Ignorance, Inference and Proof:
Abductive Logic Meets the Criminal Law

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1. *Getting started*

It is a matter of some interest that logic and the law should share so many of their foundational concepts – concepts such as proof, evidence, truth, inference, probability, plausibility, presumption and reasonableness – and yet should have had very little to say to one another within living memory. It is not especially surprising that logic and the law should have suffered (I use the word in its Latin sense) this alienation. With regard to its foundational concepts – for example, the concept of proof beyond a reasonable doubt, the concept of the balance of probabilities, the concept of the reasonable person – the law embeds am implied epistemology of implicity. There exists among practitioners, especially judges, the view that definitions and formalizations of such notions are both unnecessary and is liable to conceptual distortion. But definitions and formalizations are mother's milk to logicians. Where the law favours approximation and contextually sensitive nuance, logicians thrive on exactitude and rigour. So why *wouldn't* the lawyers and logicians go about their business without the regard of the one for the other?

It would be wrong to leave the impression that there is no analytical exactitude in the law. It would also be a mistake to suggest that there has been no contact with the formal disciplines. Trials are often complex and judgements often embed exhaustive and detailed analyses of relevant points of law. In recent years probability theorists have sought to model probabilsistic reasoning in legal settings and computer scientists have tried to produce software that captures the dialectical structure of aspects of legal reasoning. What is more, especially among legal theorists, these formalistically-minded incursions have not been entirely unwelcome. Even so, there remains a lot of resistance by lawyers and legal scholars to the analytical and methodological norms championed by logicians.

What I would like to do in this essay is probe the possibility of further contact between logic and the law by bringing to bear on verdicts at the criminal bar insights from the logic of abduction. In the course of this examination, we will find occasion to discuss three rather nasty-looking problems which I shall call *the criminal abduction paradox,* the *no-reason-to-doubt problem* and the *no-rival problem.* I will close the paper with a brief discussion of what I call *data-tampering*.

2. *Verdicts as abductive*

In the common law tradition, a conviction at the criminal bar is constituted by a verdict of guilty beyond a reasonable doubt. Verdicts reflect an interpretation of the evidence heard at trial and an assessment of the competing parties' theories of it. A theory of the evidence is an inference to the best explanation, which is said to be the most common form of abductive reasoning.[1] So we may say that a guilty verdict is said to be

[1] Non-explanatory modes of abduction appear prominently in the "reverse mathematics" pioneered by Harvey Friedman and his colleagues, e.g., [Friedman and Simpson, 2000]. The idea of reverse mathematics originates with Russell's notion of the regressive method in mathematics ([Russell, 1907/1973]), and is also present in some remarks of Gödel (1944, 1946/1990]). For more about this, see [Irvine, 1989]. We should also remark that, on some philosophical construals of the concept of interpretation, inferences to the best explanation are not abductive in my sense. This is discussed in [Gabbay and Woods 2005, chapter 4, section 3]. Even so, theories of the evidence at the criminal bar are indeed typically both explanationist and abductive in character.

the conclusion of a suitably strong abduction, and that a verdict to acquit is a judgement to the effect that the evidence permits no contrary abduction of requisite strength. What, then is this thing abduction? What is is logical structure?

3. *Ignorance-problems*

In what is perhaps their most distinctive feature, abductions are responses to *ignorance-problems.* An agent has an ignorance-problem in relation to an epistemic target that cannot be hit by the cognitive resources presently at his command, or within easy and timely reach of it. If, for some proposition *P*, I want to know whether *P*, and I lack the information to answer this question, or to draw it out by implication or projection from what I currently know, then I have an ignorance-problem with respect to *P*. So what do I do? The two most common responses to ignorance-problems are

1) Subduance
2) Surrender.

In the first case, one's ignorance is removed by new knowledge, and an altered position is arrived at which may serve as a positive basis for new action. In the second case, one's ignorance is fully preserved, and is so in a way that cannot serve as a positive basis for new action. For example, suppose that you are writing a letter to a friend and that you can't remember how to spell "accommodate". Does it have two *m*s or one? You don't know. If you consult a dictionary or go online or ask your office-mate, you will come to know. This is subduance. But if you are alone in a canoe in the middle of a lake north of Sioux Lookout, and if you want to finish your letter then and there, you'd be better advised to give up on "accommodate" and make do with "take care of". This is surrender.

There is a third response that is sometimes available. It is a response that splits the difference between the prior two. It is abduction. Like surrender, abduction is ignorance-preserving, and like subduance, it offers the agent a positive basis for new action. With subduance, the agent overcomes his ignorance. With surrender, his ignorance overcomes him. With abduction, one's ignorance remains, but one is not overcome by it. It is a response that offers the agent a reasoned basis for new action in the presence of that ignorance. No one should think, by the way, that the goal of abduction is to *keep* oneself in ignorance. The goal is to make the best of the ignorance that one chances to be in.[2]

4. *A schema for abduction*

The nub of abduction can be described informally. I want to know whether something *P* is the case. But I don't know and am not in a position here and now to get to know. However, I observe that if some further proposition *H were* true, then it together with what I already know *would* enable me to answer my question with regard to *P*. Then, on the basis of this subjunctive connection, I conjecture tentatively that *H is* true and, on *that* basis, I release it provisionally for subsequent inferential work in the relevant contexts. More formally, let *T* be an agent's epistemic target at a time, and *K* his knowledge-base at that time. Let K^* be an immediate successor of *K* that lies within the agent's means to produce in a timely way. Let *R* be an attainment-relation for *T* and R^{subj}

[2] Ignorance-problems are discussed in greater detail in [Gabbay and Woods, 2005] and [Woods, 2007] and [Woods, 2007b].

a subjunctive-attainment relation for it. *K(H)* is the revision of *K* upon the addition of *H*. *C(H)* denotes the conjecture of *H* and H^c its activation. Accordingly, the general structure of abduction is as follows ([Gabbay and Woods, 2005]).

1. *T*!	[setting of *T* as target]
2. ~(*R(K, T)*	[fact]
3. ~(*R(K*, T)*	[fact]
4. $H \notin K$	[fact]
5. $H \notin K^*$	[fact]
6. ~*R(H, T)*	[fact]
7. R^{subj} *(K(H), T)*	[fact]
8. *H* meets further conditions S1, …S_n	[fact][3]
9. Therefore, *C(H)*	[sub-conclusion, 1-7]
10. Therefore, H^c	[conclusion, 1-8]

It is easy to see that the distinctive epistemic feature of abduction is captured by the schema. It is a given that *H* is not in the agent's knowledge-set. Nor is it in its immediate successor. Since *H* is not in K, then the revision of *K* by *H* is not a knowledge-successor set to K. Even so, $R^{subj}(K(H),T)$. So we have an ignorance-preserving abduction, as required.

It is reassuring to note that the present proposal manages to capture the distinctive features of Peirce's own schema for abductive reasoning:

> The surprising fact C is observed
> But if A *were* true C *would* be a matter of course. Hence, there is reason to *suspect* that A is true ([Peirce, 1932-1958, 5. 189], emphases added).

Here the subjunctive character of the explanatory link is clear. It is also clear that it lends its support to nothing stronger than the suspicion of the hypothesis' truth. Thus Peircean abduction is also ignorance-preserving.[4]

It is advisable here to guard against a misconception. When I say that an abduction involves the activation of a hypothesis in a state of ignorance, it is not at all necessary, or frequent, that the abducer be wholly in the dark, that his ignorance be total. It need not be the case, and typically isn't, that the abducer's choice of a hypothesis is a blind guess, or that nothing positive can be said of it beyond the role it plays in the subjunctive attainment of the abducer's original target (although sometimes this is precisely so). Abduction isn't mysticism. In particular, it is not foreclosed that there might be evidence that lends a hypothesis a positive degree of likelihood. But when the evidence is insufficient for activation, sometimes explanatory force is the requisite "top-up". Abduction is often a deal-closer (albeit defeasibly) for what induction cannot bring off on its own.

Before moving on to things legal, let me also make brief mention of another important feature of abduction. There are lots of cases in which abduction stops at line 9,

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[3] Roughly speaking, what this means is that *H* has a no more plausible or relevant rival constituting a greater degree of subjunctive attainment of *T*.

