THE REASONER

CONTENTS

EDITORIAL

Dear Reasoners,

let me reiterate a warm suggestion: *contribute to The Reasoner!*

Why should you consider doing this? Well, because not everything worth reading can go through the lengthy and costly process of academic writing. Sometimes good ideas need to be jotted down quickly, otherwise they will be lost, possibly forever! THE REASONER SPECULATES is the place for ideas that are too good to be snowed under the next hundred of posts on facebook or twitter, but which aren't quite fully baked for a paper. I discussed this (partly baked!) idea in my May

2017 editorial, but bear with me if I repeat once more the key message by I.J. Good "It is often better to be stimulating and wrong than boring and right".

NEWS are of course always welcome. You can report on workshops, seminars, summer/winter schools and all sorts of reasoning activities that you find exciting. Not only the reasoning community will be updated on your field – your funding body will be delighted to read about how you used their money!

If you are running an important project, then you may also consider reporting regularly about it on the DISSEMINATION CORNER. We are delighted to host in this issue updates on the ERC Consolidator Grant the Logic of Conceivability and we hope to host many more.

Two sections evolved into being the most recognisable features of The Reasoner for the past decade. The first is AN INTERVIEW WITH . . . in which guest editors introduce the background and work of a reasoner, who is then asked to share their insights with the readers. Topics of interest span the history and foundations of reasoning as well as its applications, from artificial intelligence to medicine to economic theory – reasoners can be found in all playgrounds. The second very recognisable feature of our gazette is WHAT'S HOT IN . . .. And it does what is says on the tin: Columnists report in their contribution what is hot in their fields.

See the submit page on the website for more details on how to contribute!

HYKEL HOSNI
University of Milan

The Logic of Conceivability: Applying LoC-Style Models to Imagination

The Logic of Conceivability (LoC) project studies the logic of propositional intentional states in many different ways. One example that we often mention is *imagination*: imagining that Trump will invade Europe, imagining transparent iron, imagining being at a tea-party, imagining that you go on holiday, etc. Last time, Franz spelled out the general framework that the LoC is developing to account for such states: the theory of topic-sensitive modals. Here, I want to discuss one of the applications of such a model: developing a formal theory of *pretense-imagination*.

Pretense is the fascinating cognitive phenomenon of make-believe. Consider the following example of a pretense tea-party:

> The child is encouraged to 'fill' two toy cups with 'juice' or 'tea' or whatever the child designated the pretend contents of the bottle to be. The experimenter then says, 'Watch this!', picks up one of the cups, turns it upside down, shakes it for a second, then replaces it alongside the other cup. The child is then asked to point at the 'full cup' and at the 'empty cup' (both cups are, of course, really empty throughout). (Leslie, 1994, p. 223)

Children, from a very young age on, consistently point to the cup *that has been turned upside down* when asked to point at the 'empty cup'. This indicates that children are able to engage with pretense even if it goes against what they believe the world to actually be like. One of the main questions that then arises is that of *how* we develop such a pretend scenario that seems so rational, but is often in contradiction with our explicit beliefs: the children explicitly believe that both cups are empty, yet they behave in pretense in a rational way *as if* one of the cups is full. They imagine this non-actual scenario in a *reality-oriented* way. Which logical rules, if any, govern the development of such a pretense scenario? We can gain some insights into this issue by applying an LoC-style model to it.

Pretense-imagination – i.e., the imagination that we engage with in pretense – is used in many different settings, from make-believe games of children to future-planning and *what-if* conditionals (see for example, Byrne's fantastic work on *Rational Imagination*).

We can develop an LoC-style formal model of pretense-imagination from which we can read off sequences of individual imaginative stages, denoted by (*imstage*), that form imaginative episodes, *imag*. As the pretense-imagination follows 'belief-like' inference patterns and develops in stages, we use a simplified version of *branching-time belief revision models* (cf. Bonnano 2007). Using these branching-time belief revision model, we can model the development of (hypothetical) belief revision over time. Hypothetically revising your beliefs

is exactly what happens in pretense as make-believe: you consider what you *would* do and believe in a particular situation (e.g., when at a tea-party). By making some formal assumptions about the models that we consider, we can create a special set of branching-time belief revision models. In these models we can *track* which propositions (up to logical equivalence) an agent revised their beliefs with in order to get to the next belief state. Given a particular development of the pretense, we suggest that the content of the pretense-imagination are those propositions with which an agent updated their hypothetical belief.

