiagent Systems, Leicester, UK, 29–30 March.

AISB: Annual Convention of the Society for the Study of Artificial Intelligence and Simulation of Behaviour, De Montfort University, Leicester, 29 March - 1 April.
SBP: International Conference on Social Computing, Behavioral Modeling, & Prediction, Bethesda, MD, 29 March - 1 April.
Matching and Meaning: Automated Development, Evolution and Interpretation of Ontologies, Leicester, UK, 31 March - 1 April.

April

Theory of Belief Functions: Brest, France, 1–2 April.
The Snowbird Workshop: The Learning Workshop, Cliff Lodge, Snowbird, Utah, 6–9 April.
JAIST: International Symposium on Integrated Uncertainty Management and Applications, Ishikawa, Japan, 9–11 April.
Newton and Empiricism: Center for Philosophy of Science, University of Pittsburgh, 10–11 April.
ADS: Agent-Directed Simulation Symposium, Orlando, Florida, USA, 12–15 April.
Research Students' Conference in Probability and Statistics: Department of Statistics, University of Warwick, 12–15 April.
Scientific Philosophy: Past and Future: Tilburg University, The Netherlands, 13 April.
Progress in Medicine: University of Bristol, 13–15 April.
Visions of Computer Science: Edinburgh University, 13–16 April.
The Future of Philosophy of Science: Tilburg Center for Logic and Philosophy of Science, 14–16 April.
Synthese Conference: Columbia University, New York, 15–16 April.
SSPP: Southern Society for Philosophy and Psychology annual meeting, Atlanta, GA, 15–17 April.
Northwestern/Notre Dame Epistemology Conference: Northwestern University, 16 April.
UNILOG: 3rd World Congress and School on Universal Logic, Lisbon, Portugal, 18–25 April.
FLOPS: 10th International Symposium on Functional and Logic Programming, Sendai, Japan, 19–21 April.
Non-classical Mathematics: a special session at World Congress on Universal Logic 2010, Lisbon, Portugal, 22–25 April.
Formal Semantics and Pragmatics: 6th International Symposium of Cognition, Logic and Communication, University of Latvia, Riga, 23–25 April.
Instruments: Mental and Material: 6th Annual HAPSAT Conference, Institute for the History and Philosophy of Science and Technology, University of Toronto, 25 April.
LPAR: 16th International Conference on Logic for Programming, Artificial Intelligence and Reasoning, Dakar, Senegal, 25 April - 1 May.
ICCMNC: International Conference on Computer Mathematics and Natural Computing, Rome, Italy, 28–30 April.
RIAO: Adaptivity, Personalization and Fusion of Heterogeneous Information, Paris, France, 28–30 April.

SDM: SIAM Conference on Data Mining, Columbus, Ohio, 29 April–1 May.
IGCC: 2nd annual Interdisciplinary Graduate Conference on Consciousness, Boston University, 30 April–1 May.
Reference and Referring: Inland Northwest Philosophy Conference, Moscow, ID & Pullman, WA, 30 April–2 May.

May

Models and Simulations: University of Toronto, 7–9 May.
Reason Today. From Differentiation to Unity: Babes-Bolyai University, Cluj-Napoca, Romania, 7–9 May.
KR: 12th International Conference on the Principles of Knowledge Representation and Reasoning, Toronto, Canada, 9–13 May.
AAMAS: 9th International Conference on Agents and Multi Agent Systems, Toronto, Canada, 10–14 May.
Formal Epistemology Festival: Learning From Experience & Defeasible Reasoning, University of Toronto, 11–13 May.
AISTATS: 13th International Conference on Artificial Intelligence and Statistics, Chia Laguna, Sardinia, Italy, 13–15 May.
NMR: Workshop on Commonsense and Non-Monotonic Reasoning for Ontologies, Sutton Place, Toronto, Canada, 14–16 May.
Meaning, Modality and Apriority: University of Cologne, Germany, 17–20 May.
Infinity: Infinite and Infinitesimal in Mathematics, Computing, and Natural Sciences, Cetraro, Italy, 17–21 May.
FLAIRS: 23rd Florida Artificial Intelligence Research Society Conference, Daytona Beach, Florida, 19–21 May.
IDA: 9th International Symposium on Intelligent Data Analysis, Tucson, Arizona, 19–21 May.
POBAM: Philosophy of Biology @ Madison Workshop, University of Wisconsin-Madison, 21–23 May.
PM@100: Logic from 1910 to 1927: Bertrand Russell Research Centre, McMaster University, Hamilton, Ontario, Canada, 21–24 May.
SLACRR: 1st St. Louis Annual Conference on Reasons and Rationality, University of Missouri-St. Louis, 23–25 May.
Algorithmic Randomness: Department of Mathematics, University of Notre Dame, 24–28 May.
LATA: 4th International Conference on Language and Automata Theory and Applications, Trier, Germany, 24–28 May.
ISMVL: 40th International Symposium on Multiple-Valued Logic, Barcelona, Spain, 26–28 May.
SPE3: Semantics and Philosophy in Europe, Institut d'Histoire et de Philosophie des Sciences et des Techniques (IHPST) and Ecole Normale Supérieure (ENS), Paris, 27–29 May.
Game Theory and Communication: Prospects and Syntheses: Center for the Study of Language and Information, Stanford University, 28–29 May.