[4] This is reinforced by Peirce's insistence that abduction is a kind of guessing ([Peirce, 1931-1958, 5. 172]). See also [Peirce, 1992, p. 178] for the claim that providing cogent abduction for it is never a reason to believe *H*.

that is, with the conjecture of the hypothesis in question but not its activation. When this happens, the reasoning that generates the conjecture does not constitute a positive basis for new action, that is, for acting *on* that hypothesis. Call these abductions *partial* as opposed to full. Peirce has drawn our attention to an important subclass of partial abductions. These are cases in which the conjecture of *H* is followed by a decision to submit it to experimental test. Now, to be sure, doing this is an action. It is an action *involving H* but it is not a case of acting *on* it. In a full abduction, *H* is activated by being released for inferential work in the domain of enquiry within which the ignorance-problem arose in the first place. In the Peircian cases, what counts is that *H* is withheld from such work. Of course, if *H* goes on to test favourably, it may then be released for subsequent inferential engagement. But this is not abduction. It is induction.

Now it is quite true that epistemologists of a certain risk-averse bent might be drawn to the admonition that partial abduction is as good as abduction ever gets and that complete abduction, inference-activation and all, is a mistake that leaves any action prompted by it without an adequate rational grounding. This is not an unserious objection, but I have no time to give it its due here. Suffice it to say that there are real-life contexts of reasoning in which such conservatism is given short shrift, in fact is ignored altogether. One of these contexts is the criminal trial at common law, a matter to which I now turn.

5. *Its bearing on theories of the evidence*

The cases I want to consider here are those in which the trier of fact is a jury and in which both sides offer competing theories of the evidence. It is true that these aren't by any means invariable features of criminal trials as they actually occur. In many jurisdictions, the incidence of trial by jury is being lowered by trial by judge, and in most cases the defence does not offer its own positive theory of the case. (In fact, it is something of a joke among prosecutors that, once it is clear that counsel for the defence will offer its own theory of the case, the case for the prosecution is all but won! Apart from the fact that they occur with *some* frequency, my choice of cases having this pair of features is largely for expository ease. What I say about those cases can with a little imagination be adapted readily enough to trials in which these characteristics are absent.

The abductive character of theories of the evidence is perhaps most evident when the evidence is circumstantial. For my purposes here, I am content to restrict the scope of the abductive thesis to the enormous number of cases that cluster around this paradigm in real-life. There is a myth that seems to have become rather entrenched among the laity, to the effect that circumstantially argued cases can't meet the criminal proof standard or, anyhow, can do so only in some diminished sense, *faute de mieux*. The myth is contradicted by both legal practice and juridical pronouncement. Thus we read in [Klotter, 1992, p. 69] that

> [h]istory is replete with examples of convictions based exclusively on circumstantial evidence.[5]

What is more, in an American case from 1969,

[5] [Klotter, 1992] defines circumstantial evidence as follows: "Direct evidence proves a fact without inference … Circumstantial evidence is evidence from which a fact is reasonably inferred but not directly proven." (pp. 67-68).

> The trial judge properly instructed the jury that 'the law makes no distinction between direct and circumstantial evidence but simply requires that the reasonable doubt [if it exists] should be drawn from all the evidence in the case', including 'such reasonable inferences as seem justified in the light of your own experiences.' ([Klotter, 1992, p. 68])[6]

and,

> [c]onvictions should not be overturned simply because this court determined that the circumstances do not exclude every reasonable hypothesis of [the] evidence [for acquittal]. ([Klotter, 1992, p. 69]).

We shouldn't omit to mention that on rare occasions the evidence that a jury is prepared to accept admits of only one possible explanation. In such cases, it is perfectly proper for the jury to make a "transcendental" inference in the form: "These are the facts. These facts could not have come about except that the accused committed the crime with which he is charged. Consequently, we must convict." Transcendental arguments are regressive or backwards-chaining arguments, but they are not abductive, since, when they come off, they are not ignorance-preserving. But I say again that the occasion for a jury availing itself of a transcendental inference is comparatively rare in actual practice.

Conviction has two components. The jury must find that the hypothesis abduced by the prosecution is strongly explanative and that no rival hypothesis permitted by the evidence is more explanative. The jury must also determine that the best explanation is strong enough to meet the criminal proof standard. In so saying, a nasty-looking difficulty presents itself. For on the face of it, this second condition cannot be met. It cannot be met because abductions are ignorance-preserving, leaving the jury not knowing whether the accused is guilty as charged. The hypothesis of guilt is a conjecture, it is an educated guess. How can an educated guess qualify as *any* kind of proof, still less a proof beyond a reasonable doubt? As we indicated at the beginning, this is trouble bad enough to deserve a name. I propose that we call it the *criminal abduction paradox.*[7]

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[6] But, here too, there are contradictory rulings. Notwithstanding that the U.S. Supreme Court eliminated it from federal trials, the following instruction regarding circumstantial evidence is still in force in the state courts of California.

> However, a finding of guilt as to any crime may not be based on circumstantial evidence unless the proved circumstances are not only (1) consistent with the theory that the defendant is guilty of the crime, but (2) cannot be reconciled with *any* other rational conclusion … Also, if the circumstantial evidence permits two reasonable interpretations, one of which points to the defendant's guilt and the other to innocence, you *must* adopt that interpretation that points to the defendant's innocence, and reject that interpretation that points to guilt. (CALJIC 2.01)

This is in all essentials Hodge's Rule (Hodge's Case (1838), 168 E. R. 1136). Hodge's Rule ceased having effect in Canada in 1977 (*R v. Cooper* (1977) 47 D. L. R. (3d) 731 (S. C. C.)), and there is some dispute among legal scholars as to whether the Rule was ever intended to be taken seriously.
See *Holland v. U.S.* (1954) for the opinion that "the instruction on circumstantial evidence is confusing and incorrect."

[7] The thesis that abduction is intrinsically ignorance-preserving has attracted some critics. Readers interested in pursuing this issue in greater detail are invited to consult the appendix. For present purposes, it suffices that in the vast majority of circumstantial convictions theories of the evidence do indeed have this characteristic as a matter of fact.

6. *Reasonable doubt*

We read in a prominent American text book that

> [r]easonable doubt is a term in common use as familiar to jurors as to lawyers. As one judge has said, it needs a skillful definer to make it plainer by multiplication of words … ([Strong, 1999, p. 517]).

A like sentiment is to be found in instructions from the U.S. Seventh Circuit Court of Appeals.

> "Reasonable doubt" must speak for itself. Jurors know what is "reasonable" and are quite familiar with the meaning of "doubt". (*U.S. v. Glass,* 846 F.d. 386 (1988).

These are remarks wholly typical of the epistemological orientation of the common law. Its fundamental concepts – proof, inference, relevance, probability, among others – are presumed to be adequately understood intuitively, that is, in the absence of analytical tutelage. What is more, the common law embodies a certain scepticism about definitions and formal explications – in other words, about certain forms of *exactitude* – according to which an analysis of a term is either redundant or conceptually distorting. Both these sentiments can be found in the lines I've just quoted.

Even so, judges will on occasion venture forth with definitions. Here is an example formulated by the Supreme Court of Canada in *R. v. Lifchus* as a model instruction to the jury. [8] It provides, on the one hand, that jurors need not have absolute certainty of the accused's guilt but, on the other, that his probable guilt is not enough. Even believing that he is guilty is not enough. In a subsequent case, it was averred that it would

> [b]e of great assistance for a jury if the trial judge situates the reasonable doubt standard appropriately between the two standards [of certainty and probability]. (*R. v. Starr*, [2000] 2 S.C.S. 144 at para. 242.)

I will not take the time to dwell on the haplessness of these high court explications, beyond saying that they are multiplications of words that make things less plain, not more. Even so, the model charge of *Lifchus* also contains a further sentence that may be of some use to us.

> In short, if based upon the evidence … you are sure that the accused committed the offence you should convict since this demonstrates that you are satisfied of his guilt beyond a reasonable doubt. (13-14).

