Chapter 39
Logical Approaches to Law

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Abstract On the face of it, we might think that logic and the law were made for each other. Their intellectual identities are grounded in a shared stock of concepts: *argument, proof, evidence, inference, probability, relevance, presumption, precedent* or *analogy*, *plausibility, reasonability* and *explanation.* Provided that we understand logic broadly enough to include not only mathematical theories of deduction and induction, but also more recent attempts by computer scientists to investigate defeasible and default reasoning, there is not an item on this list that escapes the attention of logicians. If we also take note of brisk developments in dialogue logic and formal argumentation theory, the list of shared concepts enlarges accordingly, including among others, *leading questions* and *cross-examination.*

39.1 Conceptual Commonalities?

On the face of it, we might think that logic and the law were made for each other. Their intellectual identities are grounded in a shared stock of concepts: *argument, proof, evidence, inference, probability, relevance, presumption, precedent* or *analogy*, *plausibility, reasonability* and *explanation.* Provided that we understand logic broadly enough to include not only mathematical theories of deduction and induction, but also more recent attempts by computer scientists to investigate defeasible and default reasoning, there is not an item on this list that escapes the attention of logicians. If we also take note of brisk developments in dialogue logic and formal argumentation theory,[1] the list of shared concepts enlarges accordingly, including among others, *leading questions* and *cross-examination.*

[1] See, for example, Barth and Krabbe [1].

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It would not be wrong to say that we have had a golden age in logic, concerning whose beginnings it is an acceptable convenience to mention Frege's *Begriffschrift* of 1879. Logic has had a formal character ever since Aristotle. Golden age logic is formal, but in ways never envisaged by Aristotle. Golden age logic is also mathematical. There are at least three different but compossible ways in which this can be so — one having to do with *motivation,* another having to do with *methods*, and the third having to do with *matter*. Concerning motivation, sometimes a logic is purpose-built to accommodate a philosophical thesis about the foundations of mathematics. Thus classical logic – think here of *Principia Mathematica* – was built to accommodate logicism, that is, the thesis that arithmetic can be re-expressed without relevant loss in a purely logical notation. Intuitionist logic was likewise motivated. It was put together to accommodate mathematical constructivism, according to which only constructive proofs can be allowed.[2]

The second way in which a logic is mathematical is when its characteristic methods are mathematical. For example, the semantics of classical and modal logic, and virtually all the others in the deductive orbit, are set-theoretic through and through, and their meta-theories are structured in ways that permit proofs by mathematical induction. Inductive logics, in turn, are dominantly probabilistic, and the probabilities involved are those studied by the applied mathematics of games of chance.

Logic is mathematical in the third sense by virtue of its matter — that is to say, its subject-matter. Although some logicians draw a firm distinction between logic and mathematics, the majority view – certainly majority practice – is otherwise inclined, especially as relates to set theory. Accordingly, logic itself has come to be regarded as part of pure mathematics, as evidenced by virtually any page of the leading logic journals of the day.

There are those who think that the mathematicization of logic puts the commonality of concepts thesis in serious doubt. Everyone accepts that the intellectually foundational concepts of logic and the law are denoted by a shared lexicon of *names* – "argument", "proof", "evidence", "inference", and so on. But, say the commonality sceptics, if these names did in fact have the same referents, then the intellectually defining concepts of law would be open to mathematical articulation, which many critics think is too much for serious belief. On the contrary, they say, the concepts denoted by these common names are, in their legal contexts, *sui generis.* These reservations receive further support from methodological and procedural differences between the two disciplines. Logic expresses much of its formal character in the precision of its language, and the certainty, rigour and explicitness of its proofs, abetted by such linguistic artificialities and stipulations as may be needed to achieve those ends. It is conspicuously otherwise with the law. The medium in which legal reasoning is transacted is natural, not formal, language. Its proofs never rise to the standards of rigour demanded of logic, and the

[2]Roughly speaking, a constructive proof is one whose purported objects are expressly specifiable.

epistemological character of the law is largely one of implicitness.[3] For example, we will look in vain to the writings of theoretical jurisprudence for a definition that completes the biconditional schema, "A prosecutor's case constitutes proof of guilt beyond a reasonable doubt if and only if ....".

