THE REASONER

CONTENTS

EDITORIAL

It is a great pleasure to return as a guest editor to *The Reasoner*. I dedicated the previous editorial and interview to the role of logic and probability in legal training. This time I should like to use this opportunity to discuss a preliminary yet fundamental question on how to understand and theorise a given legal field: as seeking to advance one goal (monist theories) or multiple goals (pluralist theories).

In each field of Law (Criminal, Tort, Contract, etc.) there is a group of monist theories which prescribes a single goal that this field of Law ought to achieve. For example, one of the key questions in Criminal Law is what the goal of punishment is. Monist theories are conventionally divided into four types of answer: Retributivist theories hold that the goal of punishment is to ensure the convicted offender gets what he deserves; Deterrence theories regard the goal as deterring either the criminal or other potential criminals from engaging in crime in future; Prevention theories seeks to remove the criminal from society in order to prevent commission of further crime; and Rehabili-

tation theories seek to help the criminal to return to society as a law-abiding member. While such disagreements can sometimes be traced to more fundamental distinctions in Ethics (for example between consequentialism and deontology), this mapping is not always helpful. For example, some theories which share a commitment to consequentialism nevertheless disagree on which consequences should matter most (e.g., deterrence or rehabilitation). Similar disagreements on which goals should guide a given field of Law can be found in others, such as in Tort (between efficiency, corrective and distributive justice).

In contrast to these theories, pluralist theories of Law reject the underlying assumption of their monist counterparts that a given legal field has only one goal and argue that some legal fields can promote several goals simultaneously. Pluralist theories may be divided into explanatory and normative. Explanatory pluralist theories hold that rules in a given legal field cannot be fully understood if it is assumed that it seeks to promote a single goal. For example, not every rule

in Tort should be understood as seeking to promote efficiency (or just distribution and so on). Rather, some rules advance one goal, others another. With such an approach legal research should seek to achieve transparency: to identify those goals which are promoted by each legal rule, and determine the extent to which their promotion is compromised by attempts to achieve other goals (or by bad design, definition, or implementation).

Normative pluralist theories are more ambitious. They hold that legal rules *ought* to advance more than one goal and seek to identify which types of rule ought to achieve which goals, and how different goals ought to be balanced. For example, a

normative mixed theory of punishment could accept that Criminal Law should be used to promote deterrence, but hold that it should be constrained by the requirement not to punish the criminal more than he deserves, even if such punishment improves deterrence.

In his *Reconstructing American Legal Realism and Rethinking Private Law Theory*, recently published by Oxford University Press, Professor Hanoch Dagan, my colleague at Tel Aviv University, defends an interesting pluralist approach to legal theory in Property and Contract Law that emphasises the variety of legal institutions.

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Features

Interview with Hanoch Dagan

Amit Pundik: Hi Hanoch, thanks for agreeing to be interviewed by *The Reasoner*. Why do you think Monist theories of law are insufficient both in their understanding and normative guidance?

Hanoch Dagan: Thanks; I'm honoured and delighted, Amit. Before I answer your question, let me make two qualifications. *Firstly*, I want to limit my observations to the two core areas: Property and Contract; although I'm not sure they do not apply elsewhere, I shouldn't speculate on what I haven't studied carefully. *Secondly*, and relatedly, I do not claim that there is no common denominator to Private law (I should and will say more about it later). Rather, I criticize the pretence of monist theories of Property (or Contract, for that matter) to offer one regulative principle—the most prevalent suggestion revolves around Blackstone's formula of "sole and despotic dominion", which stands for an owner's right to exclude—that is supposed to account for this entire field, or at least for its core.

So let's indeed take property. My critique begins with a straightforward descriptive observation: Property law as both lawyers and citizens experience it is quite complex; and this complexity is at odds with the Blackstonian straightjacket. Thus we can find side by side doctrines that by and large comply with a libertarian commitment to negative liberty (think fee simple absolute, which is the technical legal term for full-blown ownership of land) alongside other doctrines in which ownership is a locus of communitarian sharing (as in marital property) or of utilitarian welfare maximization (as with patents), as well as many other doctrines vindicating various types of balances among these (and other) property values (such as copyright which both vindicates the unique significance of creative resources to authors' identity and encourages creative activity which is conducive to human flourishing and to democratic governance). I do not deny that all these different institutions share a common denominator; indeed, every property right involves *some* power to exclude others from doing something.

But I insist that this common denominator is not robust enough to illuminate the existing doctrines or determinative enough to provide significant guidance as per their evaluation or development.

