LEGAL PROBABILISM

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NOTES ON SPOTTSWOOD'S 'UNRAVELING THE CONJUNCTION PARADOX'

1. The conjunction paradox arises if we concurrently maintain two principles:

   Probability Threshold A claim is established by the governing standard of proof (say preponderance of the evidence) if the probability of the claim, on the basis of the evidence presented, meets a threshold (say $> 50\%$ in civil litigation).

   Conjunctive Proof A composite claim such as the conjunction $A \wedge B$ is established by the governing standard of proof if each element of the claim, namely elements A and B, is established by the governing standard of proof.

2. How does the paradox arise? If the plaintiff establishes that A is true by, say, 70% probability and also that B is true by 70% probability, then the plaintiff will have met their burden of proof for A and also their burden of proof for B by Probability Threshold, at least assuming the threshold is $> 50\%$. Thus, by Conjunctive Proof, the plaintiff will have met their burden of proof for $A \wedge B$. On the other hand, $A \wedge B$ will often be below 50%, especially if A and B are independent, since $P(A \wedge B) = P(A) \times P(B) = 49\%$. Thus, by Probability Threshold, the plaintiff will *not* have met their burden of proof for $A \wedge B$. Contradiction.

CLARIFYING THE PARADOX (SEC. 1)

3. Plenty of real legal cases require that multiple elements be established:

   > "consider a private actions for securities fraud under SEC Rule 10b-5, which require plaintiffs to prove six elements: (1) a misrepresentation or omission, (2) scienter, (3) a connection between the statement and the purchase or sale of a security, (4) reliance, (5) economic loss, and (6) loss causation." (p. 265)

4. The greater the number of conjuncts, the lower the probability of their conjunction. If they ignore the accumulation of the risks of error in believing conjunctive claims, jurors will overestimate the strength of the plaintiff's case.

   > "probability theory dictates that jurors should be less willing to find a defendant liable or guilty, all other things being equal, in cases where the proof against the defendant requires more rather than fewer conjunctions." (p. 266)

5. A lot hinges though on whether the elements of a composite claim are independent. The elements will hardly ever be completely independent or completely dependent. But this does not mean the paradox is irrelevant.

6. More realistically, there will be cases in which the different elements are closely connected and reinforcing and cases in which they are more squarely independent or nearly so:

> "when the facts that must be proven to sustain a claim are the kind that ordinarily go together—when they follow the pattern of an everyday story, in other words—there will be less likelihood that a failure to account for conjunctive likelihood will result in an error, than would be otherwise be the case. The reverse is also true. As either the elements of a claim or the facts needed to prove it involve events that rarely go together, a failure to account for this would be especially likely to lead to an outcome error." (p. 266)

7. So should we do away with Conjunctive Proof and hold on to Probability Threshold? This move will conflict with the law or parts of it. Jury instruction follow in some instances Conjunctive Proof. Some areas of law endorse it quite explicitly:

> "there is one additional area in which the paradox plays an unusually explicit role: the use of special verdict forms under Federal Rule of Civil Procedure 49(a) or similar rules at the state level. That device permits a judge to ask a jury to answer factual questions regarding separable elements of the case, and then to enter a judgment in favor of the plaintiff if the jury has entered pro-plaintiff findings on each separate question." (p. 267)

8. There is also empirical evidence that people's probability judgments deviate from the recommendations of probability theory. The famous 'Linda problem' suggests that people judge the statement 'Linda is a bank teller and she is active in the feminist movement' as more likely than 'Linda is a bank teller', even though the latter statement should be at least, if not more, likely than the former.

INFERENCE TO THE BEST EXPLANATION AND THE CONJUNCTION PARADOX (SEC. 3)

9. Instead of giving up Conjunctive Proof, what about giving up Probability Threshold? A prominent account of the standard of proof that is non-probabilistic is Allen and Pardo's theory of relative plausibility. This theory relies on inference to the best explanation. Is this theory immune to the conjunction paradox? It is not, especially if we give the theory a normative interpretation.