I don't for a moment want to suggest that these words are the acme of clarity, but they do embed (perhaps inadvertently so) an interesting suggestion which I now want to try to tease out. I shall do so by examining the doctrine of the reasonable man.[9]

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[8] (1999), 9 C.R. (5th) 1 (S.C.C.)

[9] It is not too much to say that in common law jurisdictions the question of the teachability of the criminal standard of proof is in substantial disarray. In a significant ruling, the Supreme Court of the United States (*In re Winship*) found that there was a constitutional obligation that criminal juries were, without exception, to be instructed that guilt beyond a reasonable doubt is necessary for conviction. Given that judges must now tell juries that they are subject to this standard, a question naturally enough arises as to whether judges should also go on to tell juries what the standard means. It bears on this that recently England has abandoned the practice of two centuries' standing of having judges instruct jurors about the meaning of the standard. What brought this about was pressure from legal theorists to the effect that "reasonable doubt

7. *The reasonable man*

The concept of the reasonable man or, as we must now say, reasonable person, lies at the heart of the law of tort, where it helps distinguish strict liability from the liability of fault. In this usage, it is the subject of a great deal of finely wrought analytical instruction by judges and, so, is an important exception to the law's epistemology of tacitness with regard to its foundational concepts. But the idea of the reasonable person also leaves its tracks in other quarters of the law, notably in its conception of how juries are to be constituted and what they can be considered capable of doing. Juries – both criminal and civil – are made up of ordinary persons who have had no expert or formal tutelage in the matters they will hear in evidence. In most common law jurisdictions, a professional training in any such matter disqualifies a person from jury duty. In this same spirit, it is assumed that the reasoning and reflection that the jury will be required to bring to bear on the evidence will be of a kind and of a quality open to the ordinary person reasoning in the ordinary way of things.

This teaches us an important lesson about reasonable doubt. In its commitment to the reasonable-person model of triers of fact, the law presumes that the standard of proof beyond a reasonable doubt is routinely manageable by ordinary persons reasoning in the way of ordinary persons. What is this "reasoning in the way of ordinary persons"? It is intuitive and unreflective reasoning. It is reasoning that omits the overt calibration of performance to criteria. It is reasoning of a sort that has been given some recognition by computer scientists – in non-rule-based systems, for example – and by moral philosophers – also in non-rule-based systems of moral judgement. This means, in particular, that when a juror finds an accused person guilty beyond a reasonable doubt, he (the juror) has no duty to make the case that his verdict meets the stated standard, which in the general case he would in any event be wholly incapable of making.

This is epistemic implicity of high order. The decision (as in some jurisdictions) to send an accused to his death rests on satisfying a criterion of justified hypothesis-activation which the ordinary person cannot articulate and should not be required to. This contrasts markedly with what may be taken as the dominant decision model in the research literatures of the non-legal disciplines. For lack of a settled term, I shall call it the *Rational Deliberation Model* (*RDM*). According to the *RDM*, a decision to perform an action *A* is reasonable only if (1) there is a criterion for the reasonableness of action, which the decision-maker is able, in principle, to articulate. And (2) it is possible in principle for the decision-maker to determine – usually by calculation – whether A

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could be neither defined, nor uniformly understood, nor consistently applied" ([Laudan, 2006, p. 76]). Much the same view prevails in a number of U.S. state jurisdictions. In Oklahoma and Wyoming, to take just two examples, a judge's instruction on the meaning of the standard is automatic grounds for reversal (*Pennell v. Oklahoma*, 640 P.2d 568 at 570 (1982), and *Cosco v. Wyoming*, 521 P. 2d 1345 (1974) at 1346). On the other hand, fifteen states require that the standard be defined, while most appellate courts discourage the practice. Again, the Seventh Circuit Court of Appeal "admonished district courts not to define 'reasonable doubt'." (*U.S. v. Martin-Tregora* 684 F. 2d 485, at 493 (7th Cir. 1982). In 1994, the Fourth Circuit Court ruled that when a jury asks for a definition of the standard, a judge is at liberty to refuse. (*U.S. v. Reives*, 114 S. Ct. at 2679 (1994). The Supreme Court has never managed to decide whether reasonable doubt should be defined, finding that the Constitution is non-committal about whether a definitional obligation exists (*Victor v. Nebraska,* 114 S. Ct. at 1243 (1980).

satisfies it. If, for example, H is a proposition which an agent thinks is supported by some evidence E, then on the *RDM* model, his finding that E supports H requires him to specify a criterion C and a relation of support S and to establish that E bears S to H, and does so in such a way that C is satisfied. Reasoning in this way is two-layered. It requires that the reasoner make the case for H by citing E, and it also requires that he makes the case that the support lent to H by *E* flows from the fact that E bears an S to H of which it can be determined – again often by calculation – that that it satisfies C. So, for example, suppose that all the ravens I've seen are black and no one has told me otherwise. I might take this as evidence for the claim that ravens *are* black. Thus my case for the claim that ravens are black is that all the ones I've seen are and no one has told me otherwise. But this is not yet *RDM*-reasoning. *RDM*-reasoning requires another step. It requires that I determine that the conditional probability of that claim on that evidence meets the criterion of inductive strength.

The doctrine of the reasonable person – of the ordinary, untutored person – rejects *RDM*. It asserts the existence of reasonable decisions in which condition (1) of *RDM* is failed (and, trivially, (2) as well). On this view, if there is a criterion of reasonableness for the decision-maker, it is not one that he negotiates by *RDM*-procedures of articulation and calculation. The rejection of *RDM* is not unique to the doctrine of the reasonable person as it operates in legal settings, far from it. It has quite general application to everyday reasoning of all kinds. So its rejection here is not a matter of special pleading or *ad hoc* stipulation.

There is a second moral to draw. It is widely believed that the criminal proof standard is a particularly high one, and artificially so. That is to say, that it is a standard higher than one that would suffice for determinations of guilt in non-juridical settings – think, for example, of a university's misconduct committee, or a mother and father judging little Billy's ructious behaviour – and artificial by virtue of the fact that it is imposed by the courts as a hedge against wrongful conviction. This is twice-over a mistake. If compared to the standards of mathematical demonstration and scientific confirmation, the criminal standard is pretty small beer. And since it is a comparatively low standard, its remarkable loftiness cannot be a matter of courtly or policy-theoretic imposition. It is quite true that courts do impose artificialities that serve as hedges against wrongful conviction,[10] but the criminal standard of proof is not one of them.

Here the last-quoted observation from *Lifchus* is suggestive. Let me cite it again: "In short, if based upon the evidence … you are sure that the accused committed the offence you should convict since this demonstrates that you are satisfied of his guilt beyond a reasonable doubt". Anaphora being what it is, it is not wholly clear what the backwards reference of "this" is. If it refers to the juror's *being sure* of the accused's guilt, then the court's admonition is wholly vacuous. But if "this" refers to the *fact of conviction,* then not only is the instruction not vacuous, it is epistemologically interesting. My own view is that, irrespective of what those jurists actually meant by the words of their instruction, this second reading comports rather well with the law's overall approach, case after case, to the issue of how verdicts are to be reached. What this general practice suggests is that a juror must convict if, upon attending to the evidence, he is *satisfied* that the accused is guilty as charged. And since, in reaching that state of

[10] Notably in judicial determinations of the admissibility of evidence, the Crown's burden of proof and the presumption of innocence.

mind, he is not a *RDM*-manipulator, satisfaction here is an *operational* concept, not a criterial one. A juror's satisfaction is not to be confused with his belief that the accused is guilty or his judgement that the accused is probably guilty, or his feeling that the accused's innocence is a practical possibility, but rather is *constituted* by the decision to convict. The *satisfaction is implicit in the conviction.*

Let E be the evidence that the juror accepts and suppose that the juror is satisfied that H, that is, that conviction is warranted. Then the juror's case for conviction is E, crudely in the form "Since E, H". If the juror's judgement is sound, there is a relation of support *S* and a criterion of support adequacy C such that E bears S to H in fulfillment of C. Hence there is a case that the juror's case for conviction is sound: Since E, and E bears S to H in fulfilment of C, then H. A juror who reasons that since E, H has no duty (and typically no ability) to produce this second-level argument. On the face of it, this is problematic. After all, whatever a juror actually does in reaching a verdict of guilty, and at whatever level of case-making he is at least *bound* by the criterion C, that is, by the standard of reasonable doubt. So when he renders his verdict H on evidence *E* how could he not have a duty to make the case that his reasoning satisfies C? Well, the short answer is that he doesn't and (nearly always) couldn't discharge the duty if he tried. This leaves us with two options. One is that criminal verdicts are arrived at irrationally or anyhow in epistemically debauched ways. The other is that hitting the standard is constituted by a finding of guilt on that evidence by a juror who is epistemically competent. Which is the right option for the theorist to exercise? The answer is that if he believes that in the general case decisions to convict on circumstantial evidences are sound, then the manner in which they were reached cannot be irrational, short a systematic miracle. Why not say, then, that meeting the standard of proof is taking the decision that is bound by it?