The normative deficiency of Property and Contract monism is at least as troubling as the descriptive deficiency, and in a somewhat paradoxical way. Monist theorists of these fields tend to be liberals, and their suggested animating principles—exclusion for property; will (or consent) for contracts—stand for the ultimate liberal value of individual autonomy. But if Law had taken these theories seriously (which, as I've just said, it fortunately hasn't), it would have erased or marginalized all these "nonconforming" forms, leaving people to their own devices if they wish to tailor-make them for themselves. Such a hands-off policy, even if accompanied by a hospitable attitude to freedom of contract, would have been detrimental to our autonomy. The reason for this is that property forms (and contract types) rely heavily on active legal (or law-like) facilitation, both for overcoming the various types of transaction costs involved and as sources (particularly in modern times) of our cultural conventions. Because Law is a major player in making options viable for us—maybe even imaginable to us—an autonomy-enhancing law must proactively participate in providing us with a multiplicity of options for interpersonal relationships: a diverse menu of property institutions and contract types. Monism undermines this liberal obligation and is thus, in my view, not only descriptively misleading but also normatively disappointing.

AP: How would you explain your pluralist theory of Legal Institutions to non-lawyers?

HD: The best way may be to first contrast it with the type of pluralist theories you mentioned in your introduction and then see how it nicely (I think…) emerges from the descriptive and normative critique of monism I've just mentioned.

I call my theory *structural* pluralism in order to highlight that its main distinctive feature is a commitment to multiplicity of legal options with respect to each major form of human interaction (regarding resources, broadly defined). Unlike certain "mixed" theories, I do not argue for foundational pluralism, which denies that there is one ultimate value (private) law should vindicate; indeed, as I've just hinted, I think that there is one such ultimate value: individual autonomy properly understood, namely our right to self-determination or self-authorship, which requires not only independence from others, but also a robust set of sufficiently diverse viable options from which we can choose. Nor do I argue that monism is always undesirable; after all, in order for us to have such multiple institutions, which can be substitutive, each such institution needs to be internally coherent, that is guided by *one* animating principle—one value or one balance of values.

Thus structural pluralism takes the existing heterogeneity of Private law seriously. It celebrates the fact that Property law includes diverse types of property institutions, each incorporating a different value or different balance of values. It insists that the multiplicity which typifies both Property's and Contract's landscape is indispensable to our autonomy because having a large number of greatly differing options among which individuals are free to choose is crucial to our right to be (to some degree) the authors of our lives. The boundaries between the various property institutions (and contract types) should be open, enabling people freely to choose and revise their forms of interaction with other individuals respecting diverse types of

resources.

AP: Should each legal institution be guided by a single goal, or should each institution be guided by several goals, and only the balance between the goals be different?

HD: I believe that subject to certain limitations—notably based on either negative external effects or infringements of the ultimate value of personal autonomy—Law should offer both property institutions (and contract types) that are guided by one value and others that are premised on a balance of values. What is important, again, is that each such institution be internally coherent, and that there is a sufficiently diverse set of institutions in the legal menu, so that it enables real choice among and within contexts. Private law's repertoire should provide more than one option to people who want, for example, to become homeowners, engage in business, or enter into intimate relationships.

AP: How should society choose which legal institutions to provide through its legal system?

HD: One guideline—the prescription of providing substitutes—is already on the table, and it implies that law should provide as many institutions as possible (given the available resources for the task). To this I want to add two points. *Firstly*, that at a certain point the marginal value from adding another distinct institution is likely to be nominal in terms of autonomy (in fact, it may even become negative because, as cognitive psychologists have shown, too many options may at times even curtail people's effective choice). *Secondly*, that an autonomy-based pluralism implies that Law's supply of these multiple institutions should be guided not only by demand. Demand for certain institutions generally justifies their legal facilitation, but absence of demand should not necessarily foreclose it. While it is difficult to expect that legal systems would routinely invent new property institutions and contract types, they should favourably respond to innovations even absent significant demand, including innovations based on minority views and utopian theories, insofar as these outliers have the potential to add valuable options for human flourishing that significantly broaden people's choices.

AP: Is your theory limited to areas of Law which regulate voluntary commitments people take upon themselves, such as Property and Contract Law, or can it be extended to areas of Law which impose mandatory duties, such as Criminal and Tort Law?

HD: I don't think that my theory applies to Criminal Law. But as I implied at the outset, nor am I sure that it is limited to Property and Contract Law. Certain areas of Private Law outside Property and Contract still regulate voluntary undertakings, so that my theory can and should apply. In these areas—think, for example, of the heightened level of liability law imposes on fiduciaries in comparison to that of other promisors—law prescribes the "rules of the game" for activities in which people can but need not engage, or for social roles they can, but do not have to undertake. A similar, albeit controversial, analysis can justify lowering the threshold of the precautions required by Tort law (or more precisely: product liability law) insofar as it deals with activities, like motorcycling, whose value intrinsically involves heightened risks. But in many other segments of Tort law only one legal decision is called for and there is no possibility of *ex ante* election. Generally, only one set of rules can govern activities such as driving. Therefore, though some views may hold that value pluralism is relevant in transport law, road accident law cannot follow the prescriptions of *structural* pluralism.

AP: Critiques of pluralist approaches often claim that such theories are unable to provide any guidance as to which legal rules should be created, since many possible different legal rules could be justified as a different balance between different goals. What do you think of this criticism?

