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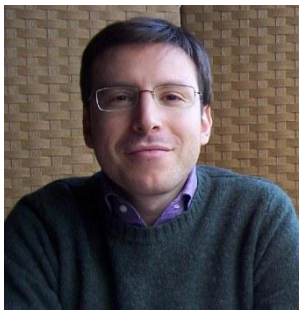
§1 Editorial

I have been News Editor of *The Reasoner* for the last two years, a position which has so far been extremely stimulating and rewarding. I am therefore very proud to be guest editor of this month's issue of my favourite online gazette!

One thing you may want to know is that, while working for *The Reasoner*, I also keep myself busy with a PhD thesis which discusses the interpretation of causality in complex systems science. The connections with reasoning, broadly construed, are numerous.

When scientists reason about complexity and causal relations in complex systems, they confront themselves with a number of issues which have been of utmost importance to philosophers for many, many years.

Among these issues: What is life? Or (perhaps a more earthly question), how can the relation between the living and the non-living be understood? How does the former come out of the latter in the dynamics of evolution? What if one day (and maybe this is already happening . . .) we gain the ability to reproduce life in a lab? Would that count as a remarkable result or as a worrisome danger? What are the implications of interfering with Mother Nature's business?



I am delighted to tackle these and other questions with Mark A. Bedau. Because of his unique background that combines training in analytic philosophy and a profound knowledge of artificial life applied to scientific fields as diverse as chemistry and economics, Mark makes a perfect interviewee for our gazette.

Let us welcome Mark, then.

Lorenzo Casini
Philosophy, Kent

§2

Features

Interview with Mark Bedau

Let me introduce Mark. Here is a brief bio, which by no means does justice to his achievements. Mark is Professor of Philosophy and Humanities at Reed College and Adjunct Professor of Systems Science at Portland State University. Among other things, he is Editor-in-Chief of Artificial Life and co-organised the last five international conferences on the topic; he is Partner in the EU-funded Programmable Artificial Cell Evolution programme; he is Visiting Professor at the European School of Molecular Medicine in Milan; he recently co-founded a start-up company, ProtoLife SRL, and the European Center for Living Technology, both in Venice. His interests range from philosophical and scientific issues concerning emergence, evolution, and the nature of life and mind, to the social and ethical implications of recreating life 'from scratch'.

Lorenzo Casini: Hi Mark. It's a pleasure for me to interview you and let our readers know more about your work.

Mark Bedau: It is my pleasure, as well.

LC: Let me start with an easy question: What is life?

MB: I appreciate your sense of humor. One of the *hardest* questions of all is to say what life is. In fact, this question is *so* hard, and candidate answers *so* controversial, that this raises a further, meta-question: Why is it so difficult to say what life is?

Nevertheless, I have drawn some provisional, tentative conclusions about what life is. First, I have focused for the past few years on minimal chemical life, or protocells, as they are sometimes called (see Rasmussen et al., *Protocells*, MIT Press, 2009). There is a rather remarkable near consensus in the protocell research community about the minimal chemical conditions required for any form of cellular life, which I refer to as the PMC model. Stripped to its most basic, the PMC model says that all forms of physical cellular life consist of an integrated network on three chemical processes, which I call *program* (P), *metabolism* (M), and *container* (C). Each of P, M, and C provide chemical support for the other two chemical processes, and the whole chemically integrated triad is the minimal chemical conditions for cellular life. I think that there is a lot to be said for the PMC model, although I think it also needs various amendments and qualifications.

But there is more to life than individual PMC systems. Part of what makes integrated PMC triads a form of life is that they can sustain themselves and repair themselves, and they can reproduce themselves and evolve over time. In fact, I think that PMC systems begin to tap the full potential of being alive only when they exist in large populations that evolve over time in an open-ended way. In my opinion, the most basic and most primary form of life, the driving force that explains most fundamentally its diverse forms, is the supple creativity of open-ended evolution.

LC: How did you become fascinated with the topic of artificial life?

MB: I learned about artificial life at the birth of the Santa Fe Institute, through collaborations with Norman Packard, Melanie Mitchell, Chris Langton, Steen Rasmussen, and others. My PhD in Philosophy from Berkeley addressed the topic of teleology, and my first paper in artificial life (with Norman Packard) was on the connection between teleology and adaptive evolution. We proposed a new set of teleology statistics for measuring and visualizing adaptive evolution. Subsequent work showed that these statistics vividly illuminate the adaptive dynamics of various evolving systems.

I was impressed with the constructive or synthetic quality of work in artificial life. To make progress on understanding how evolving systems worked, people construct computer models of evolving systems, and then they use parameter sweeps to reveal the generic behavior of those systems.

I was also impressed with the dramatic emergent properties exhibited by artificial life computer models. This led me to develop the theory of emergence for computational and mechanistic systems, which has remained one of my central intellectual passions.

One especially interesting form of emergence is the creativity of biological evolution, which created the wonderfully diverse biosphere out of the few simplest original forms of life on Earth. As I mentioned earlier, this spontaneously creative and open-ended adaptive process seems to be the fundamental explanation of a great many of life's characteristic hallmarks. I have become convinced that our best hope for fundamental breakthroughs in understanding creative and open-ended evolution is artificial life computer models.

My interest in computer models is an example of "soft" artificial life, because the systems being studied are constructed in software. In the past decade I have also become actively engaged in "wet" artificial life and am participating in efforts to create new forms of life in a chemistry laboratory from raw (entirely nonliving) materials.

LC: You referred to living systems as evolving and adaptive. One of the goals of artificial life is to under-

stand how life emerges through 'complex' patterns of micro-behaviour. This complexity has been variously characterised as, e.g. "self-organisation", or "adaptivity". What is our current understanding of what makes complex systems *complex*?

MB: Different kinds of complexity are relevant in different contexts. When we talk about complex micro-behavior giving rise to the emergence of things like life, we mean that there is a large population of micro-entities (the parts or components of macro-scale wholes) that interact with each other; in addition, we mean that the effect of the parts on the behavior of the whole is nonlinear and synergistic, and so context-sensitive. As a consequence, full knowledge of how the parts behave in isolation does not disclose the behavior of wholes composed of those parts. In that sense, the behavior of the wholes is emergent and not reducible to the behavior of isolated parts.

On the other hand, when we talk about open-ended evolution being a creative force for the construction of increasing biological complexity, we are referring to the growth in the number of qualitatively different kinds of adaptive properties that the most complex organisms have. This growth in qualitative kinds of properties is due in part to the growth in hierarchical and mereological structure possessed by organisms.

LC: In the last ten years or so, you've been advocating an interesting account of emergence. You've characterised ("weak") emergence as "underivability except by simulation" and "explanatory incompressibility". Despite the seemingly epistemic features of this characterisation, you maintain that emergence is (also) an objective, mind-independent affair. How would you summarise your views on emergence for our readers?

MB: I am a pluralist about emergence, in the sense that there is a plurality of different kinds of emergence that have a significant role to play in our explanation and understanding of the natural world. So, my support for weak emergence is consistent with my support for other kinds of emergence, too. That being said, I do think that weak emergence has an especially important role to play in the behavior of complex mechanistic systems, of the sort created and studied in artificial life. Weak emergence arises when there is a whole that is composed out of certain parts and the behavior of the whole is determined *in an essentially context-sensitive way* by the behavior of the parts. Since the behavior of the whole is determined by the behaviors of the parts in a way that is context sensitive, it follows that there is no short-cut way to determine the behavior of the whole given complete information about the behavior of the parts, short of working your way through all the gory details of the web of causal interactions among the micro-level parts. In other words, the derivation of the behavior of the whole is "incompressible."

Now, notice that this account of weak emergence is expressed in an epistemic fashion, in terms of how we would *derive or explain* the behavior of wholes. However, it is the context-sensitivity of the behavior of the parts that explains why weak emergence requires a special kind of explanation. That is, the context-sensitivity of the parts is an objective, non-epistemic fact about the systems that exhibit weak emergence. And this objective, non-epistemic fact has characteristic epistemic consequences. I use those epistemic consequences to give an indirect definition of weak emergence, by reference to the characteristic effects of micro-causal complexity (nonlinear and synergistic interactions among many parts).

