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Editorial

It is with great pleasure that I return as guest editor of The Reasoner; my thanks to Jon Williamson for the invitation. Richard Neapolitan kindly agreed to be this months' interviewee; his interests cover a broad range of scientific endeavour and his views on philosophy are particularly significant to The Reasoner. A true polymath, Rich's interests range from mathematics, through probability and statistics to finance and genetics and so he is well-placed to ponder the relative merits of interdisciplinary research. As you will see, although Rich is very skeptical about the need for philosophy departments, assigning them to a corner of the history department, he is

anything but negative about the role philosophy has played in our current understanding of science.

A commonly-held view, which appears to be historically accurate, is that once a subject ceases to be a matter of speculation, once it has a firm intellectual footing, it generally ceases to be subsumed under the umbrella of 'philosophy'. Natural philosophy became natural science and now, more commonly, the separate branches of physics, chemistry, and biology are referred to. Many physicists in the middle to late part of the twentieth century expressed a direct antipathy toward philosophy and were indignant at the suggestion that their subject might have anything to do with it. However, there were notable exceptions even then and today the philosophy of physics is a thriving research area, suggesting an acknowledgement that modern theoretical physics could not have advanced without philosophy. After all, what is philosophy if not a clarification of one's own thought and understanding of a subject, whether it is physics, probability, geology or psychology?

We live in a world obsessed with functionality (or is it just being in a Statistics and Applied Probability department makes me feel that way ...?) making it difficult for philosophy to attract graduate students and grants; and thus research progress becomes problematical. However, some scholars have found a way of circumventing these limits and controls; for example, practical ethics has become the order of the day, but the major branch of philosophy is ethics; practical ethics being a separate and not altogether philosophical entity concerning specific dilemmas. As any Kantian scholar will tell you, practical philosophy is nothing new but what 'practical philosophy' means has undoubtedly changed.

In his interview Rich avows that the two disciplines of logic and probability and statistics are arguably humanities greatest intellectual achievements. Whilst broadly agreeing, I feel that both disciplines owe everything to philosophy, not only in the past but in the present and that they will continue to do so in the future. But it is time to let Rich speak for himself!

I am delighted to introduce Professor Richard Neapolitan.

Dawn E. Holmes
Statistics and Applied Probability, University of California Santa Barbara

§2
Features

Interview with Richard Neapolitan

Richard E. Neapolitan is Professor and Chair of Computer Science, Northeastern Illinois University, Chicago, USA and is currently Visiting Scholar, Monash University, Australia. His research interests include Statistics (in particular, Bayesian networks and probabilistic modeling), Expert Systems and Cognitive Science (in particular, human learning and processing of causal knowledge). Richard is a prolific author and has been publishing in the most prestigious journals in the broad area of reasoning under uncertainty, since 1987. He has written five books including the seminal 1990 Bayesian network textbook *Probabilistic Reasoning in Expert Systems*. *Learning Bayesian Network's* and *Foundations of Algorithms* both followed in 2003; the latter, translated into three languages, has also become a standard text. More recently, working with Xia Jiang, he has ventured into a new area of application, resulting in 2007 in the book *Probabilistic Methods for Financial and Marketing Informatics*. Richard's approach to textbook writing is innovative; his method engages the student with the logical flow of the material and his books have the reputation for making difficult concepts easy to understand whilst still remaining thought-provoking.

Dawn Holmes: Rich, when was your interest in mathematics first aroused? Your doctorate was in mathematics; how did you first get into computer science and, in particular, reasoning under uncertainty as an area of research?

Richard Neapolitan: I was initially a pre-med student. However, I found physics most interesting as a freshman. My problem was the sloppy way physicist handled mathematics. I decided I better understand mathematics before trying to do anything in physics. I ended up getting a Ph.D. in the field.

I entered computer science through the back door. At the time I received my Ph.D. there were virtually no openings in mathematics departments. However, C.S. departments were developing in the U.S., while there were few Ph.D.s in the field. Since I had worked my way through college by programming, I knew enough computer science to get a position in a C.S. department.

Somehow, I read Buchanan and Shortliffe's work on certainty factors in the mid 1980's. My immediate reaction was "Why aren't these guys using probability?" So I wrote what I thought was a much better way to handle uncertainty in expert systems using probability. Since I only knew how to write math, I wrote it as if it was going to a math journal. The paper was badly panned by some AI journal (I forgot which one). At that time I met Judea Pearl. He told me how to frame mathematics so that AI people would like it. I followed his advice and the paper was published. After meeting him, I became interested in Bayesian (called belief at that time) networks. I was fascinated by the fact that we could graphically represent large multivariate probability distributions. It changed the whole way I thought about problems, and sort of brought me back to my original interest in physics. As an example, a colleague approached me recently asking me to help him with a model he was developing concerning predicting how a baseball team would do against another baseball team. I started drawing a Bayesian network. He said "It's not a Bayesian network." I answered "Every problem in probability concerning two or more variables is a Bayesian network." Once I modeled the problem with a Bayesian network, I showed him

that performance against a team was independent of the team's conference given its division (which was his concern). As another example, I never really quite understood Bell's Theorem until I modeled the problem with a Bayesian network. Anecdotally, after Pearl's book and mine were both published, he mentioned to me at a conference that I referred to him in my preface as a cognitive scientist. He said he was an electrical engineer. I guess somehow we don't escape from our original field.

DH: Some of your work is in philosophy; how important do you think an understanding of philosophical concepts is to the understanding of reasoning?