HD: For many pluralist theories the difficulty of addressing conflicts of values is indeed overwhelming. But I don't think that it is threatening to *structural* pluralism. Within each institution there is no plurality of normative voices: it is, as I mentioned, guided by a single animating principle. Between institutions, in turn, there is again no conflict; but rather a friendly (we hope) neighbourly relationship. Finally, there are no conflicts at the overarching level of the system as a whole: being autonomy-based, my theory of structural pluralism is premised on monist foundations.

The Dappled World Perspective Refined

The concept that I would term the *Dappled World Perspective* was first proposed by Nancy Cartwright (1999: *The Dappled World: A Study of the Boundaries of Science*, Cambridge University Press):

> "...we live in a world rich in different things, with different natures, behaving in different ways. The laws that describe this world are a patchwork, not a pyramid." (p. 1)

I will propose a new argument in favour of the Dappled World Perspective, and will show how this Perspective can be refined in the *model-based model of cognition* (MBMC), which I am trying to promote since my article (2009: Towards a Model-Based Model of Cognition. *The Reasoner 3(6)*, pp. 5–6).

The first thesis of MBMC: Let us try out an unusual, extremely broad, and seemingly oversimplified definition of modeling: *a model is anything that is (or could be) used, for some purpose, in place of something else.* In this definition, models are meant to be concrete systems that serve as replacements of concrete target systems (for some concrete purposes).

In this compact form, the definition was proposed by Jeff Rothenberg (1989: The Nature of Modeling. In: *Artificial Intelligence, Simulation, and Modeling, Wiley & Sons*, pp. 75–92):

> "Modeling in its broadest sense is the cost-effective use of something in place of something else for some purpose."

Similar definitions (with an emphasis on *replacing* and *purpose*) were proposed in the 1960s by Leo Apostel, Marvin Minsky, and Herbert Stachowiak. However, the very idea of "replacing" (*Ersatz*) appears already in Einstein's address (1918: Motive des Forschens. *Zu Max Plancks 60 Geburtstag: Ansprachen in der Deutschen Physikalischen Gesellschaft*, Müller Verlag, Karlsruhe, pp. 29–32).

The second thesis of MBMC: *Models are the ultimate results of cognition*, and the ultimate goal of it. Humans and robots need models (in the above sense) to manage what is happening in the world around them. This greatly simplifies the picture of cognition: *ultimately, we need models, hence, the rest of cognition should be regarded and assessed, first, as a means of*

model-building. Means of model-building can be further sub-divided into theories, research programs, doctrines, paradigms, ontologies, logics, languages, etc. Most of these knowledge constructs serve as *meta-means*—mainly, as a means of building theories.

The second thesis represents a radically simplified version of the line of thought that resulted in the "models as mediators" concept, proposed by Margaret Morrison and Mary S. Morgan (1999: Models as Mediating Instruments. In: *Models as mediators: Perspectives on natural and social science*, Cambridge University Press, pp. 10–37).

In MBMC, the Dappled World Perspective ("patchwork of laws describing the world") is refined by considering it separately at the level of models and at the level of theories and other means of model-building.

At the level of models, the Dappled World Perspective can be *derived* from the above definition of modeling by the following *Detailization Argument*:

Let us set a very detailed prediction as our purpose. How detailed could a Big Bang simulation model be made for replacing the entire history of the Universe? An obvious fact: a tiny fragment of the Universe cannot replace the entire Universe in full detail. Or, imagine a target system consisting of more than 10^{23} components (the number of molecules in a liter of gas). How detailed could a model be made for replacing such a system? Since no two identical liters of gas exist in the Universe, no model will be able to predict the coordinates and velocities of individual molecules at every moment of time. These limitations are not caused by limitations of human cognition, but are limitations built into the very structure of the Universe! Hence, a very plausible *metaphysical hypothesis*: *if the target system consists of more than 10^{23} components, no other system can replace it in full detail.*

As we see, the very idea of *modeling as replacing* implies severe limitations, namely, the Dappled World Perspective at the level of models: Neither humans nor robots can hope to create a single detailed model for extensive parts of their environment. *At the level of models, we will always have only a patchwork of models, each very restricted in its application scope.*

It remains to consider the situation at the level of means of model-building. Since a single "Model of Everything" is impossible, in order to manage what is happening in the world, we need to generate a variety of different models. Could this be accomplished by using a single future "Theory of Everything" (or, at least, by means of a *limited* set of theories)? Let us denote this hypothetical limited complete set of theories by ToE.

From the MBMC perspective, the precise meaning of "being a ToE" is defined as follows: ToE (as means of model-building) should allow us, *without any ad hoc assumptions*, to generate all the variety of models we may need. If in trying to build a model we are forced to invent even the smallest *ad hoc* assumption that cannot be derived from the alleged ToE, then the latter fails as a ToE! May we expect *such* a ToE to appear in the future?