LC: This is surely an interesting take on the issue of emergence, which shows a radically different approach to this traditional philosophical puzzle. What reasons, in your opinion, have triggered the shift from viewing emergence as a static relation between parts' and whole's properties, to regarding it as a dynamical fact, complex both in an adaptive/evolutionary sense and in a computational sense?

MB: Weak emergence concerns how micro-causal complexities generate interesting patterns in the global behavior of certain systems. This causal process necessarily unfolds over time, and so weak emergence necessarily has a dynamic quality. This dynamic quality is exactly the same as the dynamic quality of the computer simulations studied in artificial life; these give rise to weak emergent behavior when the simulation's global state is generated in an incompressible, context-sensitive way by the micro-level rules in the simulation. All artificial life, context-sensitive computer simulations involve the generation of weak emergent properties over time.

Now, some simulations aim to explain certain *static* properties of whole systems, while others aim to explain the *dynamic* process by which certain whole system properties are changing. Models of adaptive and evolutionary processes are dynamic in this way. In this case, the weakly emergent properties that arise in artificial life computer simulations are doubly dynamic: once because they are context-sensitive computer simulations, and a second time because they concern dynamical properties of complex wholes.

LC: Let us change topic. When thinking of the relation between the philosophical understanding(s) of causality and the (complex systems) scientists' views, I couldn't but notice that certain philosophical talk of causality as a counterfactual relation among (coarse-grained) events, or as processes and interactions where some physical quantity (mass-energy, momentum, charge) is conserved, is far removed from, or too restrictive with respect to, the scientists' intuition. Is my reading correct?

MB: I think this issue is still largely an open question. My guess is that counterfactual and probabilistic

analyses of causation probably fit many of the intuitions about causation held by complexity scientists—at least, they would fit as well as they fit other, ordinary examples of causation. That said, I do agree with you 100% that complexity science does highlight certain kinds of emergent macro causal patterns that would repay philosophical investigation. In general, I think that complexity science has a lot to teach philosophy of science about a number of topics, including the nature of causation. But I think those lessons are largely still to be discovered.

LC: Another thing I noticed is that the scientists' intuitions as regards causality tend to vary. Sometimes scientists are quite traditionally anchored to the idea that causal relations are the result of the mutual affection among entities (or 'substances'). At other times, instead, scientists seem to favour an interpretation of causality as a sort of transmission of information, which doesn't necessarily take place between stable entities or substances, but would rather fit well with the view that reality is, fundamentally, field-like rather than entities/properties-like. In the light of your mixed background, both philosophical and scientific, it would be nice to have your opinion on this.

MB: The sorts of views about causation that you attribute to scientists are mainly found in areas of science like quantum mechanics or relativity theory, rather than the study of complex systems. Complexity science is typically grounded in relatively simple interactions among low-level entities, but those "low-level" entities are sometimes ordinary macroscopic objects (e.g., interactions among cars are the low-level causal interactions that drive models of traffic jams), and at other times they are molecular-scale entities (e.g., the interactions among amphiphiles and water, that give rise to the spontaneous formation of micelles and vesicles). In all these cases, the low-level causal interactions are more or less "ordinary" causal interactions.

LC: It's reassuring to know that at least something about complex phenomena is "ordinary"! One last question. You're directly involved in the attempt to reproduce life 'from scratch'. I'm here referring to the project of creating 'protocells'. What are the ethical consequences of this project? Where is the (thin?) line between what can and what ought not be done?

MB: A full answer to this question would be quite lengthly, but let me sketch some of the headlines.

First, the social and ethical implications of creating protocells depends on the scientific milestones involved, such as what kinds of environment they require to survive, what kind of food they depend on, how quickly they can reproduce, how quickly they can mutate, whether they can interact with any existing forms of life, whether they are confined in containment vessels or released into our environment, etc. There is no monolithic answer, then; instead, the specific risks and responsibilities that arise will be nuanced in ways that prevent simplistic summary.

Second, even the simplest forms of life are rife with emergent properties (in the "weak" sense of emergence explained above), so their overall behavior is unpredictable even if we were given full information about their molecular composition (which, of course, we are not given). This means that, when we are trying to make responsible decisions about whether and how to create new forms of life from nonliving materials in the laboratory, we are in a situation that I have characterized as "deciding in the dark" (the same holds for the creations of top-down synthetic biology, too). One can ameliorate our uncertainty about the consequences of the creations of synthetic biology by empirical experience with such creations, but the point is that we precisely lack that experience when dealing with synthetic biology. This means that our normal methods of assessing risks are largely unhelpful. In this situation many people fall back on the precautionary principle, which (in its strongest form) states that we should not do things that could possibly have bad consequences, even if our uncertainty about consequences means that we lack hard evidence that there are any real risks. But I find the precautionary principle (in its strong form) to be excessively conservative and to tie our hands unwisely. So, the emergent properties of synthetic life forms requires us to devise new ways to assess risk when deciding in the dark.

On the other hand, the emergent properties of synthetic life forms create a powerful new opportunity for us. Traditional top-down engineering is based on rational design and predictable functional decomposition of global system behavior; this method is predicated on the absence of emergent properties. So, we need to devise new engineering methods if we are to take advantage of the power unleashed by synthetic biology. In particular, we need to devise new methods for engineering biochemical systems with desired emergent properties. Fortunately, there is a research tradition in artificial life and machine learning that is developing exactly these kinds of engineering methods. I have in mind methods like evolutionary algorithms. These methods take inspiration from natural evolution, which is Nature's method for designing highly functional living systems with emergent properties.

Finally, one further ethical issue should be raised. Synthetic biology in general, and bottom-up synthetic biology in particular, should remove any doubt about the fact that simple life forms are nothing more than complex biochemical mechanisms. Nothing else makes sense of our ability to reprogram life at will and to make new forms of life out of nonliving raw materials. And if this is true about the simplest life forms, then it is presumably also true for all the more complex life forms which have evolved from simpler life forms; this in-

cludes human beings. There are broad consequences of this mechanistic picture for our understanding of our place in the universe. Even though the ultimate philosophical consequences are still up in the air, we can be sure that such a mechanistic picture will violate some people's cultural presuppositions. At the very least, we should be sensitive to this culture shock.

LC: Well, we've covered a wide range of topics and given much food for thought. I'm very pleased and so are the readers, I'm sure. Thank you so much for your time!

MB: It has been my pleasure as well.

On the Paradox of the Adder

Nuel Belnap formulated his paradox in the following manner:

> Let δ symbolize the denotation function, and let us baptize the symbol "'$\delta a + 1$'", using the letter "a" for its name; that is, we declare that a='$\delta a + 1$'. So by applying the denotation-function, δ, to both sides, we readily obtain $\delta a = \delta(\text{'}\delta a + 1\text{'})$. But $\delta(\text{'}\delta a + 1\text{'}) = \delta a + 1$ (because δ is denotation), so $\delta a = \delta a + 1$. As a result, there is a paradox. Ordinary Peano arithmetic says that the adding-one function has no fixed point: $n + 1 \neq n$, all n. But this stands in contradiction to what we have just shown, that $\delta a = \delta a + 1$, i.e., that δa is a fixed point of adding one. Nuel Belnap (2006: Prosentence, Revision, Truth, and Paradox, *Philosophy and Phenomenological Research* Vol. LXXIII, No. 3, pp. 705–712.)

It is clear that in the formula '$\delta a + 1$', the term 'δa' denotes a number and not a numeral, because in this context the addition is a mathematical operation that is defined on numbers and not signs, thus the reasoning is grammatically correct. From a semantic point of view, Belnap emphasized the similarity between his paradox and another circular paradox:

> We may also "solve" the Adder in analogy to the three-valued "solution" to the Liar paradox. That is, we may let u be "the ungrounded number," following Kleene arithmetic by declaring that u is a fixed point for the adding-one function: $u + 1 = u$. Then we can let the denotation of a be u, which "solves" the paradox. ... the Adder is exactly the same as the Liar, *mutatis mutandis*: Given the Liar and no hierarchy, either negation has a fixed point, in which case we are not doing (ordinary two-valued) semantics, or else, if negation has no fixed point, we have a contradiction in our semantic theory.

