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How to Bias a Jury

A Statistical Investigation of Peremptory Challenge

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1 Introduction

The acquittal of Gerald Stanley for the murder of Colten Boushie in Canada has led to renewed interest in the legal process used in criminal trials in that country. This interest is particularly focused on the procedure of peremptory challenge used in jury construction, which allows the defense and prosecution to reject potential jurors without providing a reason. While a great deal of discussion has been devoted to the subject, very little of that has focused on mathematically analyzing the problem of adversarial jury selection, this project aims to quantify the effect of peremptory challenge on jury selection.

2 Legal and mathematical background

There is evidence that the practice of peremptory challenge has been practiced in tribunal legal systems since at least Roman times[1]. Currently, it exists in some form in much of the English speaking world, though it was removed in the United Kingdom in 1988[2]. Its removal was due to the deviation from the principle of random selection that it represented. In Canada, the Criminal Code dictates an equal number of peremptory challenges for the prosecution and defense, determined by the severity of the most serious charge placed against the defendant[3]. In the case of a murder trial, the number of peremptory challenges allowed is 20.

Suppose the bias of a juror, p_i, is taken to be the probability of a juror ruling a defendant guilty before seeing any evidence. If we further assume a binary population with two biased groups of sizes N_j and with homogeneous biases $p_j, \quad j = 1,2$. Then the bias of a jury of size n is given by

$$J = \sum_{j=1}^{2} \frac{n_j}{n} p_j$$

With the condition of an unbiased jury corresponding to $J = 0.5$. Under simple random sampling we would expect the bias to be

$$E[J] = \sum_{j=1}^{2} \frac{E[n_j]}{n} p_j = \sum_{j=1}^{2} \frac{nN_j}{nN} p_j = \frac{1}{N} \sum_{j=1}^{2} N_j p_j$$

Now assume that the prosecution and defense have the same number of peremptory challenges, n_c. Suppose that they are adversarial, that is that they both select individuals in an attempt to bias the case in their favour as much as possible. Let the prosecution have a probability of p_p of identifying those biased in favour of prosecuting, and r_p the probability of rejecting a correctly identified individual. Let p_d and r_d be defined analogously for the defense. Then the probabilities of rejection are

