

Verdicts in criminal trials: justice approximated?

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- 1) Motivation 267 DNA-based exonerations demonstrate that innocent defendants are being convicted in criminal trials. Despite recognition of these errors and their wide-ranging implications, the criminal justice system of the USA (CJS) could benefit from further analysis. This requires a conceptual framework for examining the extent to which jury verdicts accurately correlate with actual guilt or innocence. Here we take a mathematical approach to exploring ways of thinking about and measuring this important component of CJS performance.
- 2) Research Questions Is there a relationship between convicting innocent defendants and exonerating the guilty? How do the frequencies of such undesirable outcomes and of desirable outcomes change with the rate of conviction? How can useful quantitative benchmarks for CJS decision making in criminal trials be defined? How could we detect "overconviction" or "underconviction" by the CJS in these trials?
- 3) Methodology We use Bayesian inference (a standard method in probability theory) expressing the quantitative relationships among probabilities, along with frequency distributions (bell curves), to show how outcomes depend on the overall proportion of defendants convicted at trial.
- 4) Results Overlapping strength-of-evidence distributions for actually guilty and actually innocent defendants immediately imply that some guilty defendants will be exonerated and some innocent defendants will be convicted. The mathematical analysis detects a benchmark proportion convicted p^* at which an incremental (tiny) shift trades identical proportions of guilty defendants exonerated for innocent defendants convicted. This trade-off benchmark can in principle be adjusted to any desired ratio of these outcomes, raising the question of what this desired ratio might be. Rough estimates of some key parameters suggest that the CJS may tend to over-convict relative to p^* .
- 5) Discussion Our framework and analysis provide a way of articulating the inherent trade-off between avoiding wrongful convictions and convicting guilty individuals. Our study motivates an attempt to quantify key parameters and to compare CJS functioning across states in the US. It raises the issue of how and whether adjustments should be made in the proportion convicted based on quantitative analysis. This study fits into the framework of decision making under uncertainty, though here "incorrect" decisions can be "wrong"--socially and morally unacceptable. Some sort of quality evaluation and control not now in place seems to be necessary.