Let me shed some light on the connection to the Liar paradox following Belnap's argumentation in another way. Let '$\sim$' be Kleene's three-valued negation, where 's' is a sentence: 1=True, 0=False, 2=not True and not False, and $|s|$ is the logical value of s sentence.

The truth table is:

s	$\sim s$
1	0
0	1
2	2

This means:

(A1) If $1 = |s|$ then $0 = |\sim s|$
(A2) If $0 = |s|$ then $1 = |\sim s|$
(A3) If $2 = |s|$ then $2 = |\sim s|$
(A4) $0 \neq 1$ and $1 \neq 2$

Let L be the Liar sentence formulated by (1):

*(1)	$L \leftrightarrow_{df} \sim L$	(This is a circular definition.)
*(2)	$L \leftrightarrow \sim L$	(1)
*(3)	$2 = \|L\| \leftrightarrow 2 = \|\sim L\|$	(2) (A3)
(4)	If $L \leftrightarrow_{df} \sim L$ then $2 = \|L\|$	(3)

In other words, the Liar sentence does not express a proposition, because it is neither true nor false. Consider, then, the following inference of the Adder paradox:

(A1)	For all x, if x is a finite number then $x \neq x + 1$	
(A2)	$\forall x,\ x = \delta(\lceil x \rceil)$	
*(1)	$a =$ '$\delta a + 1$'	
*(2)	$\delta(a) = \delta(\text{'}\delta a + 1\text{'})$	(1) (A2)
*(3)	$\delta(\text{'}\delta a + 1\text{'}) = \delta a + 1$	(A2)
*(4)	$\delta a = \delta a + 1$	(1) (3)
(5)	If $a =$ '$\delta a + 1$'. Then $\delta a = \delta a + 1$	(1)(4)
(6)	If δa is a finite number then $\delta a \neq \delta a + 1$	(A1)
(7)	δa is not a finite number but something else, e.g. a infinite cardinal number.	(1)(5)(6)

In both cases there is a fixed point.

The above solution does not work if we insist that the Liar sentence is true or false or that δa is a finite number. Solving the Liar paradox in the framework of classical logic or semantic and definition theory, we must use language levels and different truth predicates. The following brief outline of Tarski's solution is based on an interpretation of the Axiom of Specification: To every set of sentence names P and to every one-to-one

map from sentence names to sentences $S(x)$ there corresponds a set of sentence names T whose elements are exactly those elements x of P for which $S(x)$ holds.

Let P, P_1, S be sets of sentence names; T, T_1, T_2 sets of true sentence names; and $S(x), \delta_1(x)$ one-to-one maps (bijective functions) from sentence names to sentences.

(1)	$\forall P \forall S \exists T \forall x(x \in T \leftrightarrow (x \in P(S(x)))$	Axiom of Specification
(2)	$\forall S \exists T \forall x(x \in T \leftrightarrow (x \in P_1(S(x)))$	(1)
(3)	$\exists T \forall x(x \in T \leftrightarrow (x \in P_1(\delta_1(x)))$	(2) δ_1 where $\delta_1(\lambda) \leftrightarrow_{df} \lambda \notin T_1$
(4)	$\forall x(x \in T_2 \leftrightarrow (x \in P_1(\delta_1(x)))$	$(3)T_2$
(5)	$\lambda \in T_2 \leftrightarrow (\lambda \in P_1(\delta_1(\lambda))$	(4)
(6)	$\lambda \in T_2 \leftrightarrow (\lambda \in P_1(\lambda \notin T_1)$	(5)
(7)	$\lambda \in P_1 \rightarrow (\lambda \in T_2 \leftrightarrow \lambda \notin T_1)$	(6)

Assuming that we have only a unique set of Truth ($T_2 = T_1$), the consequence is logical fallacy, thus if $\lambda \in P_1$, that is, if λ is a true or false sentence ($x \in P_1 =: x$ expresses a proposition), then we must use different sets of true sentences that are extensions of different truth predicates at different language levels.

Belnap claims:

> We may "solve" the Adder paradox in the Tarski way, by classifying it as due to bad grammar ($a =$'$\delta a + 1$' both uses "a" on the left, and mentions it on the right).

Belnap is right regarding the similarity, but he fails to localize the root of the disease. He should not degrade Tarski's solution of semantic paradoxes by using quotation marks, but should apply Tarski's theory properly. For Tarski, every semantic functor, such as the 'denote' function or 'true' predicate, has a certain level that is connected to a given language. This means that we have a 'denote$_1$' function (δ_1) in language$_1$ and 'denote$_2$' function (δ_2) in language$_2$. Let us suppose that: (D2) $\forall x \in$ terms of language$_2$, $x = \delta_2(\lceil x \rceil) =:$ For every x terms of language$_2$, $\lceil x \rceil$ denotes$_2$ x that is " 'a' " denotes "a", " 'b' " denotes "b", etc. "Julius Caesar" denotes a Roman general but " 'Julius Caesar' " denotes a name of a Roman general. (Where $\lceil \ \rceil$ is the symbol for the citation function or quasi-quotation in terms of Quine.) Note that, by using quotation marks, we mention rather than use the first two letters of the alphabet. Applying the considerations above we arrive at the following formulation of the Adder paradox.

Let δ_1 symbolize the denotation function in language L_1 defined for all the terms of L_1, and let us baptize the symbol " '$\delta_1(a) + 1$' ", using the letter "a" for its name; that is, we declare that $a =$ '$\delta_1(a) + 1$', where "$a =$ '$\delta_1(a) + 1$' " is an object language sentence. Following Tarski, we can talk about this sentence on a metalanguage level. We can talk about truth, or about what terms denote on both sides of identity relations, only at the level of metalanguage. We can claim at the metalanguage level that $\delta_2(a) = \delta_2($'$\delta_1(a) + 1$'$)$, where δ_2 means the 'denote' function in L_2 defined for all the terms of L_2. (For the sake of simplicity we suppose that the metalanguage contains the object language as a part.) It follows from D2 that $\delta_2($'$\delta_1(a) + 1$'$) = \delta_1(a) + 1$, hence $\delta_2(a) = \delta_1(a)+1$, but this sentence of L_2 does not contradict Peano's axioms. In this way the contradiction immediately disappears, thus—not surprisingly—we have eliminated the paradox. Sometimes it is worth using Tarski's solution rather than merely mentioning it.

Ferenc András

The Ramsey Principle and the Principle of Informational Equilibrium

Jérôme Dokic and Pascal Engel (2001: *Frank Ramsey: Truth and Success*, Routledge) defend a form of Ramseyan pragmatism about belief and action. They base their view on claims like these:

(R1) The essence of pragmatism I take to be this, that the meaning of a sentence is to be defined by reference to the actions to which asserting it would lead, or, more vaguely still, by its possible causes and effects (Ramsey, F. P. (1927/1991: "Facts and Propositions," in *Philosophical Papers*, ed. D. H. Mellor, Cambridge University Press, p. 51).

(R2) Any set of actions for whose utility p is a necessary and sufficient condition might be called a belief that p, and so would be true if p, i.e. if they are useful (Ramsey (1927/1991: p. 40)).

But R1 and R2—and other related claims—do not make it entirely clear what Ramsey takes the relation of belief and action exactly to consist in. Nevertheless Dokic and Engel base their view on what they call Ramsey's Principle:

(RP) True beliefs are those that lead to successful actions whatever the underlying motivating desires (Dokic and Engel (2001: p. 46)).

Whatever the merits of this interpretation of Ramsey, Dokic and Engel claim that the principle of informational equilibrium, famously defended by Jerry Fodor (1994: *The Elm and the Expert*, MIT Press), is—given one reading—just a strengthened version of RP. This principle states:

(PIE) Agents are normally in epistemic equilibrium in respect of the facts on which they act. Having all the relevant information—having all the information that God has—would not normally cause an agent to act otherwise than as he does (Dokic and Engel (2001: p. 75)).

Dokic and Engel (2001: p. 75) then endorse the following Fodorian argument in support of PIE, and thereby of RP:

T1: You cannot choose A over B unless you believe you would prefer A to B if all the facts were known to you.