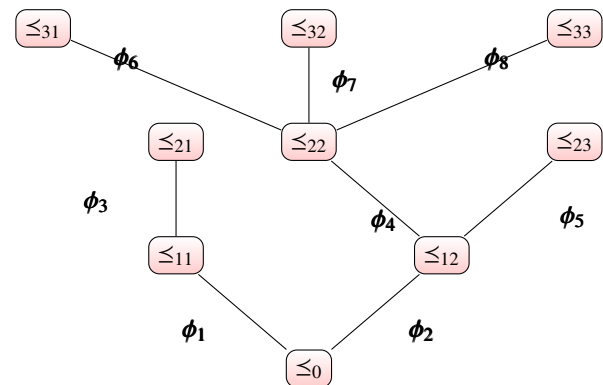The resulting models look like the one in Figure 1.

Figure 1: Branching-time belief revision model

At this point, our model of imagination still has two problems.

1. Imagination fails to distinguish between logically or necessarily equivalent propositions, imagining one automatically leads to imagining the other. In other words, we have something like the problem of logical omniscience for pretense-imagination. This results in highly unrealistic predictions for what agents imagine. Consider again the tea-party example. According to the proposed semantics, if the agent imagines at a stage that one of the cups is full, they also imagine that one of the cups is full *and 2 + 2 = 4*. However, intuitively, we can imagine or believe the former without imagining or believing the latter and *vice versa*.

2. Secondly, imagination fails to be sensitive to the context in which the pretense is set. (This is a problem for imagination that is not often acknowledged in the literature.) In particular, it turns out that pretense-imagination is sensitive to, what we call, an *overall topic*. This takes into consideration some of the contextually relative overall aims, goals, and topics of an imaginative episode. To see what we mean by 'overall topic' and how this affects the imagination, consider the following two situations:

   Context A:
   Your are flying to Australia the day after tomorrow to take a well-deserved holiday. That evening, when watching the news, you find out that there is a tornado in Indonesia and that nothing else is known at this point. You wonder whether this influences your flight.

   Context B:
   You have a friend living in Singapore, who

lives right by the coast. That evening, when watching the news, you find out that there is a tornado in Indonesia and that nothing else is known at this point. You wonder whether this might affect your friend.

In order to help you evaluate the effects of the tornado in each case, you engage in an imaginative exercise. In particular, in both cases, you use the following explicit input

(1) There is a tornado in Indonesia,

and start the imaginative process to determine the effects thereof. As **Context A** involves holiday planning and **Context B** is concerned with your friend living close to a tornado zone in Indonesia, the imaginings resulting from (1) could be different in **Context A** and **Context B**. For example, imagining 'Booking a flight through the US rather than Indonesia is safer' seems to be *off-topic* in **Context B**, whereas it is *on-topic* in **Context A**.

Dealing with these issues is where the LoC-style comes really into its own. What we do is add a *topicality* component. To do so, roughly speaking, we endow branching-time belief revision models with (an enriched version of) *topic models*. This allows us to deal with both the idealisations as well as the context-sensitivity in relation to the overall topic.

According to the new topic-sensitive semantics, the agent imagines φ if they have revised their belief state with φ at some earlier stage in the history and *the topic of φ is included in the intersection of the overall topic of the imaginative episode and the topic of the agent's belief state*. The addition of the overall topic allows us to deal with the context sensitivity of pretense-imagination. So, an agent no longer imagines that the cup is full and $2 + 2 = 4$, because the latter conjunct is not included in the overall topic. Similarly for the context-sensitive case described above. The overall topic of **Context A** 'allows' for imagining that you book a flight through the US rather than Indonesia (as this is included in the overall topic), whereas **Context B** doesn't. Logics of imagination that do not acknowledge the need for such an overall topic fail to be able to distinguish between these two cases.

All this together results in a formal model of pretense-imagination. By using tools from dynamic epistemic logic, belief revision theory, as well as more recently introduced, LoC-style topic models, we can deal with issues concerning idealisations, irrelevant background beliefs, and the context-sensitivity of pretense. LoC-style models prove to very nicely model phenomena such as pretense-imagination.