Model Uncertainty: Centre for Research in Statistical Methodology (CRiSM), Warwick, 30 May - 1 June.
BSAP: First meeting of the Brazilian Society for Analytic Philosophy, Unisinos University, Brazil, 31 May–2 June.

June

Philosophy and Model Theory: History and Contemporary Developments, Philosophical Issues and Applications, Paris, 2–5 June.
BLAST: Boolean Algebras, Lattices, Algebra, Set Theory, and Topology, Boulder, Colorado, 2–6 June.
Cognitive Ecology: The Role of the Concept of Knowledge in our Social Cognitive Ecology: Episteme Conference, University of Edinburgh, 3–4 June.
Valencia International Meetings on Bayesian Statistics: Benidorm, Spain, 3–8 June.
ICIC: 3rd International Conference on Information and Computing Science, Jiangnan University,Wuxi, China, 4–6 June.
ICMS: 3rd International Conference on Modelling and Simulation, Jiangnan University, Wuxi, China, 4–6 June.
IIS: Intelligent Information Systems, Siedlce, Poland, 8–10 June.
Self-Knowledge and Rational Agency: CSMN, University of Oslo, 9–11 June.
Society for Philosophy and Psychology: 36th Annual Meeting, Lewis & Clark College, Portland, Oregon, 9–12 June.
ICCSS: IEEE International Conference on Computational and Statistical Science, Manila, Philippines, 11–13 June.
ICDDM: IEEE International Conference on Database and Data Mining, Manila, Philippines, 11–13 June.
Foundations of Logical Consequence: Arche Research Centre, The University of St Andrews, 11–15 June.
The Foundations of Logical Consequence: St Andrews, Scotland, 12–14 June.
ICAISC: 10th International Conference on Artificial Intelligence and Soft Computing, Zakopane, Poland, 13–17 June.
DM: SIAM Conference on Discrete Mathematics, Hyatt Regency Austin, Austin, Texas, 14–17 June.
Objectivity in Science: University of British Columbia, 17–20 June.
Square of Opposition: Corte, Corsica, 17–20 June.
PCC: 9th Proof, Computation and Complexity, Bern, Switzerland, 18–19 June.
From Practice to Results in Logic and Mathematics: Nancy, France, 21–23 June.
LCM: 4th International Conference on Language, Culture and Mind, Turku, Finland, 21–23 June.
MPC: 10th International Conference on Mathematics of Program Construction, Québec City, Canada, 21–23 June.
CCA: 7th International Conference on Computability and Complexity in Analysis, Zhenjiang, China, 21–25 June.
ICML: 27th International Conference on Machine Learning, Haifa, Israel, 21–25 June.
LOGICA: Hejnice, northern Bohemia, 21-25 June.

Human-Robot Personal Relationships: Leiden University, The Netherlands, 23–24 June.
HOPOS: International Society for the History of Philosophy of Science, Central European University, Budapest, Hungary, 24–27 June.
Valencia Meetings: Valencia / ISBA Ninth World Meeting on Bayesian Statistics, Spain, June 2010.
ILP: 20th International Conference on Inductive Logic Programming, Firenze, Italy, 27–30 June.
IPMU: 13th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Dortmund, Germany, 28 June - 2 July.
CiE: Computability in Europe: Programs, Proofs, Processes, Ponta Delgada (Azores), Portugal, 30 June - 4 July.