T2: The success of an action is accidental unless the beliefs that the agent acts on are true.

C1: No belief/desire psychology can incorporate the view that the normal success of rational actions is accidental (Fodor (1994: p. 42)).

Therefore, agents are normally in epistemic equilibrium in respect of the facts on which they act. Having all the relevant information—having all the information that God has—would not normally cause an agent to act otherwise than as he does.

In defending this argument Fodor claims that T1 and T2 are truisms. He also claims that C1 is just a fact about belief/desire psychology. However, Dokic and Engel do not mention or consider C1 in their presentation of the argument, although it is clear from what Fodor says that it is necessary for the argument to work (1994: p. 42). In any case, Dokic and Engel note that PIE seems to be too strong and so we should read it as "...excluding situations in which the question of doing A or B makes sense, the agent knows all the relevant facts about this alternative, but changes her mind by choosing B (2001: p. 75)." They claim that once we adopt this reading it is straightforward to see that PIE is just a strengthened form of RP essentially asserting that "...a rational agent acts with the belief, or even the knowledge, that no obstacle will prevent her action from leading to success (2001: p. 76)." Of course, it is not entirely clear that PIE really is a strengthened form of RP. But so understood Dokic and Engel's pragmatism depends crucially on the soundness of the Fodorian argument.

But is the Fodor argument really sound? Dokic and Engel argue at length that T1 is compatible with standard construals of decision theory despite the fact that the possibility of preference reversals is both well-understood and widely acknowledged (2001: p. 76-77). So there is already reason to be suspicious of the Fodorian argument, but let us ignore T1 and consider T2. Is T2 really true? Neither Fodor nor Dokic and Engel offer anything like a serious defense of T2, but it seems to be obviously false. This is because we often act successfully and rationally on the basis of beliefs that are only approximately true. Consider the case of an archer in 2011 who knows relativistic mechanics but who uses the laws of Newtonian mechanics to determine whether or not he can fire an arrow farther than a marker placed at a specified distance. Suppose that he deliberates about this on the basis of Newton's laws, reasons that it can be easily done and fires the arrow beyond the marker. He is clearly successful as he achieves his goal intentionally, but not accidentally so. What is then interesting here is that the archer's deliberation and his success in acting is based on the laws of Newtonian mechanics which are only approximately true. Of course all approximately true beliefs are false (see Hilpinen, R. (1976: "Approximate Truth and Truthlikeness," in Przelecki, et al. (eds.), *Formal Methods in the Methodology of the Empirical Sciences*, Reidel, p. 19-42) and Kuipers, T. A. F. (ed.) (1987: *What is Closer-to-the-truth?* Rodopi)). He is successful because relativistic effects don't play a significant role in his act. His action is rational in this case because he knows that relativistic effects play no significant role in this situation and because Newton's laws are computationally easier to use. One might be tempted to respond that our archer is actually basing his reasoning on one of the following claims (or something quite like one of them):

1. Newton's laws are false but approximately true.

2. Newton's laws are false but entail predictions that are close enough to those of relativistic mechanics.

3. Newton's laws are true in the domain of their application and reduce to relativistic mechanics.

But, all of these suggestions fail to save Dokic and Engel's theory. That this is so can be seen simply by changing the date of our counter-example to 1792 and thus noting that our archer can act rationally and successfully on the basis of his approximately true beliefs about mechanics but where he cannot be reasonably held to believe any of 1, 2 or 3 even though they are true. This is because the archer in 1792 has excellent reasons to believe that the laws of Newtonian mechanics are true and does not believe any of 1–3. Our 1792 archer has *no* beliefs about relativistic mechanics and so does not believe 1 or 2. He does not believe 3 because he believes that those laws are true simpliciter. So we have a clear counter-example to T2 that renders the Fodor argument unsound. Thus, Dokic and Engel's appealing to that argument to ground PIE and thereby

RP is clearly faulty.

Michael J. Shaffer
St. Cloud State University &
Carnegie-Mellon University &
The University of Western Ontario

Reply to Frederick

In *The Reasoner* 4.12, I asked: "Can a person consistently believe that (1) human beings have a right to life, and (2) that universal health care and a livable income (an income above the poverty level and where life is sustainable) are not programs that should be implemented to save lives that would otherwise be lost?" (*The Reasoner* 4.12, p. 177). I answered in the negative. Danny Frederick counters, claiming that one can. He claims there are issues with my second premise, "If human beings have a right to life, then we have the moral obligation to save those lives that can be saved." (*The Reasoner* 5.1 p. 4) He also maintains that I have used controversial normative theories and concepts when I claimed that I did not.

His first main objection is that some people might argue that the right to life is a negative right not to be killed, not a positive right to be saved that I had assumed for my paper. I agree that if it is wrong to kill an innocent person it does not necessarily follow that allowing someone to die is wrong. But this does not mean that there are not situations where allowing someone to die and killing someone are morally equivalent. I wrote:

> Minimally, this right entails that we should not cause an innocent human life to be lost if we can save it. I am using the notion of 'causation' to mean that an action, either one of commission or one of omission, is (part of) the cause of x if the explanation of why x happened includes the action under question as part of the explanation such that if the action under question had not happened, x would not have happened. This being the case, person S can cause the death of person S' **by either killing S' or letting S' die** where S could have saved S'. (*The Reasoner* 4.12 p. 178 [emphases added])

Denying universal health care or a livable wage to those who desire to live are two examples that fit this description. Consequently, I think whether the right to life is negative or positive is not really relevant to my argument.

Frederick's second claim is:

> if human beings have a right to life, it seems that premise 2 is false, because its consequent seems absurd. The reason is scarcity.

He argues that it is absurd to think that we should save all the lives that we can possibly save. He has a good point here, but it rests on a confusion that was caused by some sloppy explanation and poor word choices on my part. I was using 'can', to refer to what the capabilities of an agent acting towards another are, not the various types of people that could be saved. I agree that it is absurd to save every possible life that can be saved. There are lives that are not worth saving because of the poor quality of life or some people not wanting to be saved. Regarding scarcity, it needs to be demonstrated that there are not enough resources to provide universal health care and a livable wage to all who desire them. However, if there is scarcity of resources then saving lives that should be saved will be a question of triage given some agreed upon system of resource distribution. A better wording of my second premise would have been; 'If human beings have a right to life, then we have the moral obligation to save those lives that **should** be saved and which we are **capable** of saving.'

Frederick's third claim is that I do use controversial concepts:

> But he has; for he affirms that people who hold inconsistent beliefs, or who endorse an inconsistency, are thereby irrational (third and last paragraphs). But one may discover an inconsistency in one's beliefs without knowing which belief is at fault. If resolving the problem is likely to take considerable time and effort, and one has other pressing concerns, it can be quite rational to live with the inconsistency, at least for the time being. (*The Reasoner* 5.1 p. 4)

This objection is due to the fact that we are using different frameworks for understanding inconsistency and rationality. I was not clear. I was using 'controversial' as an adjective applied to ethical theories/concepts (which I did not use), not theories of rationality. Regarding rationality, I am utilizing the Rawlsian framework of 'considered judgments in a state of reflective equilibrium' for understanding what it means to be rational. I am maintaining that if one believes that (1) is true then it is inconsistent to hold that (2) is also true. If someone does hold both to be true then his or her considered judgments are in a state of disequilibrium. Since our epistemic goal, as I understand it, is to have our considered judgments in a state of reflective equilibrium we then need to make an adjustment to reestablish systemic equilibrium. While there may not be time to resolve the inconsistency at the time it is recognized, we may be able to postpone the readjustment, but we cannot ignore it and act as if it is not there. I would suggest that it is not prudent to act on inconsistent beliefs until the source of the inconsistency has been identified and the incon-

sistency resolved thereby establishing systemic equilibrium. I would argue that maintaining that it is rational to live with beliefs that one thinks are inconsistent is not consistent with our best epistemic practices and could lead to unnecessary and avoidable harm. I agree that this issue is controversial.