I think that we may now say that we have ready to hand one part of an answer to the Criminal Abduction Paradox:

1. *The criminal proof standard* is not *particularly high, and is attainable without tutelage by any reasonable layperson.*

Proposition (1) is supported semantically. People who worry that the intuitive and untutored character of jury decisions is of too low an order to qualify as proof overlook the core meaning of that notion. Whether in mathematics or science or the kitchen, a proof is the result of a trial that defeats a presumption. The toughness of both the presumption and the trial vary with the nature of the contexts in which proof is sought. Things are tougher in mathematics than they are in the kitchen, but, for all their difference, a proof of a theorem and a proof of the pudding preserve this core meaning. This gives a second thing to say against the paradox:

2. *The comparative lowness of the criminal standard in no way strains the core meaning of the concept of proof.*

We come now to a third point. If again we reflect on the core meaning, we are reminded that proofs arise from *trials.* In mathematics, a trial is a sound demonstration of a proposition otherwise presumed to be mathematically inadmissible. In science, a trial is the application of the scientific method to a proposition otherwise presumed to be

scientifically inadmissible. In the kitchen, a trial is the eating of a dish otherwise presumed unfit for the King. In law, a trial is an attempt to defeat the presumption of innocence. In this we see a deviation from the abductive paradigm schematized in section 3. In the general case, the trial of an abduced hypothesis *follows* its activation. But in the law, activation is reserved until the hypothesis has been tried. So a third thing to say against the paradox is:

3. *A prosecution is an attempt to defeat the presumption of innocence. A defence is an attempt to defeat that attempt. A verdict of guilty survives all available effort to defeat it.*

8. *The abductive character of verdicts*

What is it to convict a man for murder knowing that you do not know whether he is guilty of it? The general form of this question is answered in the logic of abduction. There is a presumption that, in the absence of certainty, risky actions should be circumspect. This is the fundamental principle of risk aversion in conditions of uncertainty. The costlier the consequences should one's action turn out to be mistaken, the greater the need to mitigate uncertainty before the action is taken. This is a wisely conservative principle, but like most good things we can have too much of it. In its most extreme form risk-averse conservatism is equivalent to our second – or do-nothing – response to an ignorance-problem. No one thinks that this is the right form of the principle *in general.* Abduction, or the third response, risks action in the absence of knowledge, even where such actions are neither trivial nor practically reversible. Even so, the weightier the consequences of being wrong, the stronger the abduction must be.

4. *One's satisfaction with H is constituted by one's activation of it, knowing the risks*.

Jurors, like the rest of us, are seized of the great wrong of a wrongful conviction and have a duty to minimize the likelihood of its commission. But jurors are not permitted, still less do they have a duty, to avert the wrong of wrongful conviction by declining to convict no matter what. They have a duty to convict if they are satisfied. The *mark* of that satisfaction is activation of the hypothesis of guilt, knowing the risks.

According to the general schema for abduction, a conjecture is activated when the abducer releases it for premissory work in the disciplinary contexts in which the originating ignorance-problem arose in the first place. This is one way – the fully abductive way – of sending a conjecture to trial. One puts it to work, and one sees what happens. It is quite true, as we saw, that sometimes a conjecture is sent to trial without the intervening step of activation. In such cases, the conjecturer does not act on the hypothesis he has arrived at until its *bona fides* have been subsequently established. As common as this practice may be, it is not abduction according to the general schema. Let me here repeat that some people may see it otherwise. They may think that the example at hand shows the general schema in a bad light. Lacking an interest in unedifying semantic wrangles, I was prepared to split the difference. Such cases are not abductions in full; they are *partial* abductions.

This has a direct bearing on the abductive character of theories of the case. When a prosecutor conjectures the guilt of the accused and the defence conjectures his innocence, it lies in the nature of criminal proceedings that neither party can put his respective conjecture to work in ways that qualify as *activation.* Activation falls to the jury. So we may say that a distinctive feature of theories of the evidence is that, for opposing counsel, they are partial rather than full abductions. For juries, however, they are full.[11]

9. *Epistemic reliability?*

My limited purpose so far has been to disarm the Criminal Abduction Paradox by demonstrating that, on the contrary, the criminal proof standard, both in its height and the manner of its attainment, is low enough and ordinary enough to permit satisfaction by a jury's abduction. It has not been my further purpose to suggest that in general the results of such abductions are epistemically satisfying in all respects. My sole claim here is that they are not *paradoxical.*

What, then, of their epistemic reliability? It is a harder question to answer than we might like it to be. Such empirical work as presently exists is disturbing. In an investigation of several hundred Michigan jurors, fully twenty-five percent asserted that "you have a reasonable doubt if you can see *any* possibility, no matter how slight, that the defendant is innocent" ([Kramer and Koening, 1990, p. 414]; quoted from [Laudan, 2006, p. 49]). In another study, one in four Florida-based jurors found that when the evidence is evenly balanced between guilt and innocence, the defendant must be found guilty ([Strawn and Buchanan, 1976, pp. 480-481]; quoted from [Laudan, 2006, pp. 49-50]). Discouraging as these findings are, there may be some reason not to take them at face-value. For if, as has been suggested here, a jury's finding is intuitive, unreflective and non-criterial, that is, non-*RDM*, the very questions that prompted these answers are of a type that require reflection, and reflection in terms that may not have entered the jury's actual thinking. Accordingly, there may be some room for hope that they are answers which inadequately reflect what was actually in those jurors' minds as they reached their decisions. But this is a matter for another time. I want now to turn to the other pair of problems mentioned at the outset.

10. *Reasonability without reasonable doubt*

I have already mentioned that the proof standard itself is subject to constraints that appear to damage what might be called the "epistemic legitimacy" of criminal proceedings, generating verdicts that are either factually untrue or factually unsupported.[12] It is widely conceded that, while a trial has the twin objectives of truth and justice, there are various respects in which the goal of justice takes precedence over the

[11] But surely, it might be objected, jury-abductions aren't fully full. The hypothesis activated by a finding of guilt is not one released for subsequent premissory engagements by which it is tested. Rather it triggers the administration of punishment by the state. True, but "The accused is guilty" does indeed have a vital – indeed indispensable – premissory role in sentencing deliberations. It may also figure in post-conviction inferences about the accused arrived at in the press or the community at large. And in appellate settings, "The accused is guilty" is an essential input.

[12] See [Laudan, 2006] for a detailed and vigorously argued a case to this same effect.

commitment to truth.[13] Even so, what the problems to be discussed here suggest is that the law's epistemic shortfalls compromise not only the duty to get at the truth of things but also the duty to render justice. In this section and the one to follow I shall attempt to expose a pair of these difficulties. In so doing, it will become apparent that the two problems together create at least the strong appearance of a dilemma concerning how criminal verdicts are reached. In the present section, I will consider ways in which the dilemma might be escaped. In section 11, I examine implications for the structure of jury deliberations.

As before, the first half of the purported dilemma arises most naturally in the context of cases that are based solely on circumstantial evidence. I want to quote again from Klotter's report of the 1978 ruling of the Indiana Court of Appeals:

> Convictions should not be overturned simply because this court determined that the circumstances do not exclude every reasonable [acquitting] hypothesis of [the] evidence ([Klotter, 1992, p. 69]).