10. An explanation is better than another in light of criteria such as internal consistency, consistency with background beliefs and simplicity. These criteria align with what probability theory would say. Explanations that are simpler and more internally consistent tend also to be more likely. On the other hand, conjunctive explanations will be less simple and less likely. And conjunctive explanations that contain parts that do not go naturally together—probabilistically, the parts are nearly independent—will also be less likely. So inference to the best explanation tends to agree, normatively speaking, with probability theory. And if it does, the conjunction paradox persists.

> "the best interpretation of explanationism as a *normative* theory seems to demand that jurors make such adjustments, as conjunctive stories will generally be less simple than unitary or disjunctive ones. Moreover, to the extent that they incorporate story elements that are relatively surprising or coincidental in combination with one another, they will also suffer defects in their internal consistency and their consistency with a fact-finder's background beliefs. (p. 282)

11. (Of course, explanations should also be judged in light of how much evidence they can account for (coverage). In that sense, conjunctive explanations will be better because they can accommodate more pieces of evidence.)

NOVEL MATHEMATICAL ACCOUNTS (SEC. 4)

12. Nesson, Cheng and Claremont have provided alternative mathematical formulations of the standard of proof, roughly following the Least Likely Element Rule (LLER). So, basically, treat the probability of the conjunction of different elements, $A, B, C, \ldots$ as the probability of the least likely element and decide. The standard of proof is met if the probability of the least likely element meets the probability threshold.

13. Suppose each element is proven by 60% probability, and the two elements have some dependency. So the conjunction has a probability between 60% (full dependence) and 36% (independence). The LLER would recommend finding against defendant in a civil case since both claims are proven above 50% probability. By contrast, Probability Threshold would recommend the opposite, since the probability of the conjunction could be as low as 36%.

14. So which rule of decision should we follow?

> "Such a decision [=the decision based on Probability Threshold] ...seems quite justifiable when we reflect on the fact that for each element, if we go with our 0.6 probability in the plaintiff's favor we will be wrong two times for every three times we are right. Moreover, based on fact that our plaintiff must prove their case conjunctively while our defendant can win disjunctively, an error on either element would mean that the defendant was really in the right, and did not legally owe the plaintiff what it demands. Epistemic humility counsels us to remember that even though we can make a narrow call as to who is right on each element, we may be wrong, and such risks are amplified as cases accumulate conjunctive arguments." (p. 287)

15. Could the recommendation of Probability Threshold make it too easy for defendants to get away? That may be true, but also keep in mind that:

> "most lawsuits are not brought by 'small-time' plaintiffs against 'big-time' corporate defendants. In fact, a recent survey of state court litigation found that contract claims wildly outnumbered tort claims by a factor of about 9:1, and that the largest subcategories of contract claims were debt collection cases (37% of all contract claims), landlord-tenant cases (29%), and foreclosure cases (17%), none of which fit the 'little sues big' paradigm. (p. 288)

> "the complaints that the ordinary rules of probability theory are unfair to plaintiffs or would increase the error rate of the system seem ill-founded. The strict product rule would only operate in a rare set of cases, and when it did have its effect a fair-minded observer would be hard-pressed to call the result unfair, at least if they took into account the real likelihood of human error as uncertain decisions accumulate together. " (p. 288)

CLEARER JURY INSTRUCTIONS (SEC. 5 AND APPENDIX)

16. So, in the end, we should abandon Conjunctive Proof but keep Probability Threshold. Jury instructions should be framed accordingly. Consider for example this instruction, warning the jurors that conjunctions may give rise to an accumulation of the risk of error:

> "If you think that the plaintiff has a better explanation of each individual element, you should then consider whether, given the proof the plaintiff has offered, the combination of all the elements being true at the same time is less likely than the defendant being right with respect to just one of them."
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> "You should consider this possibility with particular care if the case seems 'close' to you, if the plaintiff's story is complicated, or if the plaintiff's story seems to involve unusual coincidences or combinations of events. This is meant to account for the fact that if you make many close calls in the same direction, at some point you are likely to be wrong about at least one of those calls." (p. 293)

17. Whether these instructions will be effective is another matter. Experiments are needed to test how jurors will react to some instructions rather than others.