Frederick has not persuaded me that I am confused about the right to life and that it is a mistake to believe that (1) and (2) are both true. I do, however, appreciate his thoughtful comments and forcing me to be clearer in what I am arguing for.

John Alexander
Phoenix College &
South Mountain Community College, Phoenix

§3 News

Philosophy and Technology: first issue

Philosophy & Technology is a new journal published by Springer. Its aim is to contribute to a critical understanding of the challenges that technology poses on to our lives, to our decisions, and to our understanding of the surrounding world. *Philosophy & Technology* will publish its first, launching issue in March. The list of forthcoming articles can be found here.

The editorial, written by Luciano Floridi and introducing the first issue, is now freely available online: *Harmonising Physis and Techne: The Mediating Role of Philosophy*.

The journal welcomes submissions on any topic at the intersections between philosophy and technology. For further details please visit `http://www.editorialmanager.com/phte/`.

Federica Russo
Philosophy, Kent &
Executive Editor and Book Symposia Coordinator of
Philosophy & Technology

PhDs in Logic III, 17–18 February

The conference and winter school 'PhDs in Logic III' took place in Brussels on February 17-18, 2011. It consisted of four tutorials by established researchers, and fourteen contributed talks by PhD students. The topics ranged from philosophical to mathematical logic. Over the two days, the conference attracted about 40 logicians, mainly from Belgium and the Netherlands, but also from Germany, France, Switzerland, Denmark and Slovenia.

The four tutorials consisted of two one-hour sessions. Mai Gehrke (Nijmegen) gave a tutorial on duality theory and its many applications in logic (e.g. canonical extensions). Peter Koepke (Bonn) gave a tutorial on set theory, discussing techniques for getting large cardinals in inner models, and their connection with infinitary combinatorial principles. Eric Pacuit (Tilburg) gave an overview of contemporary work in epistemic logic, focusing on three pairs of concepts: single-agent/multi-agent, hard/soft information, and static/dynamic. Finally, Sonja Smets (Groningen) gave a tutorial on quantum logic, presenting both classical work and the new modal/epistemic approach she has recently been developing with Alexandru Baltag.

The contributed talks can be classified in three main groups: algebraic logic, set theory, and philosophical logic. There were three talks on algebraic logic. Dion Coumans (Nijmegen) talked about her application of duality theory to obtain a relational (Kripke) semantics for a fragment of linear logic. Sam van Gool (Nijmegen) discussed his ongoing work on a 'step-by-step' method to finitely approximate the Lindenbaum algebras of various modal logics. Yann Pequignot (Lausanne) presented a duality perspective on the equational theory of regular languages.

Five of the contributed talks were on set theory. Raphaël Carroy (Lausanne) showed how to use the backtrack game to decompose a Baire class one function into a collection of continuous functions, thus inducing a fine-grained hierarchy on the Baire class one functions. Kevin Fournier (Lausanne) presented his research on the Wadge hierarchy and reducibility by continuous functions. Yurii Khomskii (ILLC, Amsterdam) provided an overview of regularity properties of sets of real numbers. Philipp Lücke (Münster) presented his research on automorphism towers; this group-theoretical construction turns out to be highly dependent upon the model of set theory in which it is computed. Damien Servais (Louvain-la-Neuve), finally, left the familiar terrain of ZF: he discussed his work on Quine's alternative axiomatization NF (New Foundations).

The remaining six talks were on various topics in philosophical logic. Vincent Degauquier (Louvain-la-Neuve) discussed his work on four (families of) bivalent logics: classical, paraconsistent, paracomplete and positive. He introduced sequent calculi for these logics and compared their proof-theoretic strength. Tjerk Gauderis (Ghent) introduced his modal adaptive approach to abduction. His reasons for 'going modal' were mainly syntactical in nature; during discussion an intuitive epistemic interpretation was suggested as well. Jens Ulrik Hansen (Roskilde) proposed modeling the social-psychological notion of 'pluralistic ignorance' in dynamic epistemic logic (DEL), arguing that dynamic operators are necessary to capture the fragility of this notion. Alexandru Marcoci (ILLC, Amsterdam)

presented his new, DEL-based, solution to the surprise examination paradox. Sylvia Wenmackers (Groningen) presented an interrelated set of problems with Kolmogorov's axiomatization of probability theory, and proposed a new one, based on non-Archimedian probabilities (with applications to fair infinite lotteries). Stefan Wintein (Tilburg) talked about his work on formal theories of truth, arguing that Kremer's modification of the Gupta-Belnam desideratum about vicious reference should be modified once again, using notions of (strong) assertibility.

PhDs in Logic III was an academically successful and socially vivid event, illustrating the variety and quality of contemporary research in logic in Belgium, the Netherlands, and far beyond. Plans for a fourth edition in 2012 (in the Netherlands) are already on the table.

Lorenz Demey
Flanders (FWO), K. U. Leuven
Jonas De Vuyst
Flanders (FWO), Vrije Universiteit Brussel

Calls for Papers

From Practice to Results in Logic and Mathematics: special issue of *Philosophia Scientiae*, deadline 1 March.

Cushing Memorial Prize: to the best paper in the History and Philosophy of Physics, deadline 15 March.

The Singularity Hypothesis: A Scientific and Philosophical Assessment: an edited volume commissioned by Springer, deadline 15 March.

Entertainment Computing: special issue on Games and AI, Elsevier, deadline 30 March.

Advanced Methodologies for Bayesian Networks: special issue of *New Generation Computing*, deadline 1 April.

Philosophical Issues in Medicine: special issue of the *Journal of Evaluation in Clinical Practice*, deadline 1 April.

Hilary Putnam International Young Scholars Contest: to the best two essays on any aspect of of Hilary Putnam's latest views, deadline 15 April.

Experimental Philosophy: special issue of *The Monist*, deadline 30 April.

Types for Proofs and Programs: special issue of *Logical Methods in Computer Science*, deadline 2 May.

Quantum Correlations: Entanglement and Beyond: (special issue of *International Journal of Quantum Information*, deadline 15 May.

Reasoning with Context in the Semantic Web: special issue of the *Journal of Web Semantics*, deadline 15 June.

C. L. Hamblin and Argumentation Theory: special issue of *Informal Logic*, deadline 30 June.

The Problem of the Criterion: special issue of *Philosophical Papers*, deadline 30 June.

Modalities: Semantics & Epistemology: special issue of *Philosophia Scientiae*, deadline 1 July.

Philosophy of Information: book symposium published by *Etica&Politica* on 'Philosophy of Information' by Luciano Floridi, deadline 1 July.

Composition, Counterfactuals and Causation: special issue of *Humana.Mente*, deadline 30 July.

Extended Cognition and Epistemic Action: special issue of *Philosophical Exploration*, deadline 15 September.

The Alan Turing Year: special issue of *Philosophia Scientiæ*, deadline 1 November.

Formal and Intentional Semantics: special issue of *The Monist*, deadline 30 April 2012.

§4
What's Hot in ...

...Logic and Rational Interaction

In an opinion piece for the Journal of Logic and Computation, Hans van Ditmarsch and Rineke Verbrugge discuss and comment on the growing importance of publication impact factors and how this development affects logicians. The authors have asked seven well-known logicians about their thoughts on the issue. The article is available online at the site of the Journal of Logic and Computation (subscription required).

A special issue of the journal Games on "Epistemic Game Theory and Modal Logic", edited by Herbert Gintis, has appeared. The aim of the editor is to "show the relevance of epistemic game theory for the working economist and experimentalist". The issue includes contributions by logicians and economists working in the field.

LORIWEB welcomes contributions on topics relevant to the area of Logic and Rational Interaction—including announcements about recent publications and upcoming events. Please submit such news items to Rasmus Rendsvig, our web manager or to the loriweb address.

Ben Rodenhäuser
Philosophy, Groningen

§5
Letters

Dear Reasoners,

Laureano Luna in *The Reasoner* 5(2), states that 'this sentence is not true' is equivalent to 'L is not a theorem of S', where L is the Liar sentence, and S is a hypothet-

ical formal system or algorithm proving precisely the true sentences of English.

The equivalence does not follow from equating truth with provability in S. If L is true then it is a theorem of S otherwise it is not. We need the assumption that L expresses its own untruth. This contradicts the premise that L does not express a proposition.