July

AAL: Australasian Association for Logic Conference, Sydney, Australia, 2–4 July.
Methods of Applied Philosophy: St Anne's College, Oxford, 2–4 July.
AISC: 10th International Conference on Artificial Intelligence and Symbolic Computation, CNAM, Paris, France, 5–6 July.
LOFT: 9th Conference on Logic and the Foundations of Game and Decision Theory, University of Toulouse, France, 5–7 July.
IWAP: 5th International Workshop on Applied Probability, Universidad Carlos III de Madrid, Colmenarejo, Madrid, Spain, 5–8 July.
IWSM: 25th International Workshop on Statistical Modelling, Department of Statistics, University of Glasgow, 5–9 July.
INC: 8th International Network Conference, Heidelberg, Germany, 6–8 July 2010.
WoLLIC: 17th Workshop on Logic, Language, Information and Computation, Brasília, Brazil, 6–9 July.
Deon: 10th Interational Conferene on Deontic Logic in Computer Science, Florence, 7–9 July.
ISPDC: 9th International Symposium on Parallel and Distributed Computing, Istanbul, Turkey, 7–9 July.
BSPS: British Society for the Philosophy of Science Annual Conference, University College, Dublin, 8–9 July.
UAI: 26th Conference on Uncertainty in Artificial Intelligence, Catalina Island, California, 8–11 July.
ICCSIT: 3rd IEEE International Conference on Computer Science and Information Technology, Chengdu, China, 9–11 July.
FLoC: 5th Federated Logic Conference, University of Edimburgh, 9–21 July.
LICS: Logic in Computer Science, Edinburgh, Scotland, UK, 11–14 July.
TMFCS: International Conference on Theoretical and Mathematical Foundations of Computer Science, Orlando, FL, USA, 12–14 July.
Uncertainty in Computer Models: Sheffield, UK, 12–14 July.
DMIN: International Conference on Data Mining, Las Vegas, USA, 12–15 July.

WORLDCOMP: World Congress in Computer Science, Computer Engineering, and Applied Computing, Las Vegas, Nevada, 12–15 July.
CBR-MD: International Workshop Case-Based Reasoning on Multimedia Data, Berlin, Germany, 14 July.
BICS: Brain-Inspired Cognitive Systems Conference, Madrid, Spain, 14–16 July.
ICCBR: 18th International Conference on Case-Based Reasoning, Alessandria, Italy, 19–22 July.
WCCM/APCOM: 9th World Congress on Computational Mechanics and 4th Asian Pacific Congress on Computational Mechanics, Sydney, Australia, 19–23 July.
Structure and Identity: University of Bristol, 23–25 July.
NACAP: Simulations and Their Philosophical Implications, Carnegie Mellon University, 24–26 July.
KDD: 16th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Washington, DC, 25–28 July.

August

FLINS: 9th International FLINS Conference on Foundations and Applications of Computational Intelligence, Chengdu (Emei), China, 2–4 August.
Thought in Science and Fiction: 12th International Conference of the International Society for the Study of European Ideas, Ankara, 2–6 August.
ICNC-FSKD: the 6th International Conference on Natural Computation and the 7th International Conference on Fuzzy Systems and Knowledge Discovery, Yantai, China, 10–12 August.
ICCP: 10th International Conference on Philosophical Practice, Leusden, Netherlands, 11–14 August.
Making Decisions: Singapore Multidisciplinary Decision Science Symposium, Nanyang Technological University, Singapore, 12–13 August.
Bayesian Nonparametric Statistical Methods: Santa Cruz, California, 16–20 August.
ECAI: 19th European Conference on Artificial Intelligence, Lisbon, Portugal, 16–20 August.
European Meeting of Statisticians: Department of Statistics and Insurance Science, University of Piraeus, Greece, 17–22 August.
Truth Matters: Toronto, 18–20 August.
Artificial Life: 12th International Conference on the Synthesis and Simulation of Living Systems, Odense, Denmark, 19–23 August.
COMPSTAT: 19th International Conference on Computational Statistics, Paris, France, 22–27 August.
CIPP: Collective Intentionality VII, Perspectives on Social Ontology, University of Basel, Switzerland, 23–26 August.
CSL: Annual Conference of the European Association for Computer Science Logic, Brno, Czech Republic, 23–27 August.
Concept Types and Frames: in Language, Cognition, and Science, Düsseldorf, Germany, 24–26 August.