Tom Schoonen
University of Amsterdam

News

Calls for Papers

What's Hot in . . .

Medieval Reasoning

At the time of this writing, a 14 day long strike action is ongoing at over 70 UK universities. Across the country academic staff is walking out on two disputes concerning, respectively, the university pension scheme, along with pay, equality, casualisation and workloads. What better time to read about medieval university strikes, then? Universities are a medieval institution indeed – this is a historical fact, not a judgement of value – and academic strikes are certainly not a novelty of the post-industrial era.

Throughout the Middle Ages, especially in the late medieval period, you can take your pick of strikes, riots, and popular revolts. (An enjoyable historical overview for non-specialists can be found in Teofilo F. Ruiz's "An Age of Crisis: Popular Rebellions" – which is part of the audio-course *Medieval Europe: Crisis and Renewal* [Course No. 863 The Teaching Company, ISBN 1-56585-710-0]). While popular uprisings were widespread across Europe throughout the 14th and 15th centuries, university strikes had already begun in the 13th, i.e. almost immediately after the institutionalisation of the universities themselves. The two most renowned instances of university strikes in the middle ages were predominantly students' strikes, namely the Oxford dispute of 1209 (resulting in the institution of Cambridge University) and the Paris strike of 1229 (beginning in March and finding a resolution in April 1331). These strikes, overall, exploded over academic privileges and their disregard by local temporal authorities. "Academic freedom" (*libertas scholatsica*), in the Middle Ages, doesn't have much to do with freedom of research, teaching and speech: while masters and students, in some periods and in some universities, could enjoy some degree of such liberties, these were matters subject to statutory regulations. But the most substantial privileges of medieval academic freedom were juridical in nature, beginning with the right to answer only to ecclesiastic courts rather than to temporal ones. It is obvious how we have a major root of conflict between medieval academics and local power. In addition most medieval students and masters were an unruly lot, prone to public disorder. It comes as no surprise to anyone that scholars and townies did not mix well at all. We have many records, from many universities, of masters and students being illegally detained and incarcerated, throughout the 13th and the 14th century; with just as many records of their colleagues in administrative positions having to go and talk them out of trouble. But, in most cases, medieval university strikes were neither actions of a university against itself nor against its leadership. This was in a large measure due to the nature of those universities, of guilds of masters and students under ecclesiastic patronage, and – at least throughout the 13th and the 14th century – to the predominance of the Parisian administrative model favouring a fast turnover in administration (most roles could only be held for about a year of less) and early career scholars (only masters of arts were actually eligible to hold the highest office). The amount of historiography on these matters is extensive, and attempting to treat the subject prop-

erly in a few lines wouldn't do it any justice. But, overall, the reasons of the seemingly higher power of self-determination of medieval universities and their masters, in shaping the academic institutions themselves and thus interacting – sometimes conflictually, sometimes diplomatically – with external temporal powers, would be worth some reflection from all of us.

GRAZIANA CIOLA
Durham University

Uncertain Reasoning

Of our "ordinary notion of belief" – what philosophers now tend to call full belief – Richard Jeffrey was inclined to think that Frank Ramsey had "sucked out all its marrow and used it to nourish a more adequate view" – in particular, what philosophers now tend to call precise credence. Yet, in spite of Jeffrey's diagnosis, much of mainstream analytic epistemology has continued to focus on the former notion for the intervening fifty years, while the latter notion has been the preserve of a rather independent community, who study it alongside other notions, such as imprecise credence and comparative probabilities.

However, in the last five or so years, many have come to think that both sorts of attitude play a central role in our cognitive lives; and they have proposed a variety of ways in which they ought to relate to each other in the mind of a rational agent. Indeed, Liz Jackson has argued persuasively that getting clear on this relationship is necessary for making progress in a number of central debates in epistemology ('Belief and Credence', Philosophical Studies, 2019). I'll mention three proposed accounts.