Sincerely,

X. Y. Newberry

§6 Events

March

Causality, Inference and Science: Universidad Complutense de Madrid, 4–5 March.

CICC-ITOE: International Conference on Innovative Computing and Communication and Asia-Pacific Conference on Information Technology and Ocean Engineering, Macao, China, 5–6 March.

ISHPS: Israeli Society for History & Philosophy of Science, Bloomfield Science Museum, Jerusalem, 6 March.

Actions as Processes: CETL Building, University of Leeds, 10–11 March.

Theory-Ladenness of Experience: Heinrich-Heine Universität Düsseldorf, Germany, 10–11 March.

Southern Society for Philosophy and Psychology: New Orleans, Louisiana, 10–12 March.

STACS: 28th International Symposium on Theoretical Aspects of Computer Science, Dortmund, Germany, 10–12 March.

Actions, Products and Propositional Content: IHPST, Paris, 12 March.

Shapiro Conference in Philosophy: Epistemology of Inference: Department of Philosophy, Brown University, 12–13 March.

Model Uncertainty and Selection in Complex Models: University of Groningen, The Netherlands, 14–16 March.

The Boundaries of the Mental: Institut für Philosophie, Ruhr-Universität Bochum, Germany, 14–16 March.

Thinking about Animal Cognition: Institut für Philosophie, Ruhr-Universität Bochum, Germany, 17–18 March.

European Epistemology Network: Lund, Sweden, 17–19 March.

Edinburgh Graduate Conference in Epistemology: University of Edinburgh, 18–19 March.

NAFIPS: 30th North American Fuzzy Information Processing Society Annual Conference, El Paso, Texas, USA, 18–20 March.

AI and Health Communication: Stanford University, California, 21–23 March.

Discovery in the Social Sciences: Towards an Empirically-informed Philosophy of Social Science: University of Leuven, Belgium, 22–23 March.

The Problem of Relativism in the Sociology of (Scientific) Knowledge: University of Siegen, 22–23 March.

Truth to Be Told: Workshop on Philosophical and Formal Theories of Truth: Department of Philosophy, Institute for Logic, Language and Computation, Universiteit van Amsterdam, 23–25 March.

Embodied, Distributed and Extended Cognition: Philosophy Department, Universitat Autònoma de Barcelona, 24–25 March.

Epistemic Norms & Values: University of Tennessee, Knoxville, USA, 25–26 March.

ICDDM: International Conference on Database and Data Mining, Sanya, China, 25–27 March.

Experimental Philosophy Workshop: New York City, 26 March.

Lexical Resources in Psycholinguistic Research: Berlin, 28 March.

Understanding, Testimony and Communication: University of Cologne, 28–29 March.

Rethinking Reason: Philosophy Department, Saarland University, Saarbrücken, 28–31 March.

Higher-order Logic versus Set Theory: Institute of Philosophy, London, 29–30 March.

Social Computing, Behavioral-Cultural Modeling, & Prediction: College Park, Maryland, United States, 29–31 March.

Hacking's Styles of Thinking: University of Cape Town, 30–31 March.

April

Epistemology of Modeling & Simulation: Building Research Bridges Between the Philosophical and Modeling Communities: University of Pittsburgh, 1–3 April.

Paradox and Logical Revision Workshop: Arché Research Centre, St Andrews, Scotland, 2–3 April.

AISB: UK Society for the Study of Artificial Intelligence and Simulation of Behaviour, University of York, York, 4–7 April.

Computing and Philosophy: University of York, UK, 4–7 April.

Research Student Conference in Probability and Statistics: Cambridge, 4–7 April.

SpringSim: Spring Simulation Multi-conference, Boston, MA, USA, 4–9 April.

Biology and Subjectivity: University of Navarra, Pamplona, Spain, 6–8 April.

Comparative Epistemology of Information & Communication in Scientific Disciplines: Jean Moulin University, Lyon, France, 8 April.

ICNCS: International Conference on Network and Computer Science, Kanyakumari, India, 8–10 April.
The Authority of Science: University of Sydney, Australia, 8–10 April.
AIML: ICGST International Conference on Artificial Intelligence and Machine Learning, Dubai United Arab Emirates, 11–14 April.
YSM: Young Statisticians Meeting, University of Southampton, 12–14 April.
ICANNGA: International Conference on Adaptive and Natural Computing Algorithms, Ljubljana, Slovenia, 14–16 April.
ICKD: International Conference on Knowledge Discovery, Chengdu, Sichuan, China, 15–17 April.
MAICS: 22nd Midwest Artificial Intelligence and Cognitive Science Conference, Cincinnati, Ohio, USA, 16–17 April.
Experimental philosophy and the Origins of Empiricism: University of Otago, Dunedin, New Zealand, 18–19 April.
NFM: 3rd NASA Formal Methods Symposium, Pasadena, California, USA, 18–20 April.
ICI: 23nd International Conference on Informatics, Canakkale, Canakkale, Turkey, 27–29 April.
IGCC: 3rd annual Interdisciplinary Graduate Conference on Consciousness, Boston University, 29–30 April.

May

AAMAS: 10th International Conference on Autonomous Agents and Multiagent Systems, Taipei, Taiwan, 2–6 May.
ABC: Approximate Bayesian Computation, Imperial College, London, 5 May.
EBL: 16th Brazilian Logic Conference, Laboratório Nacional de Computação Científica, Petrópolis (RJ), Brazil, 9–13 May.
ICCS: 4th International Conference of Cognitive Science, Tehran, Iran, 10–12 May.
Metaphor and Communication: Faculty of Education Sciences Department of Pedagogical and Philosophical Sciences, University of Cagliari, 12–14 May.
PhiLang: 2nd International Conference on Philosophy of Language and Linguistics, University of Lodz, Poland, 12–14 May.
Metaphysics & the Philosophy of Science: University of Toronto, 13–15 May.
Philosophy of Mind, Language, and Cognitive Science: University of Western Ontario, Canada, 14–15 May.
LPNMR: 11th International Conference on Logic Programming and Nonmonotonic Reasoning, Vancouver, BC, Canada, 16–19 May.
Argumentation: Cognition & Community: Ontario Society for the Study of Argumentation (OSSA), University of Windsor, 18–21 May.
WoLLIC: 18th Workshop on Logic, Language, Information and Computation, University of Pennsylvania, Philadelphia, USA, 18–21 May.
Philosophy and Ordinary Language: Louvain, 19–20 May.
Recent Advances in Statistics and Probability: Hasselt University, Diepenbeek, Belgium, 19–20 May.
FEW: 8th annual Formal Epistemology Workshop, University of Southern California, 19–21 May.
Systematicity and the Post-connectionist Era: Taking Stock of the Architecture of Cognition: San Jose, Andalucia, Spain, 19–21 May.
ICNCI: International Conference on Network and Computational Intelligence, Zhengzhou, China, 21–22 May.
European Conference on Cognitive Science: Sophia, Bulgaria, 21–24 May.
SLACRR: St. Louis Annual Conference on Reasons and Rationality, St. Louis, MO, 22–24 May.
TAMC: 8th Annual Conference on Theory and Applications of Models of Computation, Tokyo, Japan, 23–25 May.
PAKDD: 15th Pacific-Asia Conference on Knowledge Discovery and Data Mining, Shenzhen, China, 24–27 May.
AI: 24th Canadian Conference on Artificial Intelligence, Saint John's, Newfoundland and Labrador, Canada, 25–27 May.
Normativity of Meaning: Sellersian Perspectives: Department of Logic, Institute of Philosophy, Prague, Czech Republic, 25–27 May.
SEP: Society for Exact Philosophy, University of Manitoba, Winnipeg, Canada, 26–28 May.
LATA: 5th International Conference on Language and Automata Theory and Applications, Tarragona, Spain, 30 May–3 June.
Meaning, Context and Implicit Content: Château de Cerisy-la-Salle, Normandy, France, 31 May–7 June.