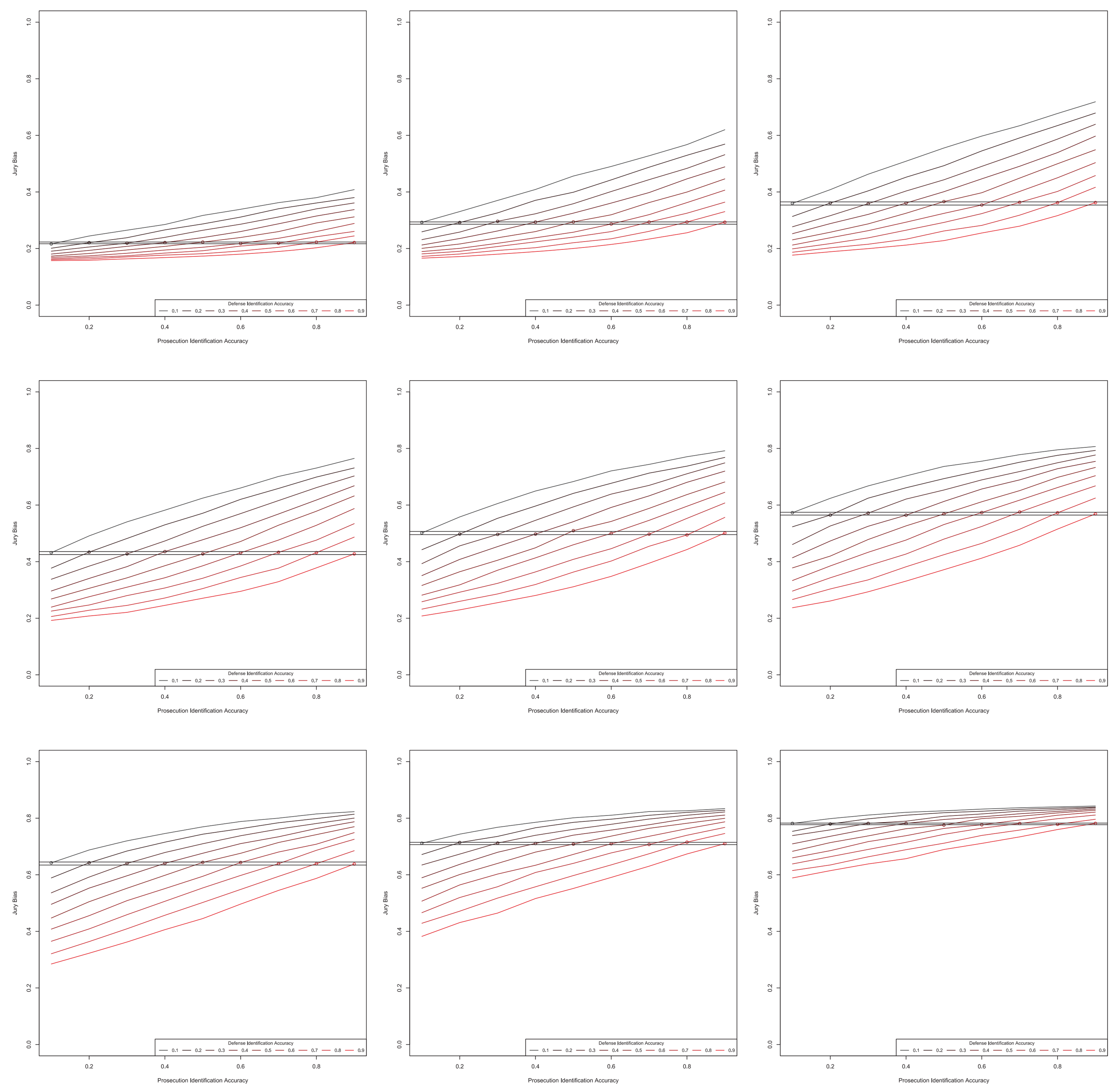
$$R_1 = p_d r_d + (1 - p_p) r_p - p_d r_d (1 - p_p) r_p$$
$$R_2 = p_p r_p + (1 - p_d) r_d - p_p r_p (1 - p_d) r_d$$

3 Simulating peremptory challenge

The above process of sampling and rejection was simulated in R for a series of settings of $\frac{N_1}{N} = q$, p_p, and p_d. r_d and r_p were held constant at 0.8. The jury size was set to the typical Canadian jury size of 12. All increments of 0.1 between 0.1 and 0.9 inclusively for all three variables were simulated. For each setting, 1000 simulated juries were created. The mean bias results are displayed in a series of graphs, with color indicating the ability of the defense to identify the jurors, and the position on the x axis indicating the ability of the prosecution to do the same. Black lines at the simple random sample confidence interval are displayed.

4 Results and discussion

Unsurprisingly, the process of peremptory challenge has a great effect on the final bias present in the jury. Most significantly, the resulting bias depends heavily on the probabilities of rejection for the different binary groups. The greatest discrepancies occur when the perceptive abilities of the defense and prosecution lawyers are most different. This suggests that peremptory challenge, as a system, creates a bias towards lawyers which are either more willing to reject or are more perceptive, allowing such lawyers to create juries which are neither fair nor representative. This suggests that the practice of peremptory challenge can easily magnify inequalities present in the legal counsel of the case.



5 Conclusion

This simulation has indicated that peremptory challenges:

- Create the opportunity for significant deviance from simple random sampling, allowing for unrepresentative juries to be formed
- Magnify differences in experience or principle which are present in the legal counsel of prosecution and defense
- Can easily lead to the creation of juries which are neither unbiased nor representative of the population being sampled

And suggests that they may indeed be a detrimental force in modern legal jurisprudence.

6 References

1. Montz, Vivien Toomey; Montz, Craig Lee. *The Peremptory Challenge: Should it Still Exist? An Examination of Federal and Florida Law. 54,* University of Miami Law School Institutional Repository 451 (2000)
2. UK Attorney General's Office. *Right of stand by guidelines* (https://www.gov.uk/guidance/jury-vetting-right-of-stand-by-guidelines--2#the-exercise-by-the-crown-of-its-right-of-stand-by-update-2012)
3. Criminal Code of Canada (http://laws-lois.justice.gc.ca/eng/acts/C-46/section-634-20111024.html)