Perhaps the simplest is the Lockean thesis, which posits a threshold and says that you should believe a proposition just in case your credence in it is no lower than that threshold (Working Without a Net, OUP, 1993). This seems natural. What's more, there are arguments in its favour. These appeal to a notion of cognitive utility, which can be measured cardinally in the way that standard pragmatic utility can be. The first such argument is due to Carl Hempel (Section 12, 'Deductive-Nomological vs Statistical Explanation', Minnesota Studies, 1962). There he assumes that a belief has a cognitive utility of 1 if it is true and -1 if it is false. And he notes that, in this case, you maximise your expected cognitive utility by opting to believe a proposition iff your credence in it is at least 50

Of course, the arguments in favour of the Lockean thesis are counterbalanced by the central argument against it, namely, the Lottery Paradox. Fix the Lockean threshold for belief at some threshold t below 1. Then find a number n large enough that 1 - 1/n lies between t and 1. Then consider a lottery in which exactly one of n tickets will win. The rational credence that any particular ticket will lose is 1-1/n, so the Lockean thesis says you should believe of each ticket that it will lose. But you are certain that one of them will win, so you must believe that too. The Lockean thesis with a threshold below maximal credence therefore requires your beliefs to be logically inconsistent. But the Lockean thesis with threshold at 1 is surely too strong.

Hannes Leitgeb's stability theory of belief takes the Lottery Paradox as its starting point (Leitgeb, The Stability of Belief, OUP; so also Arlo-Costa and Pedersen, 'Belief and Probability', IJAR, 2012). That paradox seems to show we can't have three things that we want all at the same time: beliefs that are logically consistent, credences that are probabilistic, and something like the Lockean thesis connecting them with a threshold that permits you to believe something even if you are less than certain of it. However, as Leitgeb shows, you can. The point is that, when we set up the Lottery Paradox, we are given the threshold and then we pick the set of propositions that the credences and beliefs concern. But what if we allow that the threshold for belief might be different depending on the set of propositions you consider. Then, it turns out, for all probabilistic credence functions, we can specify a threshold and a set of beliefs such that the Lockean thesis holds between the credences and the beliefs relative to that threshold. And, what's more, that threshold can often be taken to be less than 1. Of course, this won't satisfy those for which the threshold in question has some particular significance that means it should be the same regardless of the propositions you consider.

Lara Buchak offers a rather different diagnosis of the relationship between belief and credence ('Belief, Credence, and Norms', Philosophical Studies, 2014). According to her, there is no straightforward relationship between the two sorts of state. To see this, Buchak notes that high credence can be supported by statistical evidence while belief cannot. Buchak asks us to imagine that, during a tutorial with two students, a man and a woman, you step out of your office and when you return your phone has been stolen. The dramatically higher rates of theft among men than among women give you reason to have a very high credence that the man has taken the phone, but it seems that you are not justified in believing that he did. However, if a colleague reports seeing the man steal the phone, then it seems that you are justified in believing that he did it, even if the reliability of the colleague's eyesight justifies a lower credence that he did it than the statistical evidence justifies. Buchak argues that this tells against a straightforward Lockean account of the relationship between credence and belief, and Julia Staffel argues that Leitgeb's stability theory cannot account for it either ('Beliefs, Buses, and Lotteries', Philosophical Studies, 2016). Indeed, Buchak concludes that there can be no straightforward formal relationship between credences and beliefs because of the different way in which they respond to evidence.

RICHARD PETTIGREW
Philosophy, University of Bristol

EVENTS

MARCH

DSD: Data Science Discussions, Manchester, 18 March.

APRIL

PHILOAFTAI: Philosophy After AI, St Mary?s University, London, 6–9 April.
MILL: Workshop on Monotonicity in Logic and Language, Tsinghua University, Beijing, 10–12 April.
VE: Vice Epistemology, Madrid, Spain, 15–17 April.

ML–IRL: Workshop on Machine Learning in Real-Life, Addis Ababa, Ethiopia, 26 April.

May

RR&NL: Reasoning, Rules, and the Normativity of Logic, Stockholm, 25–26 May.
LEv: Logical Evidence, University of Bergen, 26–27 May.
LEp: Logical Epistemology, University of Bergen, 28–29 May.
AAL: Australasian Association for Logic, Sydney, Australia, 2–3 July.
Bayes By the Sea , Ancona, Italy: 20–25 July,
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Courses and Programmes

Courses

SSA: Summer School on Argumentation: Computational and Linguistic Perspectives on Argumentation, Warsaw, Poland, 6–10 September.