June

TICTTL: 3rd International Congress on Tools for Teaching Logic, Salamanca, Spain, 1–4 June.
Perception, Action, and Time: Department of Philosophy, Universitat Autònoma de Barcelona, 2–3 June.
XPRAG: Experimental Pragmatics, Barcelona, 2–4 June.
Philosophy and Model Theory: Paris, 2–5 June.
Church's Thesis: Logic, Mind and Nature: Krakow, Poland, 3–5 June.
ICFCC: 3rd International Conference on Future Computer and Communication, Iasi, Romania, 3–5 June.
UC: 10th International Conference on Unconventional Computation, Turku, Finland, 6–10 June.
ASSC: Association for the Scientific Study of Consciousness, Kyoto, Japan, 9–12 June.

ICCSIT: 4th IEEE International Conference on Computer Science and Information Technology, Chengdu, China, 10–12 June.

WSOM: 8th Workshop on Self-organizing Maps, Espoo, Finland, 13–15 June.

The Epistemology of Philosophy: University of Cologne, 13–17 June.

BW7: 7th Barcelona Workshop on Issues in the Theory of Reference, Special Topic: Paradoxes of Truth and Denotation, 14–16 June.

ICANN: International Conference on Artificial Neural Networks, Espoo, Finland, 14–17 June.

Logicism Today: Besse-en-Chandesse, France, 14–17 June.

CSR: 6th International Computer Science Symposium in Russia, St. Petersburg, 14–18 June.

Another World is Possible: Conference on David Lewis, University of Urbino, Italy, 16–18 June.

Knowing and Understanding Through Computer Simulations: IHPST, Paris, 16–18 June.

PNSE: International Workshop on Petri Nets and Software Engineering, Kanazawa, Japan, 20–21 June.

Defending Realism: Ontological and Epistemological Investigations: University of Urbino, Italy, 20–23 June.

Emergence and Panpsychism: International Conference on the Metaphysics of Consciousness, Munich, Germany, 20–24 June.

LOGICA: Institute of Philosophy, Academy of Sciences of the Czech Republic, Hejnice, Northern Bohemia, 20–24 June.

LICS: Logic in Computer Science, Toronto, Canada, 21–24 June.

ASC: 14th International Conference on Artificial Intelligence and Soft Computing, Crete, Greece, 22–24 June.

SPSP: Society for Philosophy of Science in Practice, University of Exeter, Exeter, UK, 22–24 June.

Ordinary Language, Linguistics, and Philosophy: Arché Research Centre, University of St Andrews, 23–25 June.

EPISTEME: Social Epistemology Meets Formal Epistemology: Recent Developments and New Trends, Center for Formal Epistemology, Department of Philosophy, Carnegie Mellon University, 24–26 June.

CMMSE: Computational and Mathematical Methods in Science and Engineering, Benidorm, Alicante, Spain.26–30 June

Evolution, Cooperation and Rationality: Philosophical Perspectives: University of Bristol, 27–29 June.

QI: 5th International Symposium on Quantum Interaction, Aberdeen, UK, 27–29 June.

Ershov Informatics Conference: Novosibirsk, Akademgorodok, Russia, 27 June–1 July.

Journées Arithmétiques: Vilnius, Lithuania, 27 June–1 July.

Models of Computation in Context: Sofia, Bulgaria, 27 June–2 July.

ICML: 28th International Conference on Machine Learning, Bellevue, WA, USA, 28 June–2 July.

Models and Mechanisms in Cognitive Science: School of Philosophy, Psychology, and Language Sciences, University of Edinburgh, 29 June.

ECSQARU: 11th European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, Belfast, Northern Ireland, UK, 29 June–1 July.

July

AAHPSSS: Australasian Association for the History, Philosophy and Social Studies of Science, Christchurch, New Zealand, 1–3 July.

Perceiving Others' Minds: University of Manchester, 1 July.

Cognitio: Nonhuman Minds: Animal, Artificial or Other Minds, Montreal, Qc., Canada, 3–5 July.

Bayesian Capture-Recapture: Centre for Research into Ecological and Environmental Modelling (CREEM), University of St Andrews, 4–6 July.

ICMC: 2nd International Choice Modelling Conference, Leeds, UK, 4–6 July.

The Computational Turn: Past, Presents, Futures?: International Association for Computing and Philosophy, Aarhus University, 4–6 July.

TABLEAUX: Automated Reasoning with Analytic Tableaux and Related Methods, Bern, Switzerland, 4–8 July.

LGS7: 7th International Conference on "Logic, Games Theory and Social Choice", National School of Political Studies and Administration, Bucharest, Romania, 6–9 July.

ICLP: 27th International Conference on Logic Programming, Lexington, Kentucky, USA, 6–10 July.

Society for Philosophy and Psychology: Université du Québec à Montréal, Montreal, Canada, 6–10 July.

DGL: 5th Workshop in Decisions, Games & Logic, Maastricht University, The Netherlands, 7–9 July.

IWSM: 26th International Workshop on Statistical Modelling, Valencia, 11–15 July.

TARK: Theoretical Aspects of Rationality and Knowledge, Groningen, the Netherlands, 11–15 July.

Australasian Applied Statistics Conference: Palm Cove, Tropical North Queensland, Australia, 12–15 July.

UAI: 27th Conference on Uncertainty in Artificial Intelligence, Barcelona, Spain, 14–17 July.

ARCOE: Automated Reasoning about Context and Ontology Evolution, Barcelona, Spain, 17–18 July.

CLIMA: 12th International Workshop on Computational Logic in Multi-Agent Systems, Barcelona, Spain, 17–18 July.

SING: 7th Spain-Italy-Netherlands Meeting on Game Theory, Paris, 18–20 July.
David Lewis on Language and Mind: 3rd Graduate International Summer School in Cognitive Sciences and Semantics, University of Latvia, Riga, 18–21 July.
WORLDCOMP: World Congress in Computer Science, Computer Engineering, and Applied Computing, Las Vegas, Nevada, USA, 18–21 July.
ICIAM: 7th International Congress on Industrial and Applied Mathematics, Vancouver, British Columbia, Canada, 18–22 July.
IJCAI: 22nd International Joint Conference on Artificial Intelligence, Barcelona, Spain, 19–22 July.
CLMPS: 14th Congress of Logic, Methodology, and Philosophy of Science, Nancy, France, 19–26 July.
ICMSA: 7th IMT-GT International Conference on Mathematics, Statistics and its Applications, Bangkok, Thailand, 21–23 July.
ISIPTA: 7th International Symposium on Imprecise Probability: Theories and Applications, University of Innsbruck, Austria, 25–28 July.
ICCS: 19th International Conference on Conceptual Structures, Derby, England, UK, 25–29 July.
IJCNN: International joint Conference on Neural Networks, San Jose, California, 31 July 31–5 August.
CADE: 23nd International Conference on Automated Deduction, Wroclaw, Poland, 31 July–5 August.

August

The Classical Model of Science II: The Axiomatic Method, the Order of Concepts and the Hierarchy of Sciences from Leibniz to Tarski, Vrije Universiteit Amsterdam, The Netherlands, 2–5 August.
ICFOCS: International Conference on Frontiers of Computer Science, Bangalore, Karnataka, India, 7–9 August.
Logical Constants: Ljubljana, Slovenia, 8–12 August.
Epistemic Inclusiveness and Trust: 3rd Copenhagen Conference in Epistemology, University of Copenhagen, 15–17 August.
ECAI: 19th European Conference on Artificial Intelligence, Lisbon, Portugal, 16–20 August.
KDD: 17th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, San Diego, CA, 21–24 August.
FCT: 18th International Symposium on Fundamentals of Computer Theory, Oslo, Norway, 22–25 August.
AiML: 8th International Conference on Advances in Modal Logic, Moscow, 24–27 August.
ICDL-EPIROB: IEEE Conference on Development and Learning, and Epigenetic Robotics, Frankfurt am Main, Germany, 24–27 August.
Philosophy of the Social Sciences: University of Copenhagen, 25–26 August.
Uncertainty Modeling in Knowledge Engineering and Decision Making: Istanbul, Turkey, 27–29 August.