Broadly speaking, the *commonality thesis* asserts that the identically named foundational concepts of logic and law are the same concepts, whereas the – as I shall say – *two solitudes thesis* is that they are different concepts with shared names. This leaves the legally-minded logician with a number of options, in which we find varying answers to the question, "Assuming there were one, what would a logic of legal concept K look like?"

1. Accept the commonality thesis, and press on with the application of a received logic to concept K in legal contexts.
2. Accept the two solitudes thesis, and cease and desist. That is, take the position that there is no logic for K, that K is not a logic-worthy concept.
3. Accept the two solitudes thesis, but press on with *adaptations* of an existing logic to the peculiarities of K in legal contexts.
4. Accept the two solitudes thesis and *originate* a formalization better-suited to peculiarities of K in legal contexts.

Here are some examples to consider: Application of the probability calculus to the concept of probability in legal reasoning is sometimes thought to exemplify option one. Of course, for logicians, number two is the null option. Adjusting a plausibility logic[4] to the particular features of legal plausibility could be taken to exercise option three, and producing a built-from-the-ground-up logic for the concept(s) of legal presumption[5] would be an instance of option four.[6]

Excluding the null option, the present three give varying characterizations of the influence of legal concepts on the orthodoxies of formal philosophy. Option one presupposes the availability of an orthodox solution. Option three is a qualified challenge of the orthodox, and option four a repudiation of it.

We should note that these same options are also available to legal theorists, in the reverse direction, so to speak. As we have it now, it would appear that the dominant position of legal theorists is the two-solitudes scepticism of option two, whereas most of the activity of legally-minded logicians hovers in the vicinity of two-solitudes adaptations of option three.

Options three and four offer the would-be formalizer greatest creative potential. Faced with concepts *sui generis* to law, option three allows for the retrofitting of a technical apparatus already in service. Option four goes further. It envisages the prospect of a new logic for the concepts that resist accommodation in even a

[3] In this respect, among others, there are notable differences between common law and legal code traditions – between, for example, criminal law in England and France. In the interests of space, I shall confine my remarks to the common law tradition. A highly readable effort to bring to the fore the epistemological orientation of criminal procedures at common law is Laudan [9].

[4] In the manner, say, of Rescher [15].

[5] Although light on the formal side, see for example, Walton [17].

[6] For another variation of option four, see Horty [6]

reconfiguration of a standing formalism. It reflects the idea that concepts peculiar to the law, even when denoted by terms that also name concepts central to orthodox logical theory, require a *sui generis* logic rather than the adaptation of some existing system. This we might call the *sui generis-sui generis* thesis. One of the more interesting open questions of present-day logical theory is whether the logical requirements of legal reasoning are best served by accepting

The sui generis-sui generis thesis: *Sui generis* concepts require *sui generis* logics.

In what follows I shall focus on cases which suggest an affirmative answer to this question.