RN: Like the philosopher Richard Rorty, I feel philosophy itself has kind of run its course. Perhaps we should not even have philosophy departments, and philosophers should reside in history departments. Professors in philosophy departments, like all professors, need to do research. So they think up new stuff (post-modernism, pragmatism, various versions of pragmatism, etc.). I personally don't see much coming out of all this. Philosophy gave birth to science, and, at least for me, science is currently the way to create accurate models of reality. So philosophers might call me a positivist if it is necessary for me to be classified into one of the 101 categories of philosophical thought. If I do philosophize a bit (I confess I have published a paper in the Philosophy of Science Journal), my purpose is to establish a solid foundation and understanding for the use of probability and statistics in science. Too often we do science without thinking carefully about what we are modeling and what we are assuming. A good example is Lotfi Zadeh's fuzzy logic and set theory. In the late 1980's the probability camp kept saying that probability theory subsumes Zadeh's theory. I remember at a special workshop on uncertainty at George Mason University around 1990 some probabilists took the floor, and showed how fuzzy logic is just probability under certain independence assumptions. I noted, as I had before, that that fuzzy logic and probability model entirely different problems. So we are mixing apples and oranges when we try to use probability to solve problems in the domain of fuzzy logic. To this

day, I occasionally come to Lotfi's defense on this matter in the UAI listserver. My point here is that I feel it is necessary to think at a very fundamental level to develop accurate models. I guess you could call this philosophizing.

DH: Do you support a particular philosophy of mathematics?

RN: I think I've already answered this.

DH: You link artificial intelligence, mathematics and philosophy; do you think the early promise of artificial intelligence has been realized?

RN: I was very careful in my 1990 text not to use the term "artificial intelligence" because I don't feel anything I ever did or was writing about had much to do with AI. Eugene Charniak commented to me in the early 1990's that "I don't think the Japanese have been any more successful at AI than us." Implicitly, he meant neither the U.S. nor the Japanese have had any success at "real" AI, namely Arnold in the Terminator. Of course, we have had a lot of success with robots, natural language processing, decision support systems, etc., but I would classify all this stuff more as expert systems. That is, they are capable of doing intelligent acts in a limited domain. If there is ever any real AI progress I would guess it would come more from the kind of stuff Gerry Edelman is doing at the Sante Fe Institute. He is a neurologist who creates robots based on models of the human brain. Last I heard, he feels that they will some day create a conscious entity.

DH: How close are we to providing a machine model of human causal reasoning?

RN: That topic is probably outside my domain. If we define causality as the relationship between random variables which can be identified with manipulation, we have developed some pretty good machine learning programs that can learn causal influences. In the late 1990's a psychologist colleague and I argued in a paper that the genesis of the concept of causality may have arisen by children observing the same conditional independencies that are fundamental to these learning programs. I based my argument on the results of research done by Piaget and his successors. However, the argument was a bit of stretch, and I was just having fun. By the way, these learning algorithms make a num-

ber of assumptions, and, as is true for all of statistics, our results are only good if the assumptions hold for the problem at hand. For example, I did a study involving 6000 subjects concerning learning causal influences on racial harassment in the military. The only causal relationship that was reliably learned was that a racial incident has a causal effect on race. So if someone was unhappy with her/his race, she/he could join the military, have a racial incident, and possibly change her/his race! I am not quite sure why we had this preposterous result. One explanation is that there was a variable that had two causal paths to an effect, and each causal path offset the other. So the variable ended up independent of the effect. The learning algorithms assume this kind of thing is not going on.

DH: Your book, *Probabilistic Reasoning in Expert Systems*, has become a standard text; how has research in expert systems changed since this was first published?

RN: Medical expert systems are the only expert systems with which I am quite familiar. I don't think there have been fundamental changes in the theory used to develop them. Rather, there have just been incremental improvements. What is surprising is that I thought by the year 2000 medical expert systems would be commonplace. I thought every Emergency Department would certainly be routinely using them. Yet still they are hardly used. It's a shame because doctors do have a difficult time diagnosing. John Ritter may be alive today if the ED had a system that checked for aortic dissections. The challenge with medical expert systems now is the development of ones that are deployable. First, they must be professionally developed and maintained rather than being university research projects. Second, we must get the medical profession to accept them. The Promedas project in the Netherlands is addressing this challenge, but last I heard they still had a way to go.

DH: What is your long term research? Is your area of research growing?

RN: I consider myself a scholar more than a researcher. My purpose is usually to understand reality better myself rather than contribute anything. Indeed, I wrote my 1990 text to integrate what I knew about

probability, causality, and Bayesian networks into a unified theory. I did it to clarify the matter in my own mind. Ross Schachter once told me that integration is what I contribute most to science. I guess he is right. I have done a decent amount of stand-alone research, but it certainly is not what I am known for. Right now I am interested in applications of Bayesian networks to bioinformatics. So I am writing a book in the area. I am not sure what my long-term goal is. I told one of my colleagues recently that I was tired of chairing the department. She asked what I wanted to do. I said "play baseball." I might do that again.

DH: Statistics and probability graduate students rarely get the opportunity to study philosophy; do you think it is important that they should? Are there any particular topics that you would recommend to statistics and probability graduate students starting out today?

RN: I think the history of philosophy is essential for all students (Plato, Descartes, Humes, Sartre, all the way up to Rorty). Although philosophy as a discipline may be dead, each individual should understand the developments that have led to our current paradigm. Of course, knowledge of philosophy is also crucial to one's emotional and intellectual development through introspection. Also, every student should take a course in logic and a course in probability and statistics. These two disciplines are arguably our greatest intellectual achievements. They are fundamental to all of science. Yet many students leave college with no knowledge of either. This has always baffled me.

DH: Finally, in your view, what is an important open problem in uncertain reasoning?

RN: I usually have something to say, but on that I do not. It seems researchers in Bayesian networks and causality are more honing the field than making any fundamental changes. Thank you.

In at most one thousand words

How many things can we say in at most that number of words? Let me show how we can take our talk to indefinitely extensible domains. Consider this version of Berry's paradox:

(D) *the least natural number not definable in English in at most one thousand words*

It seems that, on pain of paradox, D defines no number even if it seems that there can only be a finite number of English definitions in at most one thousand words. It's usually believed that the definability paradoxes, such as Berry's and Richard's, stem from fuzziness: 'define' is said to be vague or fuzzy unless restricted to a formal language. But fuzziness is usually caused by estimative hesitation in face of empirical objects, e.g., 'how many grains of sand make up a pile?', 'what color are the eyes of Charlize Theron?', whereas Berry's paradox seems more logical. I'll argue that fuzziness may be inessential to the definability paradoxes.