If, in order to proceed, we will invest resources only in attempting to build a complete fundamental theory of physics, then no ToE (in the above sense) will ever be obtained—as put by Philip W. Anderson (1972: More Is Different. *Science, New Series*, Vol. 177, No. 4047, pp. 393–396):

> "The ability to reduce everything to simple funda-
> mental laws does not imply the ability to start from

those laws and reconstruct the universe. …, at each level of complexity entirely new properties appear, and the understanding of the new behaviors requires research which I think is as fundamental in its nature as any other."

If the above arguments can be accepted, they simultaneously show that the seemingly oversimplified concept of MBMC leads to significant conclusions.

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Scientific reasoning can be circular

Is scientific reasoning circular? Circular reasoning occurs when an argument's premise(s) and conclusion imply each other with equal logical force, instead of the premise(s) being more believable than the conclusion. Thomas Kuhn (1970: *Structure of Scientific Revolutions*, Chicago: Chicago University Press, p. 90; first ed. 1962) claimed that "circularity is characteristic of scientific theories." The justification of theories by observational data involves circularity because observations are theory-laden (scientists necessarily interpret data through the filter of a theory). Michael Shenefelt and Heidi White (2013: *If A, then B: How the World Discovered Logic*, New York: Columbia University Press, pp. 146–155) critique Kuhn's account and advance their own formulation of scientific reasoning that avoids circularity. After examining the dialectic, the present article discusses two possible cases of circular reasoning in science, different than the structure of Kuhn's account, showing that Shenefelt and White's circular-free account cannot cover all instances of scientific reasoning.

Shenefelt and White (p. 147) contend that on Kuhn's account scientists "believe in theories because of data and data because of theories, and consequently each becomes a premise for the other." Let T stand for the preferred theory, and A through D stand for premises describing data (note that perhaps data are not, strictly speaking, true or false until premised or interpreted). Shenefelt and White (pp. 151-153) present diagrams with vertical arrows to illustrate Kuhn's account of scientific reasoning, and their own; the essential points are represented below in 1–3 and 4–6. Below is the structure of Kuhn's account, which we will call Circularity (Shenefelt and White, p. 153):

1. A and B and C and D.

2. If A and B and C and D, then this implies T.

3. If T, then this entails A and B and C and D.

Circularity could represent good science, for virtues of scientific theorizing like simplicity and explanatory power might redeem it, as Shenefelt and White (p. 150) recognize. Still, if Circularity is correct, it might decrease our confidence in scientific theories. (Perhaps modeling scientific reasoning as probabilistic could capture nuances that the structures above and below do not, but let us stay within the given framework.)

Shenefelt and White (p. 148) claim that "an experienced scientist treats data with caution," not assuming the data are true and therefore not treating them individually as premises. How do scientists do this and avoid circularity? Scientific reasoning starts with a *disjunctive* premise, not a conjunctive premise

as in 1 (Shenefelt and White, pp. 150–152). On their proposal (Shenefelt and White, p. 150), A through D "represent the findings [data] that don't fit the rival theories and that can't all be false, though some might be." Let us call this Noncircular:

4. A or B or C or D.

5. If A or B or C or D, then this implies T.

6. If T, then this entails not C and not D.

In 4, the scientist does not know or assume which disjuncts are false; she just has *data*, but if at least one datum is true, the entire disjunction is true. Thus, T is inferred and the disjuncts C and D, inconsistent with T, are negated in 6. Because 4 is more believable than T (4 is true if at least one of the disjuncts is true), Noncircular avoids the problem of circularity (Shenefelt and White, p. 152). The data point to T, whose acceptance rules out some data as anomalous. In this way, scientists are careful not to assume that all the data are true, although they assume at least some of the data are true. Analogously, a jury infers that the accused is guilty because probably some of the witnesses are speaking truthfully, while not assuming that they all are doing so (Shenefelt and White, p. 155). Therefore, Noncircular shows how scientists avoid circular reasoning.

At least, in *most* cases circularity is avoided. Two situations can occur in which scientific reasoning involves circularity, generated when one piece of data gets privileged. First, consider Lonely Datum, when there is only a single piece of data, preventing the formation of a disjunction. Yet, scientific reasoning *can* proceed as follows:

7. A.

8. If A, then this implies T.

9. If T, then this entails A.

Suppose a scientist testing the gravitational strength on a new planet only has the opportunity, due to time constraints, to drop one object. It falls at the predicted rate and the scientist records the datum, A, supporting the preferred theory of gravitational strength. In this case the theory then implies the truth of the datum. The result could be anomalous, but the scientist has *some* warrant for inferring T, although the reasoning process is circular. Therefore, Noncircular does not hold in all cases. Admittedly, scientists are "reluctant to trust any one datum alone" (Shenefelt and White, p. 149), so cases like Lonely Datum don't represent typical science. However, even an experienced scientist might, reluctantly, need to make such an inference.