Throughout logic's golden age, option two has been by far the dominant position. It is said that the first logicians were Greek lawyers. Leibniz (1646–1716) was a lawyer, and Łukasiewicz (1878–1956) too, and Mill (1806–1873) might as well have been one. But the fact remains that, for well over a century, logic and the law have plied their respective trades unemcumbered by the slightest notice of one another. However, in the latter two decades of the twentieth century and into the present one, there have been stirrings of the other two options. In 1980, Chaim Perelman argued, in the manner of option three, for a restricted role for logic in the analysis of legal reasoning.[7] In this same spirit, Horn clause logics of logic programming were applied to the analysis of the British Nationality Act.[8] Important contributions from computer scientists also include Trevor Bench-Capon's [2] survey for an encyclopedia of computer science and technology[9] and Henry Prakken's legal modelling paper of 1997.[10] Also valuable is a recent collection of papers edited by Marilyn MacCrimmon and Peter Tellers, covering a number of approaches – e.g. fuzzy logics, and logics of uncertainty and probability,[11] and a 2003 paper by Prakken and his colleagues in which argument schemes are applied to the notion of legal evidence.[12] A recent volume of note is a book edited by Dov Gabbay and others on legal rationality.[13] Not to be overlooked is the much earlier engagement of legal issues by inductive logicians and probability theorists. An important and contentious contribution was Jonathan Cohen's [3] book,[14] which urged a distinction between two concepts of probability, only one of which Cohen thought was germane to the analysis of probabilistic and evidence-weighing reasoning in legal contexts. This latter he called inductive (or Baconian) probability, and the former aleatory (or Pascalian) probability. (The English word "aleatory" comes from the Latin word for dice-games.) Another earlier influence was deontic logic, part of

[7] Perelman [12].

[8] Sergot et al. [16].

[9] Bench-Capon [2].

[10] Prakken [13].

[11] MacCrimmon and Tellers [11].

[12] Prakken et al. [14].

[13] Gabbay et al. [5].

[14] Cohen [3].

whose motivation was an interest in deontological concepts of legal procedure – obligation, permission, and so on.[15]

When formal methods are applied to a concept, let us say that it constitutes a formalization of it. When speaking of a concept's meaning in pre-formalized linguistic practice, let us say that we are speaking of its intuitive meaning or, equivalently, of the *intuitive concept*. Consider now the question, "What is achieved by the formalization of a concept; for example, what do we learn about proof from a formalization of the concept knowledge?" There are four different answers to this *concept-engagement* question.

- *Analysis* An analysis of an intuitive concept K it makes its intuitive meaning *explicit*.[16]
- *Explication* An explication of an intuitive concept K preserves its pre-formalization meaning but does so in ways that make the intuitive meaning *precise.*
- *Rational reconstruction* A rationalization of a concept K involves the ascription to K of features not present in pre-formalized linguistic usage, but in a way that retains enough of the intuitive concept to make it intelligible to say that the rational construction at hand is a formalization of *it.* Rational reconstructions are semantic *make-overs.*
- *Stipulation* Here the formalization provides a nominal definition of a concept-lacking a prior presence in pre-formalized linguistic practice, while retaining meanings of the name of the original intuitive concept. Stipulations *make up* meanings.

The distinction between analysis and stipulation is roughly Kant's contrast between analysis and synthesis. Analysis, says Kant, is the business of making concepts clear, and synthesis the business of making clear concepts. Analysis is the purview of philosophy and synthesis the province of mathematics. In our schema, explication and rational reconstruction are hybrids, with explication more analysis-like and rational reconstruction trending rather more towards stipulation.[17] It is also important to note that the fourfold concept-engagement space is orthogonal to the fourfold-option space.

There are, of course, grey areas at each of these borders, but here are some quick examples. Some probability theorists think that to the extent that the intuitive meaning of probability resides in how prior probabilities are compounded, that aspect of its meaning is captured analytically by the axioms of the probability calculus. Some mathematicians take the view that the axioms of number theory

[15] The Deon Conferences are a good source. See, for example, http://www.doc.ic.ac.uk.deon02

[16] For lack of space, I pass over two important variations of the definitional notion of formalization, namely, implicit definitions and contextually eliminating definitions. For the first, think of the definition of the concept of number afforded by the axioms of number theory. For the second, think of the reduction of number theory to logic and set theory by contextual elimination.

[17] Kant [7, 8].

offer an explication of the intuitive concept of number. The notion of rational reconstruction we associate with Carnap. Its presence may be felt in Carnap's attempt to formalize physical objects as logical constructions of sense-data. Stipulation is the stock and trade of mathematics, as Kant noted. But it is also solidly at work in all of model-based science. For example, in population biology it is stipulated that populations are infinitely large; in neoclassical economics it is stipulated that utilities are infinitely divisible; in classical belief-change theories it is stipulated that belief is closed under logical consequence; and in rational decision theory it is stipulated that deciders have perfect information. Space doesn't permit further discussion of this fourfold distinction, except to say again that its partitions are not strict. As Quine famously quipped, one person's explication is another's stipulation.