There are certainly some English definitions of natural numbers that are definitely (i.e., non-fuzzily) such, e.g., *the smallest prime number*. We can think of an ideal definer of natural numbers DEF, endowed with the whole human competence to well-define natural numbers, who would accept as definitions of natural numbers only the ones that are definitely such for him and who would be consistent over time as regards his choice acts. DEF's language ΔL can be considered the result of applying Baaz's Δ connective to get the non-fuzzy core of a part of the human linguistic competence (Baaz, M. 1996. "Infinite-valued Gödel logic with 0-1-projections and relativisations", in Petr Hájek ed., *Gödel'96: Logical Foundations of Mathematics, Computer Science, and Physics*, 23-33. Springer-Verlag, Brno).

Let $P(x)$ be the predicate 'x is a definition of a natural number' and $\mathbf{v}$ a truth-value function having as range a subset of the interval $[0, 1]$. That $P(x)$ is fuzzy usually means that $\mathbf{v}(P(x))$ can be other than 1 or 0. Let's make the reasonable assumption that for DEF it is fuzzy for no x whether $P(x)$ is fuzzy for him. Then DEF applies Δ in the following way:

$$\forall x \ (\mathbf{v}(P(x)) = 1 \ \rightarrow \ \mathbf{v}(\Delta P(x)) = 1)$$

$$\forall x \ (\mathbf{v}(P(x)) \neq 1 \ \rightarrow \ \mathbf{v}(\Delta P(x)) = 0)$$

DEF retains as P's only those x for which $\mathbf{v}(\Delta P(x)) = 1$.

The predicate ΔP can be empty but hardly fuzzy, for suppose there is an x such that $\mathbf{v}(\Delta P(x)) = r$, with $0 < r < 1$; then $\mathbf{v}(P(x)) \neq 1$; hence $\mathbf{v}(\Delta P(x)) = 0$. We can read '$\Delta P$' as 'definitely-$P$'.

Consider now

(D') *the least natural number not ΔL-definable in at most one thousand words.*

And D' should be a ΔL-definition. This suggests that fuzziness cannot account for the paradox. Alternatively, assume that D' cannot be in the domain of its quantifiers. The paradox dissolves. But this implies assuming that the universe of discourse of D' cannot be the set of all ΔL-definitions of natural numbers in at most one thousand words. Now, since it is hard to reject the usual model-theoretic assumption that any non empty set is a legitimate universe of discourse, the possibility is suggested that there is no set of all ΔL-definitions of natural numbers in at most one thousand words.

I'll approach this possibility from a simplified set-theoretic version of the notion of *indefinite extensibility* in Shapiro and Wright 2006 (Shapiro and Wright, 'All Things Indefinitely Extensible', in Rayo and Uzquiano eds. *Absolute Generality*, Oxford University Press, 2006, 255-304). Let '$x\eta C_n$' mean 'x falls under the concept C_n'. A concept C_1 is *extensible relative to a concept* C_2 iff there is a function f such that for every set S of objects that fall under C_1, if S falls under C_2, then:

1. $f(S)\eta C_1$,
2. $f(S)\notin S$.

This implies there is no set falling under C_2 of all objects falling under C_1.

The concept of set, for instance, is extensible relative to itself: from any set of sets we get by Russellian diagonalization a set not in it. Consequently, there is no set of all sets. If the set of all objects falling under C_1 had to fall under C_2, that set wouldn't exist. We say then that C_1 is *set-extensible*. This is trivially the case when C_2 is the concept of set.

The concept 'ΔL-definition of a natural number in at most one thousand words' is extensible relative to the concept 'set ΔL-definable in at most n words', for the largest n small enough to render a ΔL-definition of the least natural not in the set possible in at most one thousand words. The function f would give, for each S, 'the least natural number not defined by a member of S'. As a consequence, no set of all such definitions exists because if it existed, it would be ΔL-definable in at most n words by 'the set of all ΔL-definitions of natural numbers in at most one thousand words'. The concept is set-extensible just like the concept of set and perhaps no worse defined than it.

It seems, however, that its extension is finite. But it's not. There are a finite number of *signifiers* of such *definitions*, not a finite number of such *definitions*. Recall Saussure's classical distinction between *signifier* and *signified* (Saussure, F. 1913. *Cours de linguistique générale*, Payot, 1995). A signifier is a purely syntactic object, a string of letters, whereas a definition involves a signified. Therefore, a definition is not a signifier but a pair $\langle S, I_\alpha \rangle$, S being a signifier and I_α an interpretation containing a set D_α as a domain for the quantifiers in S, with α a definable ordinal. So, S may be assigned more than one signified. Since no set contains all ΔL-definitions of natural numbers in at most one thousand words, the signifier 'the least natural number defined by no ΔL-definition in at most one thousand words' defines variously along the hierarchy of extensions because the domain of its quantifier 'no' gets ever broader.

Laureano Luna
Philosophy, Siles, Spain

Infinitistic and non-infinitistic cures for nagging hangovers

Whenever Brett returns home drunk, he likes to rant. Trouble is, immediately after any rant, his wife nags for a length of time exactly equal to the length of his rant and (as she well knows) her doing so exactly cancels the pleasure of the rant. However, Brett has now found a solution, courtesy of Josh Parsons (2004: 'The Eleatic hangover cure', *Analysis*, 64, pp. 364-6, and 2006: 'Topological drinking problems', *Analysis*, 66, pp. 149-54.) Normally, an hour's ranting would be followed by an hour's nagging, so what Brett does is to rant for half an hour and then give the impression, by the expression on his face, that he has finished. Then, just as his wife is about to start in on her half hour of retaliatory nagging, Brett resumes the rant and goes on for another 15 minutes. At that point, once again, Brett gives the impression of stopping but, just as his wife is about to start her nagging (although 15 minutes' worth of it has been aufgehoben by his ranting, she still has 15 minutes in hand) he starts ranting again, this time for $7\frac{1}{2}$ minutes. And so on. The beauty of Josh's technique is that, in sum, Brett gets to enjoy one full hour of ranting, with no nagging whatsoever to follow.