Second, consider Outstanding Datum. If a scientist has more reason to believe in one datum, e.g., because it is more credible than the other available data, then she is more likely to move circularly to the theory that explains that one outstanding datum, as follows:

10. B^* [or A or C or D].

11. If B^*, then this implies T.

12. If T, then this entails B^*.

I introduce two devices: the symbol * represents that B stands out epistemically, and the brackets around A, C, and D indicate that those data are set aside as epistemically insignificant.

Claim 10 is a disjunction in which, for a variety of possible reasons, B receives cognitive emphasis. The scientist might initially include all the data as logically relevant in 10, but quickly recognize that only one datum, B^*, was credibly produced. In this manner, the reasoning teeters on being circular differently than on Kuhn's account. But the cognitive effect is on par with Circularity as the scientist moves from 10 to 12.

Shenefelt and White neither absolutely exclude possibilities like Lonely Datum and Outstanding Datum, nor claim that their model is meant to cover all cases of scientific reasoning. Their primary concern is "normal scientific argument" (Shenefelt and White, p. 155). Therefore, they *could* accept these cases as rare but possible forms of reasoning at the edges of science. The point was to highlight abnormal situations which do not fit their model.

Thanks to two anonymous referees for helpful comments.

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NEWS

Arché / CSMN Graduate Conference, 2–3 November

The annual Arché / CSMN Graduate Conference jointly organized by Arché (St Andrews), the Philosophical Research Centre for Logic, Language, Metaphysics and Epistemology, and CSMN (Oslo), the Centre for the Study of Mind in Nature, this year took place in the historic Parliament Hall in St Andrews. For two days, the participants had the opportunity to discuss different topics in epistemology, metaphysics, philosophy of action & rationality, philosophy of language, and philosophy of logic.

The invited lectures, delivered by Einar Duenger Bøhn (Oslo/CSMN), Jennifer Hornsby (Birkbeck/CSMN), and Roger White (MIT), reflected some of the thematic spread of the two organizing institutions. Bøhn sought to extract new insights from the historical debate around Quine's kind-based solution to the paradoxes of confirmation. Hornsby's lecture explored the metaphysical nature of events by examining and rejecting standard treatments of the imperfective paradox. She suggested that instead of assuming that predication of verbs invariably introduces existential quantification over events, in the case of sentences containing verbs in the progressive, one needs to appeal to a category of activity. White discussed the issue of explanatory regress, using Hume's objection to the design argument as a case study. He went through a series of principles that could support Hume's claim that an *explanans* needs to be in less demand of explanation than its *explanandum* to be a good explanation. White rejected all these principles and concluded that Hume's objection fails.

The contributed talks showcased stellar graduate work in the analytic tradition on a variety of subjects which were all followed by comments by Arché and CSMN staff members or one of the keynote speakers. Natalia Waights Hickman (Oxford) endorsed the possibility of a Rylean intellectualism, arguing that Ryle's target was not intellectualism *per se*, but dualistic conceptions of cognition and action as mutually exclusive. Justin D'Ambrosio (Yale) distinguished three hallmarks of intensional transitive verbs and argued that "refers" satisfies two of these, namely, existence neutrality and admitting of a spe-

cific/nonspecific ambiguity. From this he concluded that care is needed in extracting ontological conclusions from semantic theories. Daniel Fogal (NYU) presented a new view on the relation between 'reasons rationality' and 'structural rationality'. He rejected standard accounts on which these domains of rationality issue two different kinds of rational requirements, narrow scope and wide scope ones, respectively. Instead the two domains are determined by two distinct kinds of *pro tanto* rational pressures, justificatory and attitudinal pressures.

Martin Glazier (NYU) proposed that some laws connecting fundamental and nonfundamental reality themselves belong to a fundamental level of reality, which entails that some fundamental laws make reference to properties instantiated only by nonfundamental entities. This is a desirable consequence, since the appeal to such laws solves the puzzle of why there are nonfundamental facts in the first place. Andreas Fjellstad (Aberdeen/NIP) showed that the semantics for several connectives can be given by making model-theoretic satisfaction relative to whether a complex formula is used as a premise or as a conclusion, and used this technique to provide a semantics for 'tonk'.

In fall 2014, the event will be hosted by CSMN and take place in Oslo.

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SEBASTIAN BECKER
BRUNO JACINTO
Arché, St Andrews
JOLA FEIX
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Calls for Papers

CAUSAL DISCOVERY AND INFERENCE: special issue of *ACM Transactions on Intelligent Systems and Technology*, deadline 14 March 2014.
PRESUPPOSITIONS: special issue of *Topoi*, deadline 15 May 2014.
VIRTUES & ARGUMENTS: special issue of *Topoi*, deadline 1 September 2014.

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WHAT'S HOT IN . . .

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Logic and Rational Interaction

If a public debate in Germany becomes emotional there is a certain chance that it is about football. Last month saw the nation engaged in fierce discussion of the Bundesliga game between Hoffenheim and Bayer Leverkusen, two teams that are not known for attracting much public attention otherwise. After a corner kick, Leverkusen's Stefan Kießling scored a header, leading his team to a 2-1 victory.