39.2 Rationality

Model-based theories harbour a philosophically crucial distinction. It is the distinction between *descriptively adequate* theories and *normatively binding* theories. It is widely supposed that descriptively adequate theories successfully negotiate the relevant observational checkpoints, whereas normatively binding theories typically do not and need not. Consider, for example, mainstream formal theories of belief-change, in which it is stipulated that an agent proceeds rationally to the extent, among other things, that she closes her beliefs under consequence and, therefore, believes all logical truths. Since no human agent comes in any finite degree anywhere close to meeting these conditions, the theories that embody them are descriptive failures. Even so, it is commonly said that what such theories lack descriptively they more than make up for normatively; for they lay down conditions for the exercise of human reasoning *at its ideal best.*

If this were actually so, it would matter for both the moral and intellectual integrity of the law. Jurors have a duty to perform their functions rationally, including their own transitions from a required state of agnosticism about the accused's guilt to a state of belief capable of sustaining a verdict about it. Any theory of belief-change which, on pain of irrationality, mandates conditions infinitely beyond a juror's reach, triggers a further pair of options. One is that the law is an irrational disgrace. The other is that the orthodox approaches are wrong for the law, which, in turn, puts some (not much discussed) pressure on their normative presumptions.

The analysis of a concept presupposes its intuitive presence in preanalytic practice. An analysis may be said to be *conceptually faithful* to the degree that it preserves the presence of its intuitive analysandum. At the other end of the spectrum, synthesis, or the stipulation of new concepts, places a premium on the clarity that can be got from an inventive *mathematical virtuosity.* Concerning the option-space noted above, I have already mentioned the tendency of logicians to favour

something like item three, in which the logical treatment of legal concepts is by way of existing logics reconfigured to accommodate the law's contextual peculiarities. As regards the present concept-engagement possibilities, it would appear that the formalizations effected by retrofitted logics fall oftener than not in the ambit of partial reconceptualizations. It is well to emphasize, however, that option four – the most creative of our four options – will in principle tolerate each of the four grades of conceptual engagement. But here, too, I am inclined to think that when the preferred approach to a legal concept is by way of a new logic, it is advisable to try for a conceptual explication, rather than a rational reconstruction. If the concept is *sui generis* to law, and its meaning is implicit in established legal usage, the first order of business should be as much clarification as the *intuitive* concept will bear. That is, the logic of the law should be careful not to give mathematical virtuosity too much sway over conceptual fidelity. It serves neither the lawyer nor the logician to produce formalizations of concepts of central importance to law that no lawyer could recognize as such without a crash course in a department of mathematics or computer science or technical philosophy. Similarly, in reaching their verdicts, the law presupposes (approvingly) that jurors have untutored access to these concepts, hence apply them in their intuitive senses.

39.3 Probability in the Law

It is widely agreed that a verdict of guilty in a criminal proceeding at common law is both unjust and epistemically untenable if, on the evidence presented at trial, the probability of guilt is insufficiently high. Thus high probability of guilt on the evidence heard at trial is, on this view, a necessary though not sufficient condition of a correctly arrived at decision to convict. One of the quite standard ways in which logicians seek to interact with the law is to apply the calculus of probability to this notion of probability. Seen this way, when a juror reaches his decision he calculates the probability of the accused's guilt based on the trial's evidence, and in so doing conforms his reasoning, albeit tacitly, to the conditions mandated by Bayes' Theorem, a standard formulation of which is:

$$P\,(G/E) = \frac{P\,(E/G) \times P\,(E/G)}{[P(G) \times P\,(E/G) + (\,P\,(\sim G) \times P\,(E/\sim G)\,\Big]}$$