This is a pointful finding, and a problematic one. A criminal conviction may be allowed to stand even when there exists a theory of the case that calls for acquittal and the theory is reasonable. The problem arises from the following pair of facts.

> *Fact 1*: By the proof standard, a criminal conviction requires that the evidence show the accused's guilt beyond a reasonable doubt.
>
> *Fact 2*: By the rulings presently in view, a criminal conviction is permitted even when there exists a reasonable case for acquittal.

If there exists a reasonable case for acquittal then, by common sense, that very fact constitutes a reasonable doubt of guilt. This is precisely the upshot of CAJIC 2.01 (or Hodge's Rule), cited earlier, but it is precisely this that the Supreme Court overturned federally and the Indiana Court of Appeal expressly disavowed.

How can we have it that reasonable grounds for thinking an accused not guilty not constitute a reasonable doubt of his guilt? How is a judgement of bald inconsistency to be averted here? It is important to emphasize that what the criminal standard does *not* provide for is that a verdict to convict is sound if the case for conviction is more reasonable than the case for acquittal, even if the case for acquittal is also reasonable. What the standard also requires is that the reasonableness of the case for acquittal not, just so, constitute a reason to *doubt* the case for conviction. Let us set this out schematically.

1. G explains E/∴G (the prosecution's theory of the case)
2. ~G explains E/∴ ~G (the defence's theory of the case)
3. Abductive inference (1) is reasonable (hypothesis)
4. Abductive inference (2) is reasonable (hypothesis)
5. Inference (1) is more reasonable than (hypothesis)

[13] It is taken as a matter of basic justice that procedures that minimize false convictions are necessary even at the cost of an increase in the acquittal of guilty persons.

abductive inference (2)

6. The cogency of (2) need not expose
   the hypothesis G to a reasonable doubt (criminal jurisprudence)

A 1978 ruling by the First Federal Appeals Court captures this reasoning almost perfectly:

> The prosecution may prove its case by circumstantial evidence, and it need not exclude every reasonable hypothesis of innocence so long as the total evidence permits a conclusion of guilt beyond a reasonable doubt.
> (*U.S. v. Gabriner,* 571F.2d 48, at 50 (1st Cir., 1978).

It is a sentiment echoed in the Court's subsequent ruling of 1983:

> The trier of fact is free to choose among various reasonable constructions of the evidence.[14]

I daresay that there will be some people for whom the sheer counterintuitiveness of this, the *no-reason-to-doubt* problem, is a standing invitation to *ambiguate*. Perhaps this is right. Perhaps there are different senses of "reasonable" and "reason" that make it reasonable to think that the accused didn't do it without constituting a reason to doubt that he did. Let us deal with this now.

11. *The ambiguation thesis*

Perhaps we can stave-off the no-reason-to-doubt problem by pleading the ambiguity of "reasonable" and "reason for". I have not been able to find this suggestion mentioned, much less championed, in the legal literature, but this is not to deny that its influence might be felt implicitly in actual practice. My earlier inclination to dismiss the ambiguation thesis has been subdued by recent comments by Jerome Bichenbach, himself a former Crown prosecutor in Ontario, to the following effect. Since juries are not operating in the realm of mathematics, "a reasonable theory of innocence consistent with the evidence is *always* possible" (my emphasis). "Indeed with enough imagination and time we could come up with as many reasonable but highly unlikely theories as we had patience for" (emphasis added).[15] If this were actually so, reasonability would collapse into mere logical consistency with the evidence, and the number of reasonable theories of the evidence would enlarge massively and, in so doing, would elevate what Bichenbach derogates as the "accused's evil-twin hypothesis" to a reasonable theory of the evidence just about every time. Conceived of in this way, reasonability as logical consistency with the evidence casts no doubt on the reasonable hypothesis' negation. This presents us with two implications, one welcome and the other not. The welcome consequence is that the Gabriner and Thorley rulings to the effect that a reasonable case for acquittal need not be

[14] U.S. v. Thornley, 707 F. 2d 622, at 625 (1st Cir., 1983).

[15] Bichenbach was my commentator at the Windsor Conference of the Ontario Society for the Study of Argumentation in June 2007. Quotations are from a typescript kindly furnished by Prof. Bichenbach and are not yet in published form.

a reason to doubt an accused's guilt are straightforwardly true. The unwelcome consequence is that these same rulings run the risk of serious misunderstanding. It is perfectly all right for a judge to admonish a jury that the logical possibility of an accused's innocence on the evidence is not sufficient reason to suppose him so. But when a judge dresses this up as an instruction about the *reasonability* of theories of innocence, he seriously risks a jury's taking this as an instruction about reasonability rather than logical consistency, in consequence of which a *genuinely* reasonable case for acquittal might be overlooked. In short, judges have a duty to speak as plainly as the facts will allow. If a judge wishes to advise a jury that the mere logical possibility of guilt is not a reason to doubt the accused's guilt, there are plain words for saying it. But if he decides to convey this same point by telling the jury that having a reason to acquit does not imply having a reason not to convict is just asking for trouble. This is so bad a problem that I am inclined to think that the very fact that judges do make admonitions to juries in just these words counts significantly against the present version of the ambiguation thesis. If "reasonable" doesn't in these contexts mean "logically consistent", then it means something else. If so, I am at a loss to know what it means, except for the possibility that it means what "reasonable" means in the phrase "beyond reasonable doubt". But in that case, the ambiguation thesis is false, and the no-reason-to-doubt problem is revived. I shall return to this point two sections hence. I want now to develop a third problem.

12. *The no-rival problem*

The common law is an adversarial system. This carries direct consequences for how evidence is arrived at. In a word, evidence is generated tendentiously. Whether a witness will be heard at all is a matter of counsel's decision and the judge's acquiescence, and what a witness testifies to is tightly constrained by the questions put to him by counsel.

This element of tendentiousness in the presentation of evidence is crucially important in the common law tradition. Evidence is led by counsel for the opposing sides. What a prosecutor will want to place before a jury is commonly quite different from what the defence will wish the jury to hear. It lies in the adversarial nature of proceedings at common law not only that opposing counsel will sometimes offer rival theories of the evidence, but also that they will introduce rival bodies of evidence. There is a nice reciprocity in this, in as much as the evidence selected by respective counsel to attach his own theory *to* will be evidence that best fits the theory. We may take it then that the self-servingness that attaches to the use of evidence has two interlocking tendrils. The evidence that a lawyer generates is tailored to fit his pre-selected hypothesis of the case, and the selection from the totality of what is heard that a lawyer cites as the evidence to be explained is picked for its explanatory susceptibility to that same hypothesis. When it comes to evidence, opposing counsel are cherry-pickers.[16]

We have it, then, that for wide ranges of cases, when adversaries present their respective theories of the evidence, not only are their explanatory hypotheses different – guilty in the one case, not guilty in the other – but the evidence that their respective hypotheses are offered as best explaining are incompatible subsets of the total testimony heard. The basic structure of this putative rivalry is this. Putting, again, G for the

[16] This kind of one-sidedness in argumentation is discussed in [van Laar, 2007].

hypothesis of guilty as charged and ~G for the hypothesis of not guilty as charged, and putting E and E* for counsel's different and usually incompatible subsets of the total evidence, the prosecution's theory of the case is that

G best explains E

whereas the defence's theory of the case is that

~G best explains E*.

On the face of it, this is ludicrous. It makes it impossible to see in what this rivalry could consist, and in particular how the prosecution's case overrides the defence's case. That being so, it would appear that convictions at the criminal bar are impossible to achieve. Let us call this the *no-rival* problem. Left unsolved, the no-rival problem makes any criminal trial a travesty.

13. *A dilemma?*

A solution to the no-reason-to-doubt problem is required lest the criminal proof standard fall into incoherence in those numerous cases in which the evidence is solely circumstantial and there exist reasonable theories of it by both sides. We have examined and have found wanting the ambiguation solution of this problem. But it is well to note that a fureher solution to this problem is achievable by abandoning the assumption that the competing theories of the case are grounded in identically the same evidence. However, if this is done, then the parties' apparently opposing theories of the case lose their status as rivals. In particular, the case for acquittal cannot override the case for conviction, just as the case for conviction cannot be undone by the case for acquittal. Since the respective theories of the case leave one another untouched, there is as much reason to acquit as to convict, leaving the consequence that the criminal proof standard cannot be met in any such case. But in as much as such cases are the norm, we also have it as a norm that the proof standard can't be met; that is, that by and large it can't be met. But an unmeetable proof standard is legally incoherent.