What makes Kießling's strike special is that the ball took a very unusual route into the goal. It missed the goal clearly, sliding along the outside goal net and finally slipping in through a tiny hole in the net. The referee declared the goal legal, thereby reviving a debate about technical aids in football refereeing.

For the general German public the case was quickly settled: The referee had made a grave mistake, but the real culprit was the scorer himself. Especially so, since the referee had asked him what had happened before making his final judgement.

At further scrutiny, this case displays some features that should be of high interest to social epistemologists. Being interviewed after the game, the referee reported that he had seen the ball lying in the goal, Leverkusen's players celebrating the strike and a lack of protest on Hoffenheim's side. Based on these observations the referee, so he says, inferred that everything was in accordance with the rules of the game. On the other hand Kießling reported that he had only seen the ball enter a trajectory that was likely to miss the goal before turning away in frustration. Seconds later he found his teammates approaching him, congratulating him for his goal. So let's assume for the moment that all these reports were faithful and ask what social epistemology has to say about this situation.

Social epistemology roughly starts with the following line of thinking. If we take others around us seriously as epistemically competent agents, then their attitude towards some proposition p is a relevant piece of information for us in reasoning about p. Of course, we do not have direct access to our peers' beliefs about p. But we can gain information about these by observing the utterances and behaviour of those around us.

Learning about a proposition through observing the behaviour of others has proved to be successful in many cases. However this way of social reasoning carries some inherent risk if used excessively in circumstances where there is too little factual information about p present in the group of agents. If the epistemic peers themselves also base their judgments about p on social clues, phenomena such as double counting of information or circular reasoning between agents can arise. Current research in social epistemology aims at understanding feedback phenomena such as pluralistic ignorance (see *The Reasoner* 7(12)) or informational cascades (next month).

Coming back to our football example, we want to understand how the players reason about the goal situation. Observing the penalty box during a corner kick is a cognitively challenging task. It involved keeping track of at least a dozen players moving chaotically at full speed as well as following a ball that comes in at up to 100 kilometres per hour. Having to watch out for fouls or being among those who move at full speed doesn't make the observational task any easier. Thus, it is safe to assume that any of the agents on the pitch is quite error prone in his visual judgements about the events around him. Furthermore, since players and referees are highly experienced professionals, they are well aware of this fact, as are they aware that everyone else is. On the other hand, a ball entering the goal through a hole in the net was unheard of before, at least in the history of German Bundesliga.

So let's model a Leverkusen player's reasoning about whether the ball was in the goal or not. We assume that he received the information t = "the ball entered a trajectory that seemed to be missing the goal" with a high margin of error and g ="the ball was in the goal" as certain. Given our above considerations, it is plausible that

$$P(\textit{goal} \wedge \textit{perception of trajectory false} \mid t \wedge g) > P(\textit{hole in net} \mid t \wedge g).$$

Thus our player holds it to be more likely that the ball was a regular goal than not and shows the appropriate reaction: He starts celebrating, though restrainedly since he is not yet certain of having scored. The player sets out to collect further evidence

by observing his teammates. Crucially, he does not receive any information about their internal reasoning process. All he gets to see is his teammates' faces and gestures also cautiously celebrating the goal since they applied the same reasoning. The player then takes this as social evidence supporting his goal-scoring belief, thus raising his degrees of confidence and celebration. His teammates in turn take this increase as a reason for raising their degrees of belief and we enter a self-enforcing feedback loop. Similar lines of reasoning can be applied to the referee and the opposing players explaining the lack of protest from Hoffenheim's side.

So our argument shows that the *ghost goal fallacy* can arise from a rational reasoning process of epistemically reliable and honest agents in an environment of noisy signals. Taking others around us as epistemic peers might then strengthen the wrong belief rather than correcting it.

We leave it to our readers to judge for themselves whether our argument gives an adequate analysis of the events in Hoffenheim, or whether some player might have actively facilitated the emergence of an erroneous feedback loop by misreporting his observations.

LORIWEB is always happy to publish information on topics relevant to the area of Logic and Rational Interaction—including announcements about new publications and recent or upcoming events. Please submit such news items to Carlo Proietti, our web manager via submit@loriweb.org.

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Uncertain Reasoning

The idea that there might be many kinds of uncertainty is a very intuitive one. After all we seem to have no doubt as to how compute our chances to win say at the roulette table. Compare this to the situation in which we must choose between booking well in advance a discounted but fixed air fare, or a more expensive but flexible one. In cases like this we often don't seem to be able to come up with a useful quantification of the relevant chances to guide our decision.

This sort of reasoning lies at the heart of the *risk* vs *uncertainty* distinction which has become canonical after R. Luce and H. Raiffa (1957: *Games and Decisions*, Wiley). The idea, roughly speaking, is that a decision problem under risk is one for which a probability distribution over the state-space is given. Otherwise, if no such distribution is given, the agent is facing a decision problem under uncertainty. As Luce and Raiffa themselves realise however, the distinction fails to be always informative (since Savage's theory fits both). This is one important example showing that despite some undeniable intuitive appeal, robust taxonomies of uncertainty are very hard to spell out.