A rant naturally falls into discrete parts (one needs to pause for breath increasingly as the rant goes on) so any suggestion that the Parsons remedy cannot work because ranting has to be continuous is just wrong. And, although the remedy, in its pure form, involves an infinite sequence of acts constituting a supertask, a less pure form works almost equally well. Sometimes, out of pure generosity, Brett divides his hour-long rant not into an infinite number of decreasing discrete parts but into just eight, finishing off with an outburst that lasts about a quarter of a minute. His wife, true to her principles, then lets fly with the full 15

seconds of nagging that is 'owing' to him, but he can live with that.

Brett's drinking buddy, Bert, is not so lucky. The Parsons technique does not work for him because his wife is less reasonable than Brett's. When he rants at her, she 'banks' her nagging time, so that, even if she has managed to steal five minutes' worth of nagging during pauses in a rant that would otherwise last a full hour, she still pays him back with an additional 50 minutes' nagging at the end of it.

Parsons' original plan had nothing to do with nagging, but was designed as a cure for hangovers. Suppose that you get pleasantly drunk immediately after drinking beer—the amount of time you stay drunk is proportional to the amount of beer you have consumed—but the downside is that any period of drunkenness is immediately followed by an equal period of dismal hangover. Parsons recommends a 'hair of the dog' prescription for avoiding a hangover altogether: whenever an $n/2$-minute hangover is impending (say, when you have just finished being drunk for $n/2$ minutes after rapidly knocking back 5 pints of beer), you sup just enough more beer ($2\frac{1}{2}$ pints) to mask with happy drunkenness $n/4$ minutes of it, and, after that $n/4$ minutes, take another sup ($1\frac{1}{4}$ pints) sufficient to keep you drunk, thus protecting you from hangover, for a further $n/8$ minutes, and so on. In this way, in theory, you can drink ten pints of beer in a few minutes without suffering any hangover (or suffering only for a fraction of a second if you don't feel quite in the mood for performing a supertask).

Repeated trials under uncontrolled conditions only serve to confirm that this theory is wrong (except for some under-age drinkers, where n is very large), but this simply means that, annoyingly, beer operates more like Bert's wife than like Brett's, and that the 'hair of the dog' cure for hangovers, or at least Parsons' version of it, is just an old wives' tale.

Laurence Goldstein
Philosophy, Kent

Philippe Besnard and Anthony Hunter, *Elements of Argumentation*, MIT Press

Logic-based formalizations of argumentation, which assume a set of formulae and then lay out arguments and counterarguments that can be obtained from these formulae, have been refined in recent years in an attempt to capture more closely real-world practical argumentation. In *Elements of Argumentation*, Philippe Besnard and Anthony Hunter introduce techniques for formalizing deductive argumentation in artificial intelligence, emphasizing emerging formalizations for practical argumentation. Besnard and Hunter discuss how arguments can be constructed, how key intrinsic and extrinsic factors can be identified, and how these analyses can be harnessed for formalizing argumentation for use in real-world problem analysis and decision making.

Anthony Hunter
Computer Science, UCL

Logic and Rational Interaction: an interactive website for a new research community

Logic is traditionally taken to be the study of valid inference, the process by which we draw conclusions based on the information we already have. In recent years, however, logic has proved to bear on a much broader range of phenomena, namely on the various facets of *rational interaction*. A fast growing research community is now using logic to understand the dynamics of observation, knowledge update, belief revision, preference change, conversation, games, and other longer-term goal-driven processes of strategic agency. These researchers cope with new questions in pure logic itself, as well as new interfaces with

surrounding disciplines, such as philosophy, mathematics, linguistics, computer science, game theory, and cognitive science. At the same time, they also return to the historical origins of their discipline, by looking at patterns of argumentation, discussion, and debate.

Fragmentation is an important risk for such a diverse research community. In an effort to prevent this, as well as to foster interaction, Johan van Benthem (Amsterdam & Stanford), Vincent Hendricks (Roskilde), Fernando Velzquez-Queseda (Amsterdam), Fenrong Liu (Beijing), Eric Pacuit (Stanford) and myself have created the website Logic and Rational Interaction (LORI).

With this new online resource we aim at providing our research community with a comprehensive database regarding activities, projects, publications, people, and events worldwide. The website thus includes practical information such as short descriptions and contact links for various research centers and researchers around the world, a calendar of upcoming conferences, calls for papers and seminars, and a list of recent publications and working papers. It also provides a collection of small blurbs about current research themes, written by specialists, to which visitors can react and comment.

This interactive character is an essential part of the idea behind the LORI website. We want it to reflect the dynamism of the research community, and so we are constantly looking for new contributors to add and edit content as well as to keep the information up-to-date and accurate. An important component of this is the "live blogging" of conferences and workshops, through which information about cutting-edge research can be made broadly available.

All in all, we want the LORI website to become a hub for researchers at the interface of logic and rational interaction, as well as a doorway for the neophyte. We can only hope to achieve such an ambitious goal via strongly concerted efforts, and so we are inviting all those who are interested in joining the project to contact us by email at: logic.rational.interaction@gmail.com.

Olivier Roy
Philosophy, Groningen

AI Planning and Scheduling, 15–17 May

Planning has been a part of Artificial Intelligence since its beginning and sessions on planning are part of major AI conferences. Planning is also close to scheduling so having presentations on both topics in a single conference track promotes information exchange between close but slightly different communities. This year, FLAIRS conference held in Coconut Grove, U.S.A. in May 15–17 hosted a special track on AI Planning and Scheduling for the first time. In total, eight papers were accepted as full papers and three papers were accepted to be presented as posters in this special track. The full papers were presented in two sessions: one dedicated to scheduling, timetabling, and technologies and one dedicated to planning.