ESPP: Meeting of the European Society for Philosophy and Psychology, Bochum and Essen, Germany, 25–28 August.
AiML: 8th International Conference on Advances in Modal Logic, Moscow, 25–29 August.
ASAI: 11th Argentine Symposium on Artificial Intelligence, Ciudad Autónoma de Buenos Aires, 30 August - 3 September.

September

FEW: 7th Annual Formal Epistemology Workshop, Konstanz, 2–4 September.
Causation and Disease in the Postgenomic Era: 1st European Advanced Seminar in the Philosophy of the Life Sciences, Geneva, Switzerland, 6–10 September.
Logic, Algebra and Truth Degrees: Prague, Czech Republic, 7–11 September.
IVA: 10th International Conference on Intelligent Virtual Agents, Philadelphia, Pennsylvania, USA, 20–22 September.
LRR: Logic, Reason and Rationality, Centre for Logic and Philosophy of Science, Ghent University, Belgium, 20–22 September.
ECML PKDD: The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, Barcelona, Spain, 20–24 September.
&HPS3: Integrated History and Philosophy of Science, Indiana University, Bloomington, 23–26 September.
SMPS: 5th International Conference on Soft Methods in Probability and Statistics, Mieres (Asturias), Spain, 28 September - 1 October.

§7
Courses and Programmes

Courses

Modern Bayesian Methods: Queensland University of Technology, Brisbane, 1 February.
Advanced Small Area Estimation: Southampton Statistical Sciences Research Institute, 15–16 February.
COST-ADT: Doctoral School on Computational Social Choice, Estoril, Portugal, 9–14 April.
Carnegie Mellon Summer School in Logic and Formal Epistemology: Pittsburgh, 7–25 June.
NASSLLI: 4th North American Summer School in Logic, Language and Information, Bloomington, Indiana, 21–25 June.
Social Networks: Lipari Island, Italy, 3–10 July.
Analytic Pragmatism, Semantic Inferentialism, and Logical Expressivism: 2nd Graduate International Summer School in Cognitive Sciences and Semantics, University of Latvia, Riga, 19–29 July.

Meaning, Context, Intention: Central European University (CEU), Budapest, Hungary, 19–30 July.
ESSLLI: European Summer School in Logic, Language and Information, University of Copenhagen, Denmark, 9–20 August.

Programmes

Doctoral Programme in Philosophy: Language, Mind and Practice, Department of Philosophy, University of Zurich, Switzerland.
MA History and Philosophy of Biology: Department of Sociology and Philosophy, University of Exeter.
HPSM: MA in the History and Philosophy of Science and Medicine, Durham University.
Master Programme: Philosophy of Science, Technology and Society, Enschede, the Netherlands.
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 in Metaphysics, Language, and Mind: Department of Philosophy, University of Liverpool.
MA in Philosophy: by research, 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.
MSc in Mathematical Logic and the Theory of Computation: Mathematics, University of Manchester.
MSc in Artificial Intelligence: Faculty of Engineering, University of Leeds.

MSc in Cognitive & Decision Sciences: Psychology, University College London.
MSc in Cognitive Science: University of Osnabrück, Germany.
MSc Specialization Mind, Language and 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.
Master of Science: Logic, Amsterdam.

Jobs

Lectureship: in Philosophy, School Of Philosophy, University of East Anglia, deadline 3 February.
Junior Professor: in Theoretical Philosophy, Humboldt University, Berlin, deadline 4 February.
Readership: in Research Methodology, Methodology Institute, LSE, deadline 12 February.
Lectureship: in Philosophy, University of Nottingham, deadline 15 February.

Studentships

PhD Studentship: "Multilevel Search Methodologies for Problem Solving", School of Computer Science, University of Nottingham, until filled.
PhD Studentship: Philosophy of Medicine, Centre for the Humanities and Health, King's College London, deadline 1 February.
PhD Studentship: Philosophy and Psychiatry, Centre for the Humanities and Health, King's College London, deadline 1 February.
Graduate Teaching Assistantship: Ontology, School of Computing, Science & Engineering, University of Salford, deadline 5 February.
PhD positions: "Probabilistic Graphical Models and Image Analysis", University of Heidelberg, Germany, deadline 26 February.
PhD Scholarships: on "Causation", Department of Philosophy, Macquarie University, deadline 26 February.
PhD Studentships: Experimental Psychology, University of Bristol, deadline 1 March.
PhD position: in Philosophy of Science, Department of Philosophy and Tilburg Center for Logic and Philosophy of Science, Tilburg University, deadline 15 April.