This, then, is our dilemma. The no-reason-to-doubt problem makes for judicial incoherence. Its solution is of a kind that takes us out of the frying pan of the no-reason-to-doubt problem into the fire of the no-rival problem, which generates incoherencies of its own.

Actual practice indicates a way out of our dilemma, and a good thing too. If juries were required to base their decisions on opposing counsel's versions of the evidence, E and E*, not only would they be landed in the no-rival problem, but much more often than not they would be subject to the illogical duty of accepting incompatible subsets of the total evidence heard. Since, as already noted, counsel lead and rebut evidence tendentiously, that is, with a view to its fitting their own respective pre-determined theories of the case, what reason is there to suppose that their respective summations would be any the less self-serving and selective? As it happens, what a juror is in fact required to consider is whether G is the best explanation of that subset of the total evidence that *he himself* selects, that *he himself* picks out as the grounds upon which his assessment of G must rest. Although it cannot be guaranteed in advance that a juror's evidence will never be identical to that of the one counsel or the other, it is empirically

evident that a juror will nearly always put into play a third subset of the total.[17] Either way, the juror will have made the evidence on which he himself will proceed abductively "his own".

The story of how a juror goes about filtering the evidence into a basis for his own determinations is a highly complex and epistemologically vexed one ([Woods, 2007]), for which I lack the space here. But we may take note in passing of some of the difficulties that filtration has to contend with. One is that, in the general case, witnesses and jurors are strangers to one another, with no independent access to the track record of the witnesses heard, short of general assumptions, such as that people in general are truthful in general. But the assumption is to some degree called into question by the fact that, owing to the incoherencies that afflict the total testimony, some of these witnesses are lying or honestly mistaken. But then the question is: Whom are these jurors to believe? Part of what guides jurors in the solution of such problems is the plausibility of what they hear. But this, too is modified guidance at best. For some of what they hear is highly implausible, and yet might be accepted on the basis of the plausibility of the *witness* who attests to it.

All this occasions a serious challenge to the would-be logician of legal reasoning. All the going theories of plausibility presuppose the appraiser's independent access to a witness's "reliability" index (see, e.g., [Rescher, 1976]). And, while there is little doubt that jurors (and the rest of us) implicitly recognize a distinction between the plausibility of what is said and the plausibility of him who says it, no known theory of plausibility satisfactorily elucidates the contrast and most don't deal with it at all. It is true, however, that lawyers do discuss a witness's testimony under the heading of "demeanour", that is, their "conduct, bearing, behaviour, delivery, inflexion: in short, anything that characterizes [their] mode of giving evidence but does not appear in a transcript of what [this] actually said" ([Bingham, 2006, p. 333]). Interestingly, enough, it appears to be a growingly dominant opinion among judges that witness's demeanour is not in fact a particularly reliable indicator of his reliability ([Bingham, 2006, p. 335]). As Lord Bingham of Cornhill remarks, "I ally myself with the doubters". Perhaps judges, who are experienced in the ways and means of oral testimony, have grounds on which to justify this dismissiveness. But for jurors, who in the nature of the criteria for their selection are rookies, it is hard to see how the factor of speaker-plausibility isn't often significantly in play.[18]

Suffice it to say that the mere fact that jurors produce their own filtrations of the evidence provides the technical means of escaping our dilemma. To see how this happens, consider first the no-reason-to-doubt problem. In convicting an accused, a juror must find that on the basis of his own filtration of the evidence the accused is guilty beyond a reasonable doubt. If we suppose that, in so determining, he allows that there is a reasonable case for acquittal, then he must acquit unless the case for acquittal attaches to a different filtration of the evidence. In that case the reasonableness of the contrary case is grounded in evidence that the juror doesn't accept or to which he gives insufficient weight to support the rival hypothesis. Since it is routinely the case that in the situation we are presently describing jurors and counsel will be operating with different evidence-filtrations, then it is open to juries to convict even in the face of a reasonable case for

[17] Although it is equally common for these different subsets also to overlap fairly substantially.
[18] Speaker-plausibility is discussed in greater detail in [Gabbay and Woods, in progress].

acquittal. For now a reasonable case for acquittal is, for any juror intent on conviction, a reasonable explanation – perhaps even the best explanation – of an evidence-filtration that he is unhappy with.

Relief can also be offered to the no-rival problem. Given that nearly always opposing counsel rest their respective pleadings on different and incompatible filtrations of the evidence, this creates a no-rival problem *for counsel.* The prosecution's ⟨G best explains E; so G⟩ and the defence's ⟨~G best explains E*; so ~G⟩ have precisely the logical character imputed by the no-rival problem. It is a problem that would have teeth if the juror's duty were to accept one of these inferences on grounds that it does better, both explanatorily and in relation to the proof standard, than its rival. For if there *is* no rival, that determination cannot be made. In fact, however, this is not the juror's duty. His duty is not to break an unbreakable tie between prosecution and defence abductions, but rather to determine whether the G-hypothesis is adequately grounded in his own filtration of the evidence, even if should chance to be the case, however rarely, that his own filtration of the evidence is identically the same as that of one or other of the counsel.

14. *Incommensurabilities in the jury room*

The no-rival problem is a kind of incommensurability problem. Where E and E* are rival *filtrations* of the evidence, then the claims that G best explains E and that ~G best explains E* cannot be rival *theories* of it. Two things are incommensurable when these are not able to be judged by the same standard. So the betterness of G on E over ~G on E* is indeed incommensurable. True, G might be a better explanation of *E* than ~G is of *E**. But absent an independent assessment of the betterness (i.e., the superior acceptability) of E over E* or of E* over E, the two theories of the evidence can't be one another's rivals. That is, ⟨G best explains E; so G⟩ and ⟨~G best explains E*; so ~G⟩ can both be cogent inferences to the best explanation. But they are cogent in relation to different parameters E and E*. They lack a "common standard".

It may strike us as odd, that is, as *logically* odd, that pleadings at the criminal bar should so routinely lock opposing counsel into such incommensurabilities. Perhaps it is not surprising, then, that – thus positioned – counsels' respective theories of the case are question-begging and full of straw.[19] Surprising or not, it doesn't matter. It doesn't matter because it is not the role of counsel to construct an argument that will be accepted by his opponent. Rather his role is to assist the juror in constructing an argument that will be accepted by the juror. To this end, respective counsel will try to "sell" jurors two things. Not only will they press their own theories of the evidence, they will also press their own filtrations of the evidence.

With these things said, an interesting clarification can be made as to how in the individual discharge of their duties jurors acting together generate criminal verdicts. As we have seen, the individual juror has a twofold duty. He must fashion a judgement as to the accused's guilt on the evidence, and he must tie that question to his own filtration of

[19] One begs the question by attributing to one's rival propositions that he has not conceded, is not committed to conceding and would not concede if asked. One commits a straw-man fallacy against another party when one produces an argument from the other party's concessions whose conclusion contradicts a proposition, which although attributed to him, the other party does not hold and is not committed to holding.

the evidence. In most criminal trials at common law, there are twelve jurors, and in most jurisdictions convictions require the jury's unanimous vote. Since the jury will either acquit or convict, there are two cases to consider.[20]

- *The jury acquits*. It suffices for acquittal that there be at least one filtration of the evidence, accepted by at least one juror, for whom the hypothesis of guilt is not the best explanation of it, and/or does not meet the proof standard.

- *The jury convicts.* Here it is required that for each juror there exists a filtration of the evidence, which the juror is satisfied is best explained by the hypothesis of guilt and does so in fulfillment of the proof standard.