Reasoning with Conditional Time-intervals by Philippe Laborie and Jerome Rogerie started the scheduling session. The paper describes a novel approach to scheduling with optional activities that can be part of the final schedule but that are not required. The paper *Recovering from Inconsistency in Distributed Simple Temporal Networks* by Anthony Gallaher and Stephen Smith focuses on dynamic aspects of temporal reasoning, namely on restoring temporal consistency after problem modification. *Distributed University Timetabling with Multiply Sectioned Constraint Networks* by Yang Xiang describes a real-life course timetabling application. The paper *A Novel Prioritization Technique for Solving Markov Decision Processes* by Jilles Steeve Dibangoye, Brahim Chaib-draa, and Mouaddib Abdel-illah deals with improved algorithms for Markov Decision Processes.

The planning session started with *A New Approach to Heuristic Estimations for Cost-Based Planning* by Raquel Fuentetaja, Daniel Borrajo, and Carlos Linares. The paper describes new heuristics for plan-

ning with action costs. In *Tractable Class of a Problem of Goal Satisfaction in Mutual Exclusion Network* Pavel Surynek focuses on consistency techniques for solving planning problems with mutually exclusive actions. The paper *Towards getting domain knowledge: Plans analysis through investigation of actions dependencies* by Lukáš Chrpa and Roman Barták concerns learning of composed actions from both planning domains and existing plans. Finally, the paper *Reformulating Constraint Models for Classical Planning* by Roman Barták and Daniel Toropila deals with modelling of planning problems as constraint satisfaction problems.

Three short papers were presented as posters. *Combining Heuristic Search with Hierarchical Task-Network Planning: A Preliminary Report*, by Nathaniel Waisbrot, Ugur Kuter, and Tolga Kynik, proposes a novel HTN planning approach that exploits domain independent state-based heuristics. The paper *Neptune: A Mixed-Initiative Environment for Planning and Scheduling* by Pauline M. Berry, Blazej Bulka, Bert Peintner, Mark Roberts, and Neil Yorke-Smith describes an integrated planning and scheduling system that assists the user in exploring the space of plans. The paper was awarded "The best FLAIRS 2008 poster". The last short paper *Feeder Setup Optimization in SMT Assembly* by Jan Kelbel and Zdenek Hanzálek deals with a real-life scheduling problem of assembly lines.

We would like to thank all authors for their contributions. Our special thanks go to the programme committee members for their hard work and great help with reviewing and discussion of the submitted papers.

Roman Barták
Computer Science, Charles University, Czech Republic

Hana Rudová
Informatics, Masaryk University, Czech Republic

ManyVal08: Applications of Topological Dualities to Measure Theory in Algebraic Many-Valued Logic, 19–21 May

Programme Committee: Stefano Aguzzoli (Milan), Brunella Gerla (Varese), Vincenzo Marra (Milan)

Organising Committee: Stefano Aguzzoli (Milan), Matteo Bianchi (Milan), Simone Bova (Siena), Pietro Codara (Milan), Brunella Gerla (Varese), Vincenzo Marra (Milan)

The 2008 edition of ManyVal focused on topological dualities, probability theory, and measure theory for MV-algebras and generalizations. About 40 participants attended the conference, and 22 talks were given. It is foreseen that the ManyVal conferences will become a series, to be held in the Milan area every other year starting from the first 2006 edition. The aim of the series is to foster close interaction between researchers interested in a very specific topic but nonetheless having different backgrounds. This was reflected in the choice of the invited speakers for the 2008 edition: A. Dvurecenskij (quantum structures), M. Gehrke (topological dualities and canonical extensions), D. Mundici (MV-algebras), and H. Weber (analysis and measure theory). A unifying theme common to several talks—whether explicitly or not—was the interaction between states and measures through topological duality, as follows. Given an algebraic structure that generalises Boolean algebras, let us think of its elements as being "generalised events" (described by formulae of a non-classical logic, in case the algebraic structure happens to arise from the Tarski-Lindenbaum construction). One seeks an appropriate notion of probability assignment (or "state") to such generalised events. Axiomatic definitions of such states generalise Kolmogorov's axioms, and typically only require some form of finite additivity. In the presence of a sufficiently well-developed topological duality theory for the algebraic structures at hand, one can then attempt to represent such states as generalised integral operators acting on the dual space, as in the classical Riesz Representation Theorem. It then

often turns out that the generalised measures that dually represent states satisfy some form of countable additivity. When a satisfactory correspondence of this sort between states and measures can be obtained, the proposed axiomatic definition appears defensible. Theorems in the style of de Finetti (no-Dutch-Book arguments), another topic addressed by some of the talks, can lend further independent support to such a definition. In many cases, unfortunately, our current insight into the algebraic structures at hand is far too weak for this programme to be carried out in any detail. Accordingly, some talks at the conference addressed much more specific questions about certain classes of algebras, e.g., inquiring whether the existence of at least one state on each such algebra may be granted.

Vincenzo Marra
Computer Science and Communication, Milan

WCB08: Workshop on Constraint Based Methods for Bioinformatics, 22 May

The fourth consecutive edition of the workshop on Constraint Based Methods for Bioinformatics took place in Paris in May 22nd, 2008. In 2005 and 2007 it was co-located with the International Conference on Logic Programming in Sitges (SP) and in Porto (PT), respectively. The 2006 edition was co-located with the Conference on Principles and Practice of Constraint Programming. This year, instead, we enjoyed its co-location with the multidisciplinary Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems.

Among the received submissions, 9 papers were accepted and presented. A first group of papers dealt with the analysis and simulation of *Biological Networks*. In this group Philippe Veber talked about how detecting inconsistencies in large influence networks using declarative programming techniques from Answer Set Programming. Al-

fonso Jaramillo showed how to use techniques coming from combinatorial circuits to design Gene Regulatory Networks. Jonathan Fromentin described how investigating qualitative properties of Gene Regulatory Networks using Constraint Programming, and Sylvain Soliman presented a way to compute the minimal semi-positive invariants of a Petri net representing a biological reaction system, as resolution of a CSP.