Here 'G' denotes guilt, 'E' evidence, and 'P' probability. Accordingly, we may read the present instance of the theorem as asserting that the probability of guilt on the evidence presented ($P(G/E)$) is the prior probability that the accused is guilty ($P(G)$) *times* the likelihood accorded to the evidence by the hypothesis of guilt ($P(E/G)$) DIVIDED BY the prior probability of guilt ($P(G)$) *times* the guilt of the accused

($P(E/G)$) *plus* the prior possibility of innocence (P(G)) *times* the likelihood of the evidence given the innocence of the accused ($P(E/\ G)$).[18]

Upon reflection, it appears that implementation of Bayes' theorem is precluded by a juror's other duties, of which none is more important than the presumption of innocence. What this means in concrete terms is that in determining whether to convict the accused, at no time in this process can the hypothesis of guilt be given any probative consideration. In particular, in trying to make up their minds about a given piece of testimony, jurors may not use the hypothesis of guilt to determine or recompute the *credibility* of the evidence they have heard. Accordingly, the presumption of innocence precludes jurors from binding their reasoning to the $P(E/G)$-clause of the theorem. This leaves us with the following *upshot-space*:

- What legal procedure requires is a violation of Bayesian rectitude, and yet jurors on the whole manage to do what the law requires. In which case, jurors are probabilistic misfits.
- What legal procedure requires is a violation of Bayesian rectitude, and (if only tacitly) jurors manage to honour the Bayesian requirements. In which case, jurors are legal misfits.
- What legal procedure requires has nothing to do with what Bayes' theorem requires. In legal contexts, determining $P(G/E)$ is not a Bayesian enterprise.

The present example lays down a valuable restriction on how to proceed. To the extent that *any* concept of probability is implicated in the determination of guilt or innocence, do not give it a Bayesian formalization. This is not a trivial conclusion. The probability calculus is a triumph of mathematical virtuosity. To date no mature and settled formalization of a non-Bayesian notion of legal probability has taken hold. Repairing this omission offers to logicians of the law the prospect of gainful employment.

39.4 Proof in the Law

At the criminal bar, conviction requires evidence that proves guilt beyond a reasonable doubt. Evidence presented at trial is entirely by way of testimony, of what witnesses say under oath. A witness can testify to a matter of fact or, if sworn as an expert, to a matter of opinion. Triers of fact (typically a jury) and triers of law (always a judge) are held to a strict duty of agnosticism both prior to the trial and at each of its phases, until the cessation of testimony, the presentation of closing arguments of counsel and the instruction of the jury by the judge. Neither do the triers have any independent means of confirming or disconfirming the propositions avowed by witnesses. Still less is the general epistemological question of the probativity of information gathered in this way an arguable matter in criminal

[18] It would be well to note that Bayes' theorem is not a definition of conditional probability. If it were, it would be viciously circular. It is in fact a rule for calculating a large class of conditional probabilities.

proceedings. The law's implicit epistemology makes it a non-negotiable assumption that sayso can be a reliable generator of proof beyond a reasonable doubt.

This creates an obvious problem for the criminal proof standard, especially when witnesses give conflicting testimony and the evidence is circumstantial in any significant degree. Is there a formal epistemologist who would allow as a *general* proposition that contradictory circumstantial testimony meets any standard of proof that he would antecendently have recognized? If the answer is No, the logician now has two more options to consider. One is to reject the law's concept of proof as epistemologically untenable. Another is to concede its epistemological legitimacy, and seek for the adaptation of an existing logic for its formalization or a purpose-built logic for it.

