Using Statistics to Fool Juries

Daniel C. Durham

Arizona State University

Using Statistics to Fool Juries

Every individual who serves as a juror brings personal beliefs, understandings, and prejudices into the courtroom which can impact how they reach a verdict. Concerning statistics, the manner in which the numbers are presented in court can often become a critical juncture in providing the jury with an overall impression of guilt or innocence (Schweitzer & Saks, 2012). Unfortunately, the statistics presented in court are often used out of context and on occasion are somewhat biased with the intent of supporting otherwise unsubstantiated assertions rather than reinforce the facts of a case (Pullinger, 2013). Accordingly, jurors must remain acutely aware of the relevance and validity of statistical evidence which is presented in court as well as the credentials of expert witnesses providing the data (Geis, 2012).

Coin Toss Thought Experiment

During the first viewing of the coin toss thought experiment presented by Donnelly (2007) I believed that option C was correct. Option C identified that on average the head-tail-head combination would take fewer tosses to occur than the head-tail-tail combination. My answer was based on the assumption that it was more improbable for the same side of the coin, in this case, tail-tail, to occur more frequently over the course of ten tosses. However, after reviewing the video a second time and studying the video transcript for the coin toss experiment, I better understood why the head-tail-head pattern would occur fewer times due to the overlapping of the head-tail-tail tosses. What surprised me about the actual answer was my belief that multiple flips of a coin would result in an equal head-tail distribution and corresponding failure to consider that the head-tail-head pattern would occur more frequently. In researching this issue, I was also intrigued to learn that some scientific statements of probability are based on the use of applicable mathematical models of probability (Shephard, 1978).

Hypothetical HIV Test

Given the stated accuracy of the hypothetical human immunodeficiency virus (HIV) test I was surprised to learn that the likelihood of actually having the disease was not 99 percent. The underlying reason for my incorrect assumption was associated with a failure to consider the rareness of the disease and random occurrence in the general population. Additionally, I did not consider the correlation between the rareness of the disease and the number of false positive tests in the overall population sample. This issue with false positive tests provides further emphasis on the importance of ensuring that statistical estimates include the necessary context to allow for a more accurate interpretation of the actual occurrence of a given event (Baker, 2011). Additionally, the probability of an individual contracting a given disease can vary depending upon how prevalent it is in the general population and whether the overall proportion of individuals who take a test have the disease (McClish, 2012).

Two Scenarios and Uncertainty

The apparent miscarriage of justice presented by Donnelly (2007) regarding the conviction of Sally Clark for murdering her two babies serves to reinforce the importance of the role and accuracy of statistical evidence in criminal investigations and prosecutions. It is imperative that everyone involved in the criminal justice process, including jurors, be capable of comprehending that the occurrence of certain events can very often affect the probability that another event will occur. Unfortunately, during the trial of Sally Clark, the statistical claims made by the expert witness were not clarified as being an assumption, and their testimony was never questioned when presented in court. However, in reality, two scenarios of uncertainty existed: the statistical probability associated with an assumption of independence; and the occurrence of a logical error.

In general, the assumption of independence is often readily accepted as being an accurate explanation of an event. In the trial of Sally Clark, the basic assumption was made that the odds of two infant cot deaths in the same family were the same as a single death. The problematic issue with assumptions of independence is the belief that an event or observation under one condition is not linked in any way to observations under other conditions. Given the unknown variables associated with any observation, proceeding on the belief that one event does not affect the outcome of another event increases the likelihood that statistical data may be inaccurate.

The basic idea of a logical error is somewhat akin to failing to see the entire situation clearly because you are looking too closely at the details. An individual can be said to have committed a logical error when they assume that a stated hypothesis is correct and fail to consider other potential causes or impacts upon their claim. In other words, the validity of a given interpretation is, at best, questionable when other variables which are potentially associated with a situation are not considered.

In the America criminal justice system, a hypothesis can typically be disproven with a single piece of evidence. Conversely, it takes an enormous amount of evidence and effort to prove that a hypothesis is correct. This is why prosecutors and defense attorneys often focus upon disproving or rejecting the generally accepted position rather than attempting to prove the alternative. The problem for a defendant arises when a prosecutor or witness makes a claim, and the jury does not understand the issue or fails to consider the overall context or accuracy of the statement. This becomes even more problematic for the defendant with their attorney does not object or otherwise attempt to disprove the stated hypothesis. The acceptance of a statistical or other claims without question very often results in a jury rejecting the presumption of innocence and finding a defendant guilty regardless of the preponderance of the evidence.

References

Baker, S. G. (2011). Modelling the cumulative risk of a false-positive screening test. *Statistical Methods in Medical Research*, *20*(3), 291-293.

Donnelly, P. (2007, January 12). Peter Donnelly: How juries are fooled by statistics | Transcript | TED [Video file]. Retrieved from http://www.ted.com/talks/peter_ donnelly_shows_how_stats_fool_juries/transcript

Geis, G. (2012). Newspapers, criminologists, and crime statistics. *Crime, Law and Social Change*, *58*(2), 131-138.

Izil, T. (2012, March 11). The power of simple words - Terin Izil [Video file]. Retrieved from http://www.youtube.com/watch?v=Dz8E8UOBFJQ

McClish, D. K. (2012). Evaluation of the accuracy of medical tests in a region around the optimal point. *Academic Radiology*, *19*(12), 1484-1490.

Pullinger, J. (2013). Statistics making an impact. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *176*(4), 819-840.

Schweitzer, N., & Saks, M. (2012). Jurors and scientific causation: What don't they know, and what can be done about it. *Jurimetrics: The Journal of Law, Science & Technology*, *53*(4), 433.

Shephard, A. H. (1978). Toss of a coin: Probability and games of chance: Mathematical models of physical phenomena. *Canadian Psychological Review*, *19*(2), 105-115.