



# Re-Shaping the Police Landscape: The Glacier of Forecasting



*By*  
**Lawrence Sherman**  
***Cambridge University***  
5<sup>th</sup> EBP Conference  
July, 2012



# 2011 Landscape Changes: Sudden and Gradual

## Earthquakes

Record Number:  
202 = 6+ Richter

- Japan
- New Zealand
- Myanmar (Burma)
- Turkey
- India-Nepal

## Glaciers Melting

(faster than expected)

- Greenland
- Himalayas
- Antarctica
- Andes
- Patagonia

# Policing Landscape Changes: Sudden v. Gradual

## Earthquakes

Police

killings → Arab Spring

Elected Police

Commissioners—UK

Budget Cuts—UK, US

## Glaciers Melting?

Slow, steady increase in

***Better Evidence:***

1. Forecasting

2. Focusing

3. Follow-Through

# Police Glaciers

- Growth of Police Knowledge, Research
- Cambridge Police Executive Programme
- Society for Evidence-Based Policing
- More experiments in UK than ever before

# Campbell Collaboration

- [www.campbellcollaboration.org](http://www.campbellcollaboration.org)
- Crime and Justice Coordinating Group
- 29 Completed systematic reviews
- Hosted by Norway
- Swiss and Israeli co-chairs
- New Campbell Centre in China?
- Global basis for peer-reviewed evidence

# 3 Kinds of Evidence

1. Prediction: risk and harm levels
2. Prevention: Cost-effectiveness evidence
3. Punishment: Managing resources

# Predicting Serious Harm— *not just minor crime*

- From arrest to parole release
- Who is dangerous, who is not
- Restrain loss of liberty for the worst
- Use restoration, rehabilitation for most

# 3 Ways to Predict Behaviour

1. Clinical (untested) assessments
2. Checklists validated by testing
3. Data mining validated by testing



# Testing Forecasts: What Actually Happens?

	Actually Happens	Actually does <b>NOT</b> Happen
Predicted to Happen	<b>1. True Positive</b>	<b>2. False Positive</b>
Predicted NOT To Happen	<b>3. False Negative</b>	<b>4. True Negative</b>

# From Clinical to Data Mining

## **Predicting Domestic Violence**

Cambridge MSt Thesis

Tested Predictions

All murder, attempted cases = false negatives

Predictions missed

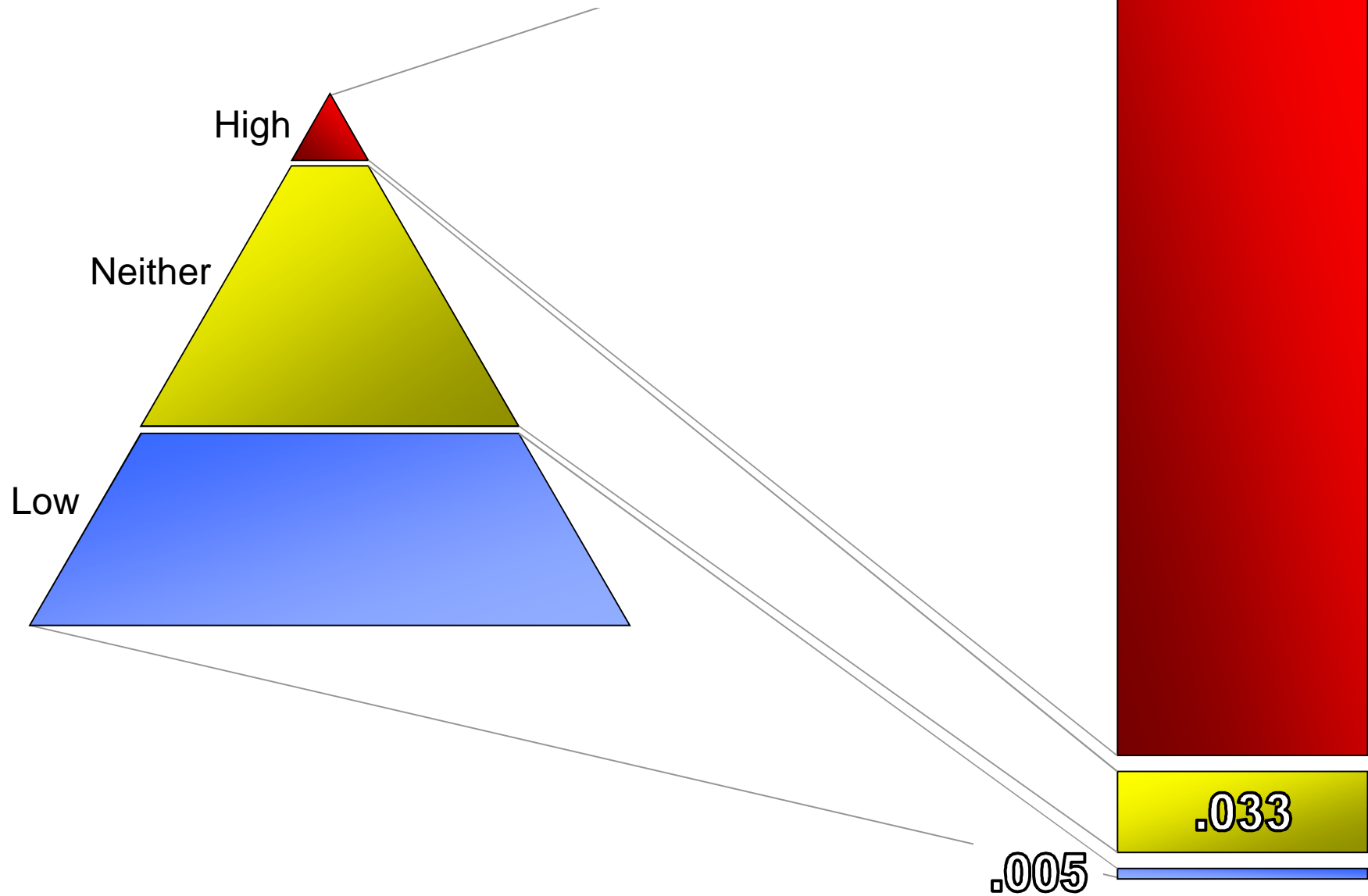
**Chief Sara Thornton,  
Thames Valley**