It is typical of cases in which defendents enter a plea of not guilty that witnesses will give conflicting testimony, thus confronting the juror with a critical pair of evidential duties to perform (or so it would appear). He must try to find a maximal consistent subset of the evidence that is most worthy of his belief. He must also determine whether that subset meets the requirement of proof of guilt beyond a reasonable doubt. An utterly natural question for a logician is, "What are the criteria for the correct performance of these tasks?" It is striking that jurisprudence does not answer this question. Indeed, it hardly even formulates it. This is not to say that the law gives no instruction on how to perform these duties. But what it doesn't do is specify those *criteria* in whose fulfillment dutiful compliance consists. Although there are occasional exceptions, the standard instruction to jurors from the bench runs along the following lines (again simplified):

- *If you believe witness W in regard to matter M, you must convict. If you believe witness W′ with respect to matter M, you must acquit. In regard to the rest of the testimony, if you find that what you believe of it merits conviction, then you must convict. If not, you must acquit.*

Concerning how to go about determining whether to believe a witness, the instruction is:

- *Pay attention. Try to understand the witness. Do not prejudice the issue or rush to judgement. Use your common sense.*

The last incorporates the venerable paradigm of the reasonable man (sic):

- *Form your judgement in the manner of the reasonable man, that is, by reasoning in the way of ordinary persons about ordinary things.*

It has long been recognized that jury deliberation is an exercise in practical, not theoretical, reasoning. The doctrine of the reasonable person carries an important suggestion about the logic of practical reasoning:

- *If there are criteria for the goodness of practical reasoning, their fulfillment in actual practice is inadvertent.*

All of this is crucial for a correct understanding of the epistemic status of the proof standard.

- *The criminal proof standard is not particularly high, and is attainable without tutelage by any reasonable layperson reasoning in the ordinary way of things.*

It would not be going too far to say that here is a concept of proof-determination that cuts sharply against the grain of orthodox epistemologies. In so doing, it raises obvious questions: Are there existing formal orthodoxies that can do the job for this notion of proof and of the decision consequent upon its positive application? It is notable that rational choice theory won't do. Its concept of the rational decider is one who seeks to maximize personal advantage. But the law's concept of the rational person is the intuitive concept: a rational agent is thoughtful and clear-headed, and by no means always selfish. Any theory of human performance that ties rationality to the pursuit of personal utilities are broadly utilitarian in character. But a juror's world is a deontological world in which preference is suppressed in favour of duty. So it is natural to wonder whether there is a mathematically virtuosic formal epistemology that could be contrived for this concept of proof. We may think that, to date, the most promising candidates are to be found in the proliferating literatures of defeasible, default and abductive reasoning. But even here, it is early days for definitive application to the law.[19]

As we begin to see, the criminal proof standard is less a matter of proof than of intellectually conscientious belief. If we used Woods [19] as our guide, a competent judge would instruct the jurors as follows:

- "With due regard for the instructions I have given you so far, and mindful of your duty to pay close attention to everything you've seen and heard at trial open-mindedly and without bias, if you find that you cannot in all intellectual conscientiousness convict the accused on that basis, then you must acquit. Equally, if you find that in all intellectual conscientiousness you cannot acquit the accused on that basis, then you must convict. Period."

It bears repeating that the criminal law's concept of proof is *sui generis.* It is not proof in the mathematical sense, and it is not proof in the information-theoretic sense. In a recent interview with Athanasios Christacopulous John Corcoran offers wise counsel to anyone eager to dive into the choppy waters of criminal proof:

> Before wrapping up my answer, I would like to remind myself and your readers of the points I have made several times. First, belief can be an obstacle to a proof because one of the marks of proof is its ability to resolve doubt. Second, we don't usually try to prove propositions we don't believe or at least suspect to be true. Third, the attempt to find a proof of something leads to doubts we never would have had. If you have a treasured belief you would hate to be without, do not try to prove it.[20]

Mind you, Corcoran is not speaking here of proof of criminal guilt, but his remarks serve to reinforce its *sui generis* conceptual character.

[19] See Woods [18] and [19], chapter 21. For a more thorough-going discussion, see also Woods [20], especially parts E and F.

[20] Corcoran and Christacopulous [4].