The decisional structure of conviction embodies at least the potential for incommensurability. It is possible in principle that, for each of the twelve jurors who vote for conviction, there exists a different and incompatible filtration of the evidence in which his vote is grounded. Should this possibility obtain, then the collective decision of the jury is saturated with incommensurability, what with one's juror's ⟨G best explains E_1, so G⟩ incommensurate with each of the other jurors' ⟨G best explains E_i, so G⟩ (where $2 \leq i \leq 11$). Were it the case that in its collective determination a jury is obliged to reach its decision to convict on a common filtration of the evidence, then convictions would rarely be possible. But, as we see, what a decision to convict requires is agreement about guilt, not about the filtrations in which these decisions to convict are grounded. Mitigating these relativities is the sheer endurance of jury deliberations, routinely extending to days and often to weeks. When jurors deliberate, they expose to one another their own respective theories of the case. In so doing, there is some occasion for one juror's theory of the case to help reshape another juror's filtration of the evidence. But there is nothing in what is known empirically about how juries operate that comes close to supporting the suggestion that in the exercise of their collective judgement juries always or even frequently eliminate these evidence-filtration incommensurabilities. There is a telling lesson in this. A verdict to convict requires that all jurors hold a common hypothesis, but it does not require that jurors have a common theory of the case. The consequences for the requirement of jury unanimity are obvious. It provides that unanimity regarding guilt may rest, and often does rest, on inconsistent filtrations of the evidence. This guarantees that at least some of the propositions in which the verdict of guilt is lodged are false. It also means that any juror who votes for conviction on the basis of his own filtration of the evidence is committed to thinking that any vote for conviction that is lodged in a filtration that is incompatible with his own is defective. This too is problematic. It seems to show that the criminal proof standard is an even more vexed matter than is suggested by our dilemma. But does it show this in fact?

15. *Preserving falsehood*

[20] Excepting jury deadlock, and verdicts of not-proven, as in the Scottish tradition, and a similar verdict allowed in Sweden and Italy.

Abduction (I say) is ignorance-preserving inference, if not invariably then typically. Jury verdicts, especially those for conviction, rest (I say) in individual filtrations of the evidence that, if not invariably then typically, harbour falsehoods. How can justice be served by such convictions? How can it be right to send an accused to prison when the twelve jurors have achieved their unanimity on separate filtrations of the evidence which are mutually inconsistent, hence falsity-guaranteeing? On the face of it, any such conviction is a false conviction, hence a miscarriage of justice. But the appearance is deceiving. A decision to convict represents a *consensus.* Consensus is a decision method that leaves certain items of disagreement unresolved. In a typical case, a decision *D* is reached by the consensus of a group *G* when, although there is unanimity about *D*, there may be some lack of it about the bases on which individual members of *G* have rooted their support of *D*. This raises the quite general question of whether decisions by consensus can ever qualify as rational. There are two answers to consider, only one of which can be true. The gloomy answer is that falsity is always a spoiler for rationality. Since consensuses are forms of decision-making that preserve at least some of the falsity that arises from matters left in disagreement, then consensuses are inherently unreasonable or (worse) irrational. On the other hand, consensuses have particular virtues, aside from the obvious practical advantage of bringing a decision-quest to an end. One of these is the virtue of *lamination*. Let a group's *D* be a decision about a matter of practical importance, a matter calling not only for a timely decision but also for the *right* decision. There are two subcases to consider.

> *Subcase one. G* reaches *D* unanimously based upon individually identical reasons for *D.*
>
> *Subcase two*. *G* reaches *D* unanimously, but its members do not reach unanimity about the evidence that supports *G*.

Subcase one gives a unanimous decision but not one reached by consensus. Subcase two is a matter of consensus, and breaks in turn into two additional subcases, in one of which the individual reasons for *D* are different but mutually consistent, and in the other of which they are mutually inconsistent. It is this last case that is at issue here. Let $E_1 \ldots, E_n$ be the separate evidence-sets on which, respectively, the members of *G* rest their agreement as to *D.* It is possible, of course, that some of the E_i lend to *D* no support whatever or that they are madly implausible on their fact, in which case it might be that *G*'s fondness for *D* is the result of bias or of D's self-evidence, or some such thing. But if the members of *G* are doing their jobs properly, it is essential that the E_i on which *D* is based by seriously considered for their probity and their accuracy. To the extent that the members of *G* are competent decision-makers, we may take it as plausible that each of the E_i represents a different way of getting things right. Each E_i might be subject to the Roshamon Principle, according to which each is reasonable reading of the evidence. The Roshamon Principle proffers an explanation of how it can be reasonable for different interpreters of it to come up with different, and even incompatible, readings of the facts. The explanation is that reasonability will tolerate (to an extent) variations in competence, background, perspective – in short, of the differences of persons' "own experiences" ([Klotter, 1992, p. 68]). By these lights, different though reasonable readings of the facts

are different, though possibly exclusive, ways of "getting things right". Lamination occurs when different ways of reading the facts lead to a common conclusion or decision. Another way of saying this is that if *D* is upheld by all the (available) different ways of getting things right, then *D* is arguably a not markedly less well-supported decision than one to the same end but based upon just one way of getting things right. The shortest possible way of saying this is that by its very constitution, consensus in falsity-preserving, and short of outright condemnation of consensus as such, the very fact hat verdicts to convict are often consensuses, hence decisions which themselves are falsity-preserving, cannot be enough to convict them of unreasonability. "Ah yes", it will be said. "But is this reasonability enough to meet the standard of guilty beyond a reasonable doubt?" The answer is yes. At least, it is yes if judged by our earlier construal of the standard as that which satisfies an ordinary person reasoning in the way of ordinary persons.

16. *Data-tampering*

Juries are not encouraged to vote for acquittal on grounds that they don't understand the case. Indeed, strictly speaking, they are not allowed to do so. It is a deeply embedded presumption of common law that the ordinary untutored layman can understand enough of any case he hears to arrive at a verdict that satisfies the requisite criteria. Perhaps this is a hopelessly romantic view of the intellectual powers of the ordinary man, but its importance here is that it spurs juries to arrive at an understanding of the cases they hear.

As we have seen, jurors have no control over the evidence introduced at trial. They have no occasion to interact with either witnesses or counsel, whether by asking for clarification or by challenging reliability. Because counsel are pre-committed to their respective theories of the evidence, they have a huge stake in presenting evidence that best fits those pre-commitments. It is worth repeating that, when it comes to the introduction of evidence, opposing counsel are cherry-pickers. In the usual run of things, the total evidence presented at trial will be internally inconsistent. This triggers an obvious question. How is a juror to achieve an understanding of the case if it is embedded in logical inconsistency? We suggested pages ago that jurors form consistent filtrations of the total evidence. I say again that there is no time here to delve into this question with the care that it plainly calls for, but perhaps we might register an observation or two about what this process involves.

> *Observation 1.* The requirement to form a consistent filtration of the evidence is *in fact* a requirement to form a consistent filtration of it that one actually understands.
>
> *Observation 2.* Understanding a body of evidence is in significant measure a matter of being able to explain it. Thus the obligation to understand the case predisposes a juror to select filtrations that attract best explanations.

Observation 3. There is something corruptly "Bayesian" about this. Given the pressures under which he operates, a juror may decide what evidence to believe by the degree of fit that it has with one or other of the two hypotheses of the case.

Observation 4. Evidence filtrations are data for theories of the case. Centuries ago Francis Bacon ([Bacon, 1905]) made us see that data for theory do not come ready-made. They have to be conceptualized in a certain way. Much the same point was made by Patrick Suppes in the 1960s in a classic paper, "Models of Data" ([Suppes, 1962]). How you conceptualize or model the data will influence what counts as a possible theory of it. Thus there is a quite general problem of *data-tampering*, of modelling the data in ways that not only increase the likelihood of coverage by a given theory, *but for that reason.* Strong theories are at risk for data-tampering.

Observation 5. It has been observed by Gerd Gigerenzer, among others, that an investigator's methodology, especially his choice of analytical tools, are also at risk for data-tampering and sometimes are guilty of it. So data-tampering is not uniquely tied to the processes of evidence filtration, and is a recognized methodological phenomenon quite independently of judicial proceedings ([Gigerenzer, 1987, 1996]).

