

Statistics and Probability in Criminal Trials*The Good, the Bad, and the Ugly*

Is a high probability of guilt, in and of itself, enough to convict? There are *prima facie* arguments for both a positive and a negative answer. Since the certainty of guilt is unattainable, one can argue that a high probability should be enough to convict, for if it is not, conviction itself would be unattainable. From this perspective, the correct answer to our initial question would seem to be Yes. On the other hand, a well-known hypothetical scenario suggests that the correct answer is No. Imagine a prison yard with one hundred prisoners and only one prison guard. One day, ninety-nine prisoners collectively murder the guard. After the crime, one prisoner is picked at random and tried. His probability of guilt is very high—i.e. it is 0.99 because the participation rate in the collective murder is 99:100—but it seems unacceptable to convict him on mere high probability.

I maintain that the correct answer is No. I argue that the prosecutor's burden of proof does not only consist in establishing the high probability of the defendant's guilt; it also consists in (1) establishing guilt with a *resiliently* high probability, and in (2) offering a *reasonably specific and detailed* narrative of the crime. In the prison yard scenario, these conditions are not met. Even though the prisoner's probability of guilt is high, it is not resiliently high because new, and possibly exculpating, evidence could lower it dramatically. Second, in the prison yard scenario we are not offered any well-specified narrative of the crime—e.g. we are not told which role the prisoner on trial played in the killing of the guard. So the lack of resiliency and the lack of narrative specificity give grounds for our intuition that a conviction based on mere high probability is not acceptable.

My account has applications to current debates in both epistemology and legal scholarship. Many epistemologists hold that the high probability of a proposition, in and of itself, does not give us knowledge of that proposition. I agree. To make progress here, I suggest that we consider a notion related to, but different from, knowledge—i.e. the dual notion of *reaching a justified judgment* and of *justifiably withholding judgment*. I draw attention to two features of reaching/withholding judgment which bear a close relation to condition (1) above, i.e. the resiliency condition. The first feature is the *stability* of one's judgment against future, and possibly contradictory, evidence; the second is the *burdensomeness* associated with withholding judgment. I argue that whenever our judgment about a proposition *p* won't be stable (given our current evidence), we should withhold judgment about *p* instead, so long as doing so is not unduly burdensome for us or for those affected by our withholding judgment.

As far as legal scholarship is concerned, my account can also help us clarify some pressing issues regarding the use of statistical evidence in criminal trials. We have seen a steady rise in the use of statistics in criminal cases, especially as a result of the discovery of DNA fingerprinting in the 1980s. Relatedly, the phenomenon of "big data" has made it easier to find statistics for trial purposes. Against this background, a question naturally arises. Are statistics alone enough to convict? For one, we do feel uneasy about them: statistics seem to lack "specificity" because they place the defendant in a group with others, and we do not want to be convicted because of what others did. On the other hand, many are less uneasy in convicting on DNA evidence. The reason for this is that DNA evidence is considered more specific to the defendant, even though, in the end, its probative value rests on statistical estimates. This suggests that we should be careful with wholesale dismissals of statistical evidence in criminal trials. My position is that, in some cases, a conviction *may* justifiably rest on statistics alone, and in other cases, it *may not*. A deciding criterion, among others, is given by condition (2) above—i.e. the specificity of the narrative being offered by the prosecutor. I show that statistical evidence can be particularly problematic whenever it fails to support a well-specified narrative of the crime. This conclusion, while still leaving room for statistical

evidence in courts, refines the earlier worry that statistical evidence lacks specificity. The feature of specificity, however, should be understood as a feature of narratives, not of individual pieces of evidence. This is plausible. We cannot isolate pieces of evidence; we are better off considering the evidence more holistically.

My dissertation consists of nine chapters. Chapters 1 and 2—“Probabilists and Traditionalists” and “Sharpening Things up”—formulate the driving questions and reconstruct the dialectic between the legal probabilists and their opponents. Chapter 3—“A Debate that Began Forty Years Ago”—reviews the literature on probability and statistics in criminal trials which appeared in the last forty years. Chapter 4—“How Statistics Get Used in Criminal Trials”—details how different types of statistical evidence have been used in criminal trials. Chapter 5—“Bayes in the Courtroom”—offers an introduction to the mathematics and the philosophy of probability. It also gives a probabilistic, Bayesian analysis of the types of statistical evidence discussed in the preceding chapter, with a focus on DNA evidence. The next four chapters make the original contribution. Chapter 6—“The Burdens of Stable Judgment”—tackles the question of whether high probability alone suffices for a justified judgment. It answers this question by appealing to the notions of stability and burdensomeness. Chapter 7—“What is a Reasonable Doubt?”—situates this epistemological question in the context of criminal trials. In so doing, it offers an account of the criminal standard of proof in terms of resiliency and narrativity. Chapter 8—“When is DNA Evidence Enough to Convict?”—contrasts DNA evidence with traditional forms of evidence, such as eyewitness evidence and fingerprints; it also tackles the question of whether DNA evidence alone is enough to convict. Chapter 9—“Looking back”—makes some concluding remarks on the role of evidence, probability, and epistemic luck in criminal trials.