A second group of papers was related to the constraint-based solution to some *Combinatorial Problems* that arise in Computational Biology. In particular, Corinna Brinkmann decribed a constraint-based approach to the phase problem in X-ray crystallography; Antonio Morgado showed a pseudo-Boolean solution to the problem of computing a global phylogeny that satisfies the maximum number of quartets. Two contributionse were related to the Haplotype Inference problem. Ana Graça showed the relationships between approaches based on Generic vs Specialized 0-1 Integer Linear Programming for this problem, while Luca Di Gaspero presented a stochastic local search approach to the same problem. Finally, Raffaele Cipriano described a preliminary hybrid approach mixing Local Search and Constraint Programming applied to the protein structure prediction problem.

The workshop benefited by the excellent introductory talk by Rolf Backofen (who was also a co-chair and is surely one of the most valuable researchers in this field) about the *Perpectives of the area*. Although the workshop WCB08 was run in parallel with other two extremely interesting workshops, more than 30 participants attended (unfortunately, we lost some registered participants due to a strike in France).

The details and the final versions of the accepted papers can be found at the workshop website.

We conclude by acknowledging the PC members, the external referees, all the participants, and the CPAIOR chairs François Fages (who was also a co-chair of the workshop), Laurent Perron, and Michael Trick.

Agostino Dovier
Maths & Computer Science, Udine

COMMA: 2nd International Conference on Computational Models of Argument, 28–30 May

COMMA 2008 was hosted by IRIT, Université de Toulouse, between the 28^{th} and 30^{th} of May 2008. This was the second of what is intended to become a biennial series of conferences on the theme of Computational Models of Argument following up the first meeting held at the University of Liverpool in 2006. The technical programme covered topics concerning computationally related aspects of argumentation ranging from work on the formal computational theory (semantics, algorithmic aspects, and computational complexity theory) through contributions on elements of argumentation processes (dialogue, decision making, and uncertainty) to reports on tools for supporting argumentation as an effective computational paradigm. One notable feature of COMMA08 was the introduction of a session dedicated to software demonstrations. The technical programme was complemented by two invited talks: the first given by Henry Prakken reviewing progress on modelling argument structure and the treatment of such structure in dialogue processes; the second presented by Phan Minh Dung who described developments concerning uses of argumentation in conflict resolution scenarios.

The well-established models of abstract, deductive and assumption-based argumentation together with investigations of their properties continue to form an important strand of the formal computational theory and a number of papers presented at COMMA08 built on research contributions presented at COMMA in 2006. Thus work of Baroni and Giacomin, having already proposed a number of general evaluative criteria with which to consider argumentation semantics, presented a detailed characterization of which subsets of these criteria it

was possible simultaneously to satisfy. The same researchers in a subsequent presentation described a further development of the standard Dung-argumentation semantics via so-called "resolution-based semantics". The theory of "Value-based argumentation" featured in a number of presentations ranging from work on relating levels of argument by Modgil and Bench-Capon to proposals for alternative semantics in the paper of Bench-Capon and others. Within the logical models of argument represented by assumption-based and deductive frameworks notable presentations included Efstathiou's discussion of focused search techniques for arguments in propositional knowledge bases, and work on hybrid argumentation by Gaertner and Toni, the latter underpinned by its supporting reasoning engine (CaSAPI) appearing among the software demonstrations.

Mechanisms for argument diagramming and visualization also formed significant aspects of several papers: notably reports of the latest work on the Argument Interchange Format (AIF) described in work of Reed, Rowe, and others; the Cohere system of Benn and Buckingham Shum; and Semantic-web directed tools for argument support presented by Rahwan and Banihashemi.

The full programme of talks (including links to a number of the presentations and software systems) is available from the conference web pages.

The Proceedings of COMMA 2008 have appeared as Volume 172 of the series *Frontiers in Artificial Intelligence and Application* published by IOS Press.

Details concerning the location and schedule for COMMA 2010 will be available from the conference web pages.

Philippe Besnard
IRIT, Toulouse
COMMA 2008 General Chair

Sylvie Doutre
IRIT, Toulouse
COMMA 2008, Local Organization Chair & Secretary COMMA Steering Committee

Paul E. Dunne
Computer Science, Liverpool
President COMMA Steering Committee

Anthony Hunter
Computer Science, UCL
COMMA 2008, Programme Chair

Calls for Papers

Causality and Probability in the Sciences
Deadline 1 July

Probabilistic Models for Image Understanding: Special Issue of the International Journal of Computer Vision, deadline 21 July.

Kyburg: Special issue of Synthese commemorating Henry E. Kyburg, Jr, deadline 30 July.

Probabilistic Graphical Models in Computer Vision: Special issue of IEEE Transactions on Pattern Analysis and Machine Intelligence, deadline 16 August.

Conditionals and Ranking Functions: Special issue of Erkenntnis, franz.huber@uni-konstanz.de, deadline 31 August.

Psychology and Experimental Philosophy: Special issue of the European Review of Philosophy, deadline 1 September.

Dependence Issues in Knowledge-Based Systems: Special Issue of International Journal of Approximate Reasoning, deadline 15 Septem-

ber.

§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.

Necessary and sufficient condition

Necessary and sufficient conditions can clarify relationships between events (or properties, or facts). Let us call an event we're interested in, E. (Construe 'event' very broadly: buying groceries, winning the lottery, living abroad, etc.) Suppose that whenever something else happens, then E happens. This 'something else' is then a sufficient condition for E. Call this condition S. Say E is 'being a dog'. Then one S might be 'being a beagle'. If x is a beagle, then x is a dog. We symbolize this relationship as: $S \rightarrow E$.

Now suppose that whenever E happens, something else always occurs. This 'something else' is then a necessary condition for E. Call this N. Say E is 'being fluent in German'. One N might be 'having learned German'. One cannot be fluent in German without having learned it. If x is fluent in German, then x learned it. We might symbolize this relationship as: $E \rightarrow N$.

If you have a lottery ticket and you've picked the winning numbers, then you'll win the lottery. If we take E to be 'our winning', then we see that 'having a ticket' (H) and 'picking the winning numbers' (P) together form a sufficient condition for E. The two conditions are jointly sufficient ($(H \wedge P) \rightarrow E$). Each on its own, however, is not sufficient.