39.5 Inconsistency

It is typical that accusations of serious crimes are tried by juries, normally twelve in number. It is also typical that decisions to acquit or convict be unanimous, achieved by a bi-modal vote.[21] A jury's verdict is the product of twelve individual findings. Provided that they remain attentive and wide-awake, all twelve hear the same testimony. In what can only be regarded as a lexical misfortune, testimony is also referred to as evidence. In inductive settings, it is natural to suppose that propositions are evidential only if they are true, and there is no shortage of formal acknowledgement of this connection. But it is not a tenable connection for testimony, hence not a connection for evidence in the law's testimonial sense. This vitiates a suggestion of the previous section, namely, that the evidence on which a juror must base his finding is a maximal consistent subset of the total evidence heard. Since such subsets can contain elements which a juror disbelieves, the condition must be reformulated as calling for maximal consistent subsets of *believed* testimony.

The requirement that jurors not act on inconsistent evidence may strike one as a reasonable ideal for individual triers of fact, but it is not a condition that stands any realistic chance of realization in the aggregate. It is in principle possible that each juror bases his finding on different subsets of the total evidence, not all of them pairwise compatible. This is deeply consequential. It shows that the verdict in a criminal trial is not a unanimous finding on some aggregation of the total evidence, but rather is the sum of individual findings, each predicated on its own readings of the evidence.

Philosophical intuitions tug here in different directions. On the one hand, it is awkward that an accused can be opportuned by a verdict made by people who collectively give an inconsistent reading of the evidence. On the other hand, it might strike us as epistemically and morally promising that different, though non-compossible, readings of the evidence should lead twelve times out of twelve to the same finding across the board. As we have it now, there is no settled formal theory of inconsistency-management or collective agency that confronts this issue directly. Notwithstanding, it is possible to see in outline assumptions that a purpose-built logic should try to preserve and clarify. For simplicity, consider the extreme case in which each juror's consistent subset of the total evidence is incompatible with every other. We may suppose that the finding of an individual *juror* is both rational and legally permissible if and only if, consistent with the judge's instructions,

- *It is arrived at from a reading of the total testimony which a reasonable person, proceeding in the ordinary way about ordinary things, might reasonably have given;*

and

[21] In Scottish jurisprudence, a third option is allowed – "not proven".

- *The reasoning from his reading to his finding is that of a reasonable person reasoning in the ordinary way about ordinary things.*

We may now put it that a *jury's* verdict is both rational and legally permissible to the extent that the individual jurors' findings, each rational and legally permissible, in the sense at hand, sum to 12. For these conditions to be met, it is neither required nor desirable that individual readings – and individual findings – be aggregated. Equally it is neither required nor desirable that the jury's verdict be represented as the negotiated settlement of the jurors' competing theories of the case. A jury's verdict is not, therefore, the solution of a conflict resolution exercise.[22] In so saying, a number of theoretical paradigms – ranging from game theory in all its principal forms to voting preference theory – seem wrong for jury deliberation.

39.6 A Concluding Remark

As noted at the beginning, the law brims with concepts of considerable interest to logic. This presents the logician with a quite general methodological question. Is it best to press existing methods of formal representation into service – with or without some tweaking as needs be – or would these epistemologically laden concepts be better handled by formalizations purpose-built for them? There are advantages and tensions either way. Staying with the tried-and-true has the attractions of the familiar dab-hand, possibly at the expense of conceptual distortion. Purpose-built logics can be expected to do better on the score of conceptual fidelity, but for the most part they are not yet well-developed and are certainly not tried-and-true. So that is a cost. It is significant that these approaches do not exclude one another. It is perfectly possible for the logic of law to operate on each of these tracks, in the spirit of "let's see what works best." The law is a waiting feast for logicians. We should greet it with an experimental openness appropriate to its promise.

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[22] Of course, in actual practice, jurors may argue with one another over their differing readings of the testimony, and may at times effect some reduction of the difference. But this is not intrinsic to the juror's function. Their task is to determine whether their findings agree, not necessarily their readings.

[23] Asterisks (*) indicate recommended readings.

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