Programmes

APhil: MA/PhD in Analytic Philosophy, University of Barcelona.
Master Programme: MA in Pure and Applied Logic, University of Barcelona.
Doctoral Programme in Philosophy: Language, Mind and Practice, Department of Philosophy, University of Zurich, Switzerland.
Doctoral Programme in Philosophy: Department of Philosophy, University of Milan, Italy.
LogiCS: Joint doctoral program on Logical Methods in Computer Science, TU Wien, TU Graz, and JKU Linz, Austria.
HPSM: MA in the History and Philosophy of Science and Medicine, Durham University.
Master Programme: in Statistics, University College Dublin.
LoPhiSC: Master in Logic, Philosophy of Science and Epistemology, Pantheon-Sorbonne University (Paris 1) and Paris-Sorbonne University (Paris 4).
Master Programme: in Artificial Intelligence, Radboud University Nijmegen, the Netherlands.
Master Programme: Philosophy and Economics, Institute of Philosophy, University of Bayreuth.
MA in Cognitive Science: School of Politics, International Studies and Philosophy, Queen's University Belfast.
MA in Logic and the Philosophy of Mathematics: Department of Philosophy, University of Bristol.
MA Programmes: in Philosophy of Science, University of Leeds.
MA in Logic and Philosophy of Science: Faculty of Philosophy, Philosophy of Science and Study of Religion, LMU Munich.
MA in Logic and Theory of Science: Department of Logic of the Eotvos Lorand University, Budapest, Hungary.
MA in Metaphysics, Language, and Mind: Department of Philosophy, University of Liverpool.
MA in Mind, Brain and Learning: Westminster Institute of Education, Oxford Brookes University.
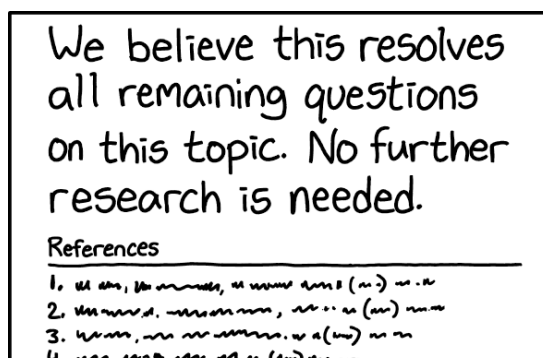**MA in Philosophy**: by research, Tilburg University.
MA in Philosophy, Science and Society: TiLPS, Tilburg University.

MA in Philosophy of Biological and Cognitive Sciences: Department of Philosophy, University of Bristol.
MA in Rhetoric: School of Journalism, Media and Communication, University of Central Lancashire.
MA programmes: in Philosophy of Language and Linguistics, and Philosophy of Mind and Psychology, University of Birmingham.
MRes in Methods and Practices of Philosophical Research: Northern Institute of Philosophy, University of Aberdeen.
MSc in Applied Statistics: Department of Economics, Mathematics and Statistics, Birkbeck, University of London.
MSc in Applied Statistics and Datamining: School of Mathematics and Statistics, University of St Andrews.
MSc in Artificial Intelligence: Faculty of Engineering, University of Leeds.
MSc in Cognitive & Decision Sciences: Psychology, University College London.
MSc in Cognitive Systems: Language, Learning, and Reasoning, University of Potsdam.
MSc in Cognitive Science: University of Osnabrück, Germany.
MSc in Cognitive Psychology/Neuropsychology: School of Psychology, University of Kent.
MSc in Logic: Institute for Logic, Language and Computation, University of Amsterdam.
MSc in Mind, Language & Embodied Cognition: School of Philosophy, Psychology and Language Sciences, University of Edinburgh.
MSc in Philosophy of Science, Technology and Society: University of Twente, The Netherlands.
MRes in Cognitive Science and Humanities: Language, Communication and Organization: Institute for Logic, Cognition, Language, and Information, University of the Basque Country (Donostia San Sebastián).
Open Mind: International School of Advanced Studies in Cognitive Sciences, University of Bucharest.
Research Master in Philosophy and Economics: Erasmus University Rotterdam, The Netherlands.

Jobs and Studentships

Jobs

Postdoc: in Probability, University of Oxford, deadline 6 March.
Postdoc: in Philosophy of Technology, University of Twente, deadline 22 March.

JUST ONCE, I WANT TO SEE A RESEARCH PAPER WITH THE GUTS TO END THIS WAY.