While driving my car, I know it has fuel in it and that its engine works. If E is 'I'm driving my car' then 'having fuel in it and its engine working' $(F \wedge W)$ is a necessary condition for E $(E \rightarrow (F \wedge W))$. Here, however, each conjunct can be taken individually as a necessary condition of E ($E \rightarrow F$ and $E \rightarrow W$).

Conditions needn't be classified only in one way. Consider 'winning the lottery', above. Having a ticket and picking the right numbers $(H \wedge P)$ is necessary, as well as sufficient, for winning the lottery

Craig Fox
Philosophy, California University of Pennsylvania

Richard Jeffrey (1926-2002)

Philosopher and logician. A former student of Carnap and Hempel, he is best known for his theory of 'probability kinematics'—a form of belief revision that explains how an agent can change her beliefs when she receives uncertain evidence—and his development of an evidence-based version of Decision Theory.

Armin Schulz
Philosophy, University of Wisconsin-Madison

§5
Events

July

WoLLIC: 15th Workshop on Logic, Language, Information and Computation, Edinburgh, 1–4 July.

LOFT: 8th Conference on Logic and the Foundations of Game and Decision Theory, 3–5 July.

Logic Colloquium: Bern, Switzerland, 3–8 July.

ICML: International Conference on Machine Learning, Helsinki, 5–9 July.

SMT: 6th International Workshop on Satisfiability Modulo Theories, Princeton, 7–8 July.

Computation and Cognitive Science: King's College, Cambridge, 7–8 July.

Negation and Denial: Philosophy Centre, University of Lisbon, 7–8 July.

4th MATHLOGAPS Training Workshop: University of Manchester, 7–11 July.

CAV: 20th International Conference on Computer Aided Verification, Princeton, 7–14 July.

Induction: Historical and Contemporary Approaches, 5th Ghentian Conference in the Philosophy of Science, Centre for Logic and Philosophy of Science, Ghent, 8–10 July.

Bayesian Modelling: 6th Bayesian Modelling Applications Workshop, Helsinki, 9 July.

Evaluating and Disseminating Probabilistic Reasoning Systems: Helsinki, 9 July.

UAI: Uncertainty in Artificial Intelligence, Helsinki, 9–12 July.

COLT: Conference on Learning Theory, Helsinki, 9–12 July.

North American Computing and Philosophy Conference: Indiana University, 12–14 July.

Classical Logic and Computation: Reykjavik, 13 July.

WCP4: Fourth World Congress of Paraconsistency, Melbourne, 13–18 July.

BPR: The 1st International Workshop on Bit-Precise Reasoning, Princeton, 14 July.

ITSL: Information Theory and Statistical Learning, Las Vegas, 14–15 July.

IKE: International Conference on Information and Knowledge Engineering, Las Vegas, 14–17 July.

DMIN: International Conference on Data Mining, Las Vegas, 14–17 July.

NorMAS: 3rd International Workshop on Normative Multiagent Systems, Luxembourg, 15–16 July.

DEON: 9th International Conference on Deontic Logic in Computer Science, Luxembourg, 15–18 July.

NCPW: 11th Neural Computation and Psychology Workshop, Oxford, 16–18 July.

Symposium on Causality: Dornburg, Germany, 17–19 July.

Proof Theory: Workshop on Logic, Foundational Research, and Metamathematics II, WWU Institute for Mathematical Logic, Münster, 18–19 July.

MoChArt: Fifth Workshop on Model Checking and Artificial Intelligence, Patras, Greece, 21–22 July.

WIGSK: Inference methods based on graphical structures of knowledge, Patras, Greece, 21–22 July.

ISBA: 9th World Meeting, International Society for Bayesian Analysis, Hamilton Island, Australia, 21–25 July.

Interdisciplinary Social Sciences: Monash University Centre, Prato, Tuscany, Italy, 22–25 July.

Model Selection: Current Trends and Challenges in Model Selection and Related Areas, University of Vienna, 24–26 July.

What (Good) is Historical Epistemology?: Max Planck Institute for the History of Science, Berlin, 24–26 July.

ICHST: XXIIIrd Congress of History of Science and Technology, Budapest, 26–31 July.

ESARM: Workshop on Empirically Successful Automated Reasoning for Mathematics, Birmingham, UK, 26 July – 2 August.

First Formal Epistemology Festival: Conditionals and Ranking Functions, Konstanz, 28–30 July.

August

Language, Communication and Cognition: University of Brighton, 4–7 August.

ESSLLI: European Summer School in Logic, Language and Information, Freie und Hansestadt Hamburg, Germany, 5–15 August.

BLAST: Boolean Algebra, Lattice Theory, Algebra, Set Theory and Topology, Denver, 6–10 August.

IJCAR: The 4th International Joint Conference on Automated Reasoning, Sydney, 10–15 August.

DEMA: Designed Experiments: Recent Advances in Methods and Applications, Isaac Newton Institute, Cambridge, 11–15 August.

ICT: The Sixth International Conference on Thinking, San Servolo, Venice, 21–23 August.

MMIS-08: The 2nd KDD workshop on on Mining Multiple Information Sources, 24 August.

Compstat: International Conference on Computational Statistics, Porto, Portugal, 24–29 August.

FSKD: The 5th International Conference on Fuzzy Systems and Knowledge Discovery, Jinan, China, 25–27 August.

LSFA: Third Workshop on Logical and Semantic Frameworks, with Applications, Salvador, Bahia, Brazil, 26 August.

Logical Pluralism: University of Tartu, Estonia, 27–31 August.

Normativity: Graduate Philosophy Conference on Normativity, Amsterdam, 29–30 August.

September

IVA: The Eighth International Conference on Intelligent Virtual Agents, Tokyo, 1–3 September.

Grandeur of Reason: Rome, 1–4 September.

ECCBR 2008: 9th European Conference on Case-Based Reasoning, Trier Germany, 1–4 September.

10th Asian Logic Conference: Kobe University, Japan, 1–6 September.

COMSOC: 2nd International Workshop on Computational Social Choice, Liverpool, 3–5 September.