September

BISP: 7th workshop in Bayesian Inference for Stochastic Processes, Getafe, Spain, 1–3 September.
ECAP: 7th European Conference in Analytic Philosophy, Milan, Italy, 1–6 September.
DOMAINS: Swansea University, Wales, UK, 5–7 September.
ECML PKDD: European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, Athens, Greece, 5–9 September.
WPMSIIP: Workshop on Principles and Methods of Statistical Inference, University of Ljubljana, Slovenia, 5–10 September.

Progic
The fifth workshop on Combining Probability and Logic, Columbia University, New York, 10–11 September

CSL: 20th Annual Conference of the European Association for Computer Science Logic, Bergen, Norway, 12–15 September.
CP: 17th International Conference on Principles and Practice of Constraint Programming, Perugia, Italy, 12–16 September.
PLM: Philosophy of Language and Mind, Stockholm University, 16–18 September.
Statistical Computational & Complex Systems: University of Padua, 19–21 September.
Computer Simulations and the Changing Face of Scientific Experimentation: Stuttgart, Germany, 21–23 September.
Social Ontology: Metaphysical and Empirical Perspectives: Workshop of the European Network on Social Ontology (ENSO), Luiss Guido Carli, University, Rome, Italy, 21–23 September.
SYNASC: 13th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, Timisoara, Timis, Romania, 26–29 September.
Formal Epistemology Meets Experimental Philosophy: Tilburg Center for Logic and Philosophy of Science, 29–30 September.

§7
Courses and Programmes

Courses

Psychophysical, Computational and Neuroscience Models of Time Perception: Groningen, 4–8 April.

Spring School on Belief Functions Theory and Applications: Autrans, France, 4–8 April.
COST-ADT: Doctoral School on Computational Social Choice, Estoril, Portugal, 9–14 April.
Logic School: Instituto de Matemática/UFF, Niterói (RJ), Brazil, 7–8 May.
Reasoning and Argument: Computer and Cognitive Science Perspectives: 2nd Summer Institute on Argumentation, Centre for Research on Reasoning, Argumentation and Rhetoric, University of Windsor, Ontario, Canada, 9–27 May.
Carnegie Mellon Summer School in Logic and Formal Epistemology: Department of Philosophy, Carnegie Mellon University, Pittsburgh, 6–23 June.
MLSS Singapore: Machine Learning Summer School, Biopolis, Singapore, 13–17 June.
MLSS @ Purdue: Machine Learning Summer School, Departments of Statistics and Computer Science, Purdue University, 13–24 June.
Relativism and Disagreement, Fallibilism and Infallibiism, Truth and Paradox: Northern Institute of Philosophy Summer School, University of Aberdeen, 28 June–30 June.
EASSS: 13th European Agent Systems Summer School, Girona, Catalonia, Spain, 11–15 July.
LxMLS: Lisbon Machine Learning Summer School, Instituto Superior Técnico (IST), Lisbon, Portugal, 20–25 July.
Interactivist Summer Institute: University of the Aegean, Syros, Greece, 29 July 29–1 August.
Set Theory and Higher-Order Logic: Foundational Issues and Mathematical Developments: Institute of Philosophy, London, 1–6 August.
ESSLLI: European Summer School in Logic, Language and Information, Ljubljana, Slovenia, 1–12 August.
Network Dynamics: Groningen, the Netherlands, 29 August–6 September.
Analysis Methods for Cross-national Comparisons: Leuven, Belgium, 28 August–4 September.
MLSS France: Machine Learning Summer School, Bordeaux, France, 4–17 September.

Programmes

APhil: MA/PhD in Analytic Philosophy, University of Barcelona.
Doctoral Programme in Philosophy: Language, Mind and Practice, Department of Philosophy, University of Zurich, Switzerland.
HPSM: MA in the History and Philosophy of Science and Medicine, Durham University.
Master Programme: 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 Mind, Brain and Learning: Westminster Institute of Education, Oxford Brookes University.
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.
MRes in Cognitive Science and Humanities: Language, Communication and Organization: Institute for Logic, Cognition, Language, and Information, University of the Basque Country, Donostia, San Sebastian.
MRes in Methods and Practices of Philosophical Research: Northern Institute of Philosophy, University of Aberdeen.
MSc in Applied Statistics and Datamining: School of Mathematics and Statistics, University of St Andrews.
MSc in Artificial Intelligence: Faculty of Engineering, University of Leeds.

MSc in Cognitive & Decision Sciences: Psychology, University College London.
MSc in Cognitive Science: University of Osnabrück, Germany.
MSc in Cognitive Psychology/Neuropsychology: School of Psychology, University of Kent.
MSc in Logic: Institute for Logic, Language and Computation, University of Amsterdam.
MSc in Mathematical Logic and the Theory of Computation: Mathematics, University of Manchester.
MSc in Mind, Language & Embodied Cognition: School of Philosophy, Psychology and Language Sciences, University of Edinburgh.
MSc in Philosophy of Science, Technology and Society: University of Twente, The Netherlands.
MRes in Cognitive Science and Humanities: Language, Communication and Organization: Institute for Logic, Cognition, Language, and Information, University of the Basque Country (Donostia San Sebastian).

§8
Jobs and Studentships

Jobs

Assistant Professor: AOS: possibly one among History of Philosophy, Metaphysics, Philosophy of Mind, Philosophy of Science, and Philosophy of Language, Department of Philosophy, Western Michigan University, Kalamazoo, MI, until filled.

tenure-track Assistant Professor: AOS: philosophy of science, Ripon College, Wisconsin, review of applications begins January 10 until filled.

Post Doctoral Research Assistant: to carry out MRI studies of logical reasoning, Department of Psychology, University of Hull, deadline 1 March.

Fitzjames Research Fellowship: in Philosophy, Merton College, Oxford, deadline 2 March.

Two Postdoctoral Research Fellowships: in Statistics, Department of Pure Mathematics and Mathematical Statistics, University of Cambridge, deadline 4 March.

British Academy Mid-Career Fellowships: to mid-career scholars, to pursue research in any field of study within the humanities or social sciences, deadline 9 March.

Post-doc position: "Identification in Mathematical Models: Synergy of Stochastic and Numerical Methods", Institut für Numerische und Angewandte Mathematik, Georg-August-Universität Göttingen, deadline 10 March.

Research Associate: in the project "Managing Uncertainty in Complex Models" (MUCM), School of Mathematics and Statistics, University of Sheffield, deadline 10 March.

Lectureship: in Philosophy of Cognitive Science, Department of Philosophy, University of Edinburgh, deadline 14 March.

Assistant or Associate Professor: of Computer Science, for research on Foundations and Machine Learning, Faculty of Science, Radboud University Nijmegen, The Netherlands, deadline 15 March.

Visiting Research Fellowships: in the Arts and Humanities, Trinity College Dublin, deadline 18 March.

Postdoctoral Fellowship: in "Ancient Scientific Method", Faculty of Philosophy & Faculty of Classics, University of Oxford, deadline 23 March.

Visiting Fellowship: Rotman Institute of Philosophy, University of Western Ontario, deadline 31 March.

Studentships

PhD Scholarship: "Rating and ranking sports players and teams using Minimum Message Length", Clayton School of Information Technology, Monash University, to be filled asap.

PhD Studentship: "Hyper-heuristics for Grouping Problems", School of Computer Science, University of Nottingham, until filled.

2 PhD-positions: in the interdisciplinary research project 'Causation in Science', Norwegian University of Life Sciences UMB, Aas, Norway, deadline 1 March.

Doctoral Studentship: in Theoretical Philosophy, Department of Philosophy, Lund University, deadline 1 March.

10 PhD student positions: within the doctoral program "Mathematical Logic in Computer Science", Vienna University of Technology (TU Wien), until filled, closes 15 March.

3 PhD positions: Institute for Logic, Language and Computation, University of Amsterdam, deadline 15 March.

PhD Scholarship top-ups: in "Approximate Bayesian Computation", University of New South Wales, Sydney, deadline 25 March.

PhD Scholarship: in the History of Modality, Department of Philosophy, Victoria University of Wellington, New Zealand, deadline 4 April.

2 PhD positions: in a research project on the notion of chance and its connection to statistical method, Faculty of Philosophy, University of Groningen, deadline 15 April.