Observation 6. As far as I know, there have to date no empirical investigations of the frequency and degree of data-tampering in criminal trials. But it would be fool-hardy to suppose that it never or hardly ever happens.

Data-tampering is intimately related to the colonizing propensities of theoretical paradigms. The more a theory is established in a domain the greater the impetus to sweep into its embrace unclaimed data or data that are claimed by weaker theoretical rivals. The colonizing character of deep and established theories is reflected in what I call the Can Do Principle ([Woods, 2003]). It provides that to the extent possible problems should be solved with known methods, and facts should be accounted for by established theories. Can Do is an expression of a benignly conservative methodological principle. It is a principle which instructs us in our theoretical affairs not to re-invent the wheel and to seek accommodation of the facts in question within frameworks already known to work. It is a principle that undergirds our fondness for reductionism and our hopes for the unity of knowledge. Like most virtues, it is possible to have too much of the conservatism of Can Do. When this happens, Can Do collapses into a degeneracy that we might call Make Do. Make Do motivates the theorist to apply Can Do beyond the limits of its reach. It prompts the assimilation of the facts in which one has an interest to theoretical paradigms whose sole relevant advantage that it is "there" and that the theorist has some knowledge of how it works in those situations in which it does work. Make Do has its supporters. They are to be found among those who think that an inadequate theory is better than no theory at all. Every good theory distorts its data to some extent. But theories loosed by Make Do distort their data beyond recognition. One of the most deeply difficult problems in the methodology of theories is that of characterizing in a suitably general and

principled way the practical difference between the virtue of Can Do and the vice of Make Do.

No one thinks that theories of the evidence are theories in the sense of the abstract constructions of science. A theory of the evidence will differ in lots of kinds of ways from Big Bang or the latest version of string theory. Even so, in criminal trials there are two and only two outcomes that a jury must decide between. They are so to speak, the pre-selected theoretical paradigms. In those cases in which each side mounts its own positive theory of the case, these two outcomes are the only two explanations of the evidence available to the juror. It is perfectly possible that on any credible filtration of the evidence, neither theory of the case succeeds; that is, that the evidence lacks a coherent explanation. When this happens, it is a juror's duty to acquit. But it bears repeating that he also has the possibly countervailing duty to *understand*, to shape the data of the case into an explanative coherency. Make an explanative coherency out of a filtration of the evidence that the juror doesn't understand or for which he is at a loss to offer an explanation condemns the trier of fact to data-tampering. It is as if Make Do had entered the proceedings and distorted the data beyond recognition. It would be quite wrong to leave the impression that Make Do cannot be effectively counselled against. But it cannot be counselled against unless judges instruct jurors in the plainest of words that if the jury doesn't understand the evidence it must, by default, vote for acquittal. Anything less leaves jurors at risk for data-tampering.

Appendix

Is Abduction Really Ignorance-Preserving?

Some think not. Here, in a review of Gabbay's and my *The Reach of Abduction,* is Geoffrey Goddu on the point:

> … there is no argument for the ignorance-condition – (or cognitive deficit condition) on abduction – it is stipulated (repeatedly) and then used to argue that many cases of what we thought were abduction are (or perhaps might) not really be abduction at all. For example, non-subjunctive deductive-nomological explanationism and evidentially clinching inference to the best explanation are rule non-abductive because they violate the ignorance-condition. …Given that so much of what is taken to be examples of abductive behavior is getting thrown out, one might doubt the logical necessity of the ignorance condition on abduction ([Goddu. 2005, 293]).

How are we to respond to this objection? First a minor quibble or two. It was never Gabbay's and my intention to stipulate the ignorance-condition into existence. Our aim was to explicate the concept of abduction, and the condition was offered as part of

that explication. In this were guided by what we think can be learned from the abductive behaviour of actual reasoners on the ground. But we also wanted to give due weight to the modern founder of abductive logic, who emphasized the guessing character of abduction ([Peirce, 1931-1958, 5.172]). We also wanted to acknowledge Peirce's emphasis on the subjunctive, conjectural and guessing features of abduction. I am mindful, of course, of Quine's quip that one person's explication is another's explication and that, in any case, there is no principled way of masking the distinction with requisite precision. So perhaps what I saw as explication, Goddu sees as stipulation. It doesn't matter. If it *is* stipulation, then the explication fails. It is false that abduction is intrinsically an ignorance-preserving mode of inference. Goddu says that we offer no argument for the condition, but I would plead the efforts of chapter 4 of the book.

Of course, it is perfectly possible for Goddu to be quite wrong mere-stipulation and no-offer-of-justification objections and yet to be quite right in saying that ignorance-preservation is not intrinsic to abduction. My own view is that he is indeed wrong about the former and right about the latter. Since Goddu presents no argument for his own objection, I shall develop one for him.

Consider the case in which the cognitive target T of would-be abducer *A* is wanting to know whether there is at least a minimally satisfactory reason to conjecture that H. Let us dub the propositional content of this want 'M'. Suppose now that *A* performs an abduction that conforms to our abduction schema. The very fact that at line 9 *A* utters C(H) commits him to M. What is more, the very fact that C(H) is the conclusion of some correct abductive reasoning makes it true that M. It also constitutes a justification of *A*'s utterance of C(H). In sum, then, we have it that M is true, that *A* is justified in accepting M and that *A* does indeed accept M. Accordingly, on at least one deeply entrenched model of knowledge, in performing the abduction currently under discussion, *A* attains his cognitive target of wanting to know whether M. So successful abduction is not always ignorance-preserving.

Point to Goddu? One might think not. The agent's target was wanting to know whether it is reasonable to conjecture that. The argument I've put at Goddu's disposal has the structure exhibited in the abductive schema of section 4. This matters. The proposition that it is reasonable to conjecture H is, at line 5, excluded from the agent's knowledge-set and, at line 6, from any immediate successor of it. Accordingly, the conclusion produced by the relevant abduction is not that it is reasonable to conjecture H but rather that it is reasonable to conjecture that it is reasonable to conjecture H. So doesn't the argument we've crafter for Goddu fail after all? It does, unless we can satisfy ourselves of a suitable reduction theorem for the property of reasonable conjecturability. Suppose that we symbolize as $R^c(P)$ the claim that it is reasonable to conjecture that P, and let us suppose a grammar that recognizes expressions such as $R^c(P)$ as sentences. Then $R^c(R^c(P))$ is a sentence. We will say that a reduction theorem holds for R^c provided $R^c(R^c(P)) \rightarrow R^c(P)$. It is easy to show that the theorem does not hold in the general case. Consider a situation in which an agent knows that P. Then it is not reasonable for him to *conjecture* that P. Similarly, if the agent knew that it was reasonable to conjecture P, it would not be reasonable of him to conjecture that it is reasonable to conjecture that P. But, putting H for P, this is precisely what the abductive schema expressly rules out for our agent: He does not know that it is reasonable to conjecture that H. With that barrier to reducibility removed, we would seem to have it that $R^c(R^c(\mathrm{H}))$ does indeed reduce to

R^c(H), and further that reducibility preserves knowledge. That is, since the agent knows that $R^c(R^c(\mathrm{H}))$ then thanks to the reduction he also knows that R^c(H), which is precisely what our argument claims.

This is useful to know. It lends further emphasis to the point above that how an agent's cognitive target is formulated has a bearing on the logical character of how it is responded to. What the present example tells us is that if you set your cognitive bar very low, it is not ruled out that an abductive response will close the gap between what is inferred and what the target calls for. Although the example removes the ignorance-condition from the status of logically necessary condition on abduction, it does nothing to discourage the idea that, even so, it remains a *generically* necessary condition on abduction; that is to say, that it is typical of abduction that whatever the level of its cognitive accomplishment, it doesn't in general rise to the cognitive level of what the originating target calls for.

In the forgoing pages I have been concerned with a large class of actual cases in which the ignorance-preservation condition is satisfied at least *as a matter of fact*. Of course, my further (and now revised) claim is that if we are to be at all faithful to Peirce's originating insights, abduction is typically and dominantly ignorance-preserving, thus effecting a quasi-nomological prototypical link between the practice and the trait. But for present purposes not even that is required.

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