Some three decades before the publication of Luce and Raiffa (1957), Frank K. Knight (1921: *Risk, uncertainty and profit*, Beard Books) distinguished between *risk* and *uncertainty* in a way which is often interpreted as follows. An agent is facing a decision under uncertainty when no 'probabilities are available' to evaluate the events of interest. I have discussed this interpretation in my January 2013 column, where I point out that Knight's own claim has a much narrower scope than it is usually understood. Textual evidence and annotations which help appreciating this point are provided by Nabil Al-Najjar's Knight on Knightian Uncertainty. Al-Najjar has selected a relatively small (but not too small) number of passages which help readers make their way through the rather demanding reading of Knight's book. The selection makes it apparent, as the curator points out, that:

> In one-shot situations, such as the Ellsberg urn experiments, Knight indicated very clearly that there cannot be a distinction between risk and uncertainty, and that rationality requires Bayesian reasoning and behavior. Whatever motivates Ellsberg experimental subjects, be it paranoia or probabilistic illiteracy, is not Knightian uncertainty—at least as far as Frank Knight is concerned.

Not only do Al-Najjar's annotations provide ample support for this claim, they also help us to build an interesting picture of Knight's epistemology of uncertainty. In this respect, one thing that clearly flies in the face of the received view on "Knightian uncertainty" is the following "key quote" from Knight (1921):

> We can also employ the terms "objective" and "subjective" to designate the risk and uncertainty respectively, as these expressions are already in general use with a signification akin to that proposed.

What follows this key quote is in rather striking accord with the sort of subjectivism advocated by de Finetti and Savage. In particular, Knight extensively insists on the economic relevance of "unique events". Those cases offer little if any possibility of reducing uncertainty to objectively measurable probabilities.

HYKEL HOSNI
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CPNSS, London School of Economics
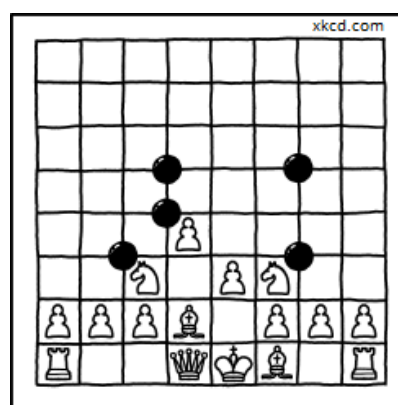
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EVENTS

JANUARY

ISAIM: International Symposium on Artificial Intelligence and Mathematics, Fort Lauderdale, Florida, 6–8 January.

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UUiEM: Understanding Uncertainty in Environmental Modelling, LSE, 8–10 January.
Conditional Thinking: Leeds, 14–15 January.
CGCPML: 7th Annual Cambridge Graduate Conference on the Philosophy of Mathematics and Logic, Cambridge, 18–19 January.

February

PHILOGICA: 3rd Colombian Conference on Logic, Epistemology, and Philosophy of Science, Bogotá, 12–14 February.
Paraconsistency: 5th World Congress on Paraconsistency, Kolkata, India, 13–17 February.
LINZ: Graded logical approaches and their applications, Linz, Austria, 18–22 February.

March

WBEM: Workshop on Beauty and Explanation in Mathematics, Umeøa University, Sweden, 11–12 March.
NNPS: Nordic Network for Philosophy of Science, Lund University, Sweden, 27–28 March.

April

NAG: Norms, Actions, Games, London, 1–2 April.
AISB: 7th AISB Symposium on Computing and Philosophy: Is computation observer-relative?, Goldsmiths, London, 1–4 April.
HAPOP: History and Philosophy of Programming, Goldsmiths, University of London, 1–4 April.
D& MC: Deductive and Mathematical Cognition, Bristol, 7–8 April.
EBL: 17th Brazilian Logic Conference, Petrópolis, Brazil, 7–11 April.
PSX4: Philosophy of Scientific Experimentation 4, Pittsburgh, PA USA, 11–12 April.

PhiloSTEM: 6th Midwest Workshop in the Philosophy of Science, Technology, Engineering, and Mathematics, Fort Wayne, Indiana, 11–12 April.
Mathematical depth: University of California, Irvine, 11–12 April.
TAMC: 11th Annual Conference on Theory and Applications of Models of Computation, Anna University, Chennai, India, 11–13 April.
PhML: Philosophy, Mathematics, Linguistics: Aspects of Interaction, St. Petersburg, Russia, 21–25 April.
PhDs in Logic: Utrecht, The Netherlands, 24–25 April.
MAICS: 25th Modern Artificial Intelligence and Cognitive Science Conference, Gonzaga University, Spokane, WA, USA, 26–27 April.
UK-CIM: UK Causal Inference Meeting (UK-CIM): Causal Inference in Health and Social Sciences, University of Cambridge, Cambridge, 28–29 April.