KES: 12th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems, Zagreb, 3–5 September.

ICANN: 18th International Conference on Artificial Neural Networks, Prague, 3–6 September.

BLC: British Logic Colloquium, Nottingham, 4–6 September.

Naturalism: Kazimierz Naturalism Workshop, Kazimierz Dolny, Poland, 6–10 September.

SMPS: Soft Methods for Probability and Statistics, 4th International Conference, Toulouse, 8–10 September.

AiML: Advances in Modal Logic, LORIA, Nancy, France, 9–12 September.

Causality and Probability in the Sciences

University of Kent, Canterbury UK, 10–12 September

Colloquium Logicum: The biennial meeting of the German Society for Mathematical Logic, Technische Universitaet Darmstadt, 10–12 September.

Logic of Change, Change of Logic: Prague, 10–14 September.

MAS&BIO 2008: MultiAgent Systems & Bioinformatics 2008, Cagliari, Italy, 13 September.

NMR: Twelfth International Workshop on Non-Monotonic Reasoning, Special Session on Foundations of NMR and Uncertainty, Sydney, 13–15 September.

ICAPS: International Conference on Automated Planning and Scheduling, Sydney, 14–18 September.

ECML PKDD: The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, Antwerp, Belgium, 15–19 September.

Spatial Cognition: Schloss Reinach, Freiburg, 15–19 September.

CSL: 17th Annual Conference of the European Association for Computer Science Logic, Bertinoro, Italy, 15–20 September.

PGM: The fourth European Workshop on Probabilistic Graphical Models, Aalborg, Denmark, 16–19 September.

KRAMAS: Workshop on Knowledge Representation for Agents and Multi-Agent Systems, Sydney, 16–19 September.

HAIS: 3rd International Workshop on Hybrid Artificial Intelligence Systems, Burgos, Spain, 24–26 September.

Ontology, mind and language: VIII SIFA National conference, Bergamo, Italy, 25–27 September.

CLIMA-IX: 9th International Workshop on Computational Logic in Multi-Agent Systems, Dresden, Germany, 29–30 September.

October

SUM: Second International Conference on Scalable Uncertainty Management, Naples, 1–3 October.

SETN: 5th Hellenic Conference on Artificial Intelligence, Syros, Greece, 2–4 October.

Reason, Activism, and Change: University of Windsor, 3–5 October.

Formal modeling in social epistemology: Tilburg Center for Logic and Philosophy of Science, 9–10 October.

ICAI: The 1st International Conference on Advanced Intelligence, Beijing, 19–22 October.

FotFS VII: Bringing together Philosophy and Sociology of Science, Foundations of the Formal Sciences VII, Vrije Universiteit Brussel, 21–24 October.

MICAI: 7th Mexican International Conference on Artificial Intelligence, Mexico City, 27–31 October.

MDAI: Modeling Decisions for Artificial Intelligence, Barcelona, 30–31 October.

November

Automated Scientific Discovery: AAAI Fall Symposium, Arlington, Virginia, 7–9 November.

Game Theory: 5th Pan-Pacific Conference in Game Theory, Auckland, 19–21 November.

December

ICLP: 24th International Conference on Logic Programming, Udine, Italy, 9–13 December.

CIMCA'08: International Conference on Computational Intelligence for Modelling, Control and Automation, Vienna, Austria, 10–12 December.

Trends in Logic VI: Logic and the foundations of physics: space, time and quanta, Brussels, Belgium. 11–12 December

ICDM: 8th IEEE International Conference on Data Mining, Pisa, 15–19 December.

PRICAI: Tenth Pacific Rim International Conference on Artificial Intelligence, Hanoi, Vietnam, 15–19 December.

January 2009

SODA09: ACM-SIAM Symposium on Discrete Algorithms, New York Marriott Downtown, New York, New York, 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.

April 2009

EuroGP 2009: 12th European Conference on Genetic Programming, Tübingen, Germany, 15–17 April.

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

§6
Jobs

Post-doctorate associate: Intelligent Systems Laboratory in the Department of Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute (RPI) in Troy, NY.

Post-doc: LogICCC, deadline 10 July.

Lectureship in Pure Mathematics: University of East Anglia, 3 July.

Postdoc or PhD: in philosophy (logic, cognition) for 3 years at the University of Düsseldorf, deadline 31 July.

Newton International Fellowships: Fellowships will be run by the British Academy, the Royal Academy of Engineering and the Royal Society to cover natural and social sciences, engineering and the humanities, deadline 4 August.

§7
Courses and Studentships

Courses

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 and mathematical reasoning and further modules from Philosophy, Psychology, Computing, Statistics and Law.

MSc in Cognitive & Decision Sciences: Psychology, University College London.

SIPTA: 3rd SIPTA School on Imprecise Probabilities, Montpellier, 2–8 July.

MODNET summer school: Manchester, July 14–18.

Probabilistic Causality: Central European University, Budapest, 21 July–1 August.

GSSPP: Geneva Summer School in the Philosophy of Physics, 22 July–8 August.

Logic Programming and Computational Logic: 3rd International Compulog/ALP Summer School, New Mexico State University, 24–27 July.

ESSLLI: European Summer School in Logic, Language and Information, Hamburg, 4–15 August.

Mathematics, Algorithms, and Proofs: Summer School, Abdus Salam International Centre for Theoretical Physics, Trieste, 11–29 August.

Causality Study Fortnight

University of Kent, Canterbury UK, 8–19 September

Mind as Machine: Department for Continuing Education, University of Oxford, 1–2 November.

Summer Institute on Argumentation: University of Windsor, Canada, contact H.V. Hansen or C.W. Tindale, 25 May – 6 June, 2009.

Studentships

PhD position: LogICCC, deadline 10 July.

8 Research Grants for PhD Students: The Cognitive Science Research Training Group, "Adaptivity in Hybrid Cognitive Systems", Institute of Cognitive Science, University of Osnabrück, 18 July.

BSPS Doctoral Scholarship: Philosophy of Science, UK, deadline 1 August.

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