May

LAMAS: 7th Workshop on Logical Aspects of Multi-Agent Systems, Paris, France, 5–6 May.
MSDM: Workshop on Multi-Agent Sequential Decision Making Under Uncertainty, Paris, France, 5–6 May.
SQUARE: 4th World Congress on the Square of Opposition, Pontifical Lateran University, Vatican, 5–9 May.
MS6: Models and Simulations 6, University of Notre Dame, 9–11 May.
Formal Methods: Singapore, 12–16 May.
Science & Metaphysics: Ghent, Belgium, 20–21 May.
FilMat: 1st international conference of the Italian Network for the Philosophy of Mathematics, Milan, 29–31 May.

June

ALGMATHLOG: Algebra and Mathematical Logic: Theory and Applications, Kazan, 2–6 June.
LogicMathPhysics: Ontario, Canada, 5–6 June.
EC: 15th ACM Conference on Economics and Computation, Stanford University, CA, USA, 8–12 June.
Paraconsistency: Paraconsistent Reasoning in Science and Mathematics, Munich, Germany, 11–13 June.
IYSM: International Young Statistician Meeting, Universitá di Cagliari, Italy, 13–14 June.
LOGICA: Hejnice, Czech Republic, 16–20 June.
SILFS: International Conference of the Italian Society for Logic and Philosophy of Sciences, University of Rome "Roma TRE", 18–20 June.
AMSTA: 8th International KES Conference on Agents and Multi-agent Systems—Technologies & Applications, Crete, Greece, 18–20 June.
CiE: Computability in Europe, Budapest, Hungary, 23–27 June.
SPS: Metaphysics of Science, Lille, 25–27 June.
SPE: Semantics and Philosophy in Europe, Berlin, 26–28 June.
& HPS: Integrated History and Philosophy of Science, Vienna, Austria, 26–29 June.
EGEC: 4th Annual Edinburgh Graduate Epistemology Conference, University of Edinburgh, 27–28 June.

July

CICM: Intelligent Computer Mathematics, University of Coimbra, Portugal, 7–11 July.

TiLXIV: Trends in Logic, Ghent University, Belgium, 8–11 July.

FLoC: 6th Federated Logic Conference, Vienna, 9–24 July.

SAT: 17th International Conference on Theory and Applications of Satisfiability Testing, Vienna, Austria, 14–17 July.

IPMU: 15th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Montpellier, France, 15–19 July.

NMR: 15th International Workshop on Non-Monotonic Reasoning, Vienna, Austria, 17–19 July.

IJCAR: 7th International Joint Conference on Automated Reasoning, Vienna, Austria, 19–22 July.

AUAI: Uncertainty in Artificial Intelligence Conference, Quebec, Canada, 23–27 July.

LOFT: Eleventh Conference on Logic and the Foundations of Game and Decision Theory, University of Bergen, Norway, 27–30 July.

UCM: Uncertainty in Computer Models 2014, University of Sheffield, 28–30 July.

Courses and Programmes

Courses

Modes of Technoscientific Knowledge: Chalet Giersch, Manigod, France, 19–25 January.

Groningen Winter School: Faculty of Philosophy, University of Groningen, 27–28 January.

MLSS: Machine Learning Summer School, Reykjavik, Iceland, 25 April–4 May.

Epistemic Game Theory: EPICENTER, Maastricht University, 12–23 May.

SIPTA: 6th SIPTA School on Imprecise Probabilities, Montpellier, France, 21–25 July.

MCMP: MCMP Summer School on Mathematical Philosophy for Female Students, Munich, Germany, 27 July–2 August.

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.

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 & 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.

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 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 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 Sebastián.

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.

MA in Reasoning

A programme at the University of Kent, Canterbury, UK. Gain the philosophical background required for a PhD in this area. Optional modules available from Psychology, Computing, Statistics, Social Policy, Law, Biosciences and History.

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 Sebastián).

Open Mind: International School of Advanced Studies in Cognitive Sciences, University of Bucharest.

PhD School: in Statistics, Padua University.

Jobs

Post-doc Position: in Set Theory, Torino University, until filled.

Post-doc Position: on the project "Rational reasoning with conditionals and probabilities", MCMP, LMU Munich, until filled.

Lecturer: in Theoretical Philosophy, University of Leeds, deadline 1 January.

Post-doc Position: In Causal Data Analysis, University of Geneva, deadline 25 January.

Professor: of Intelligent Systems, School of Computer Science and Statistics, University College Dublin, deadline 31 January.

Lecturer: in Theory of Science, University of Gothenburg, Sweden, deadline 13 February.

Studentships

Student Assistant: on the project "Rational reasoning with conditionals and probabilities", MCMP, LMU Munich, until filled.

PhD Position: in Logic, Rational Choice or Meta-Ethics, University of Bayreuth, deadline 15 January.

PhD Position: In Philosophy of Causation, University of Geneva, deadline 25 January.