# Forecasting Murder

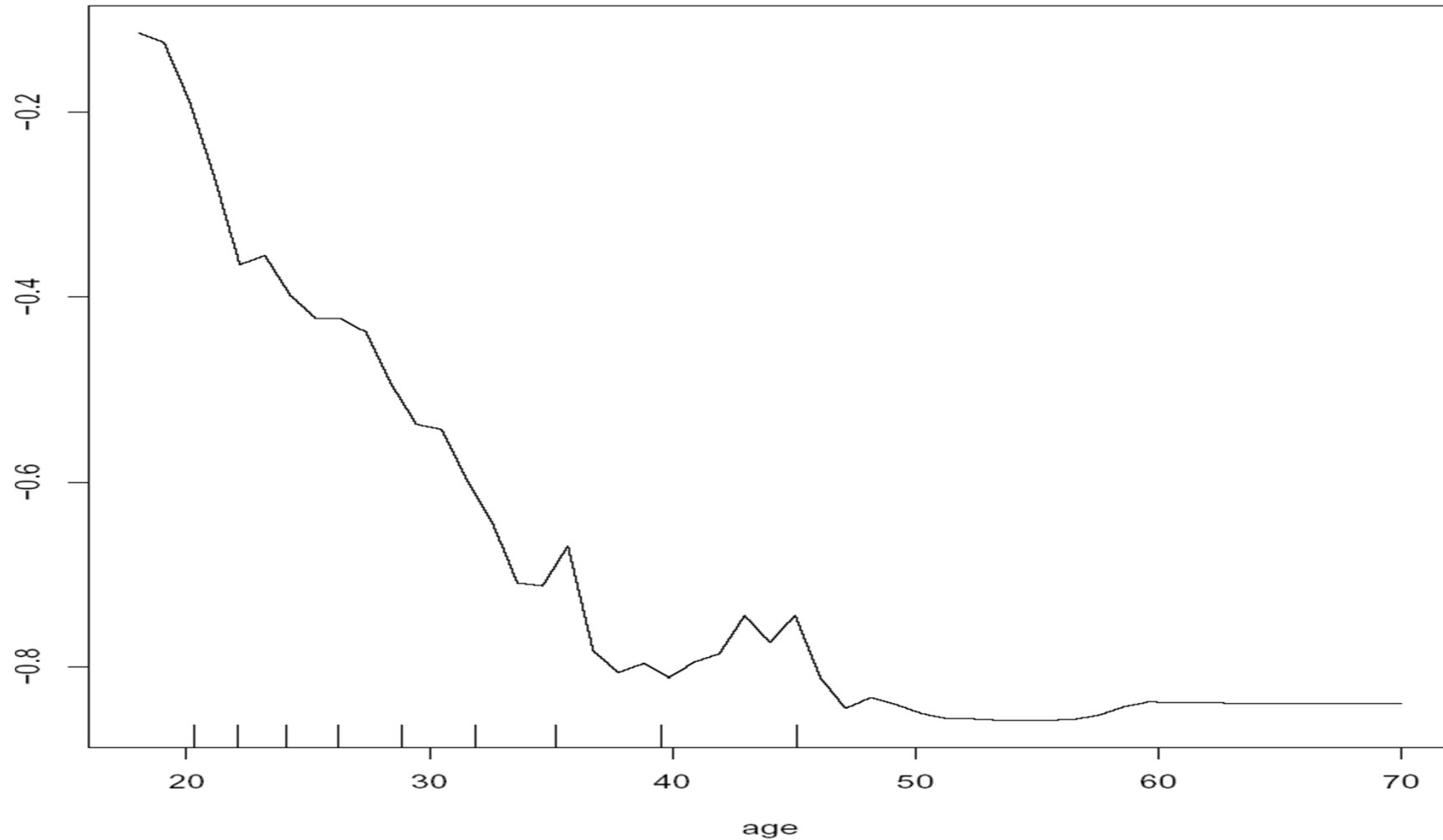
- JOURNAL OF THE ROYAL STATISTICAL SOCIETY
- Berk, Sherman, et al, 2009
- Philadelphia Probation Cases
- 300-400 murders per year
- 1.5 million population
- Rate = 14 X Scotland's

# Average Charges for MURDER or Attempted Murder Within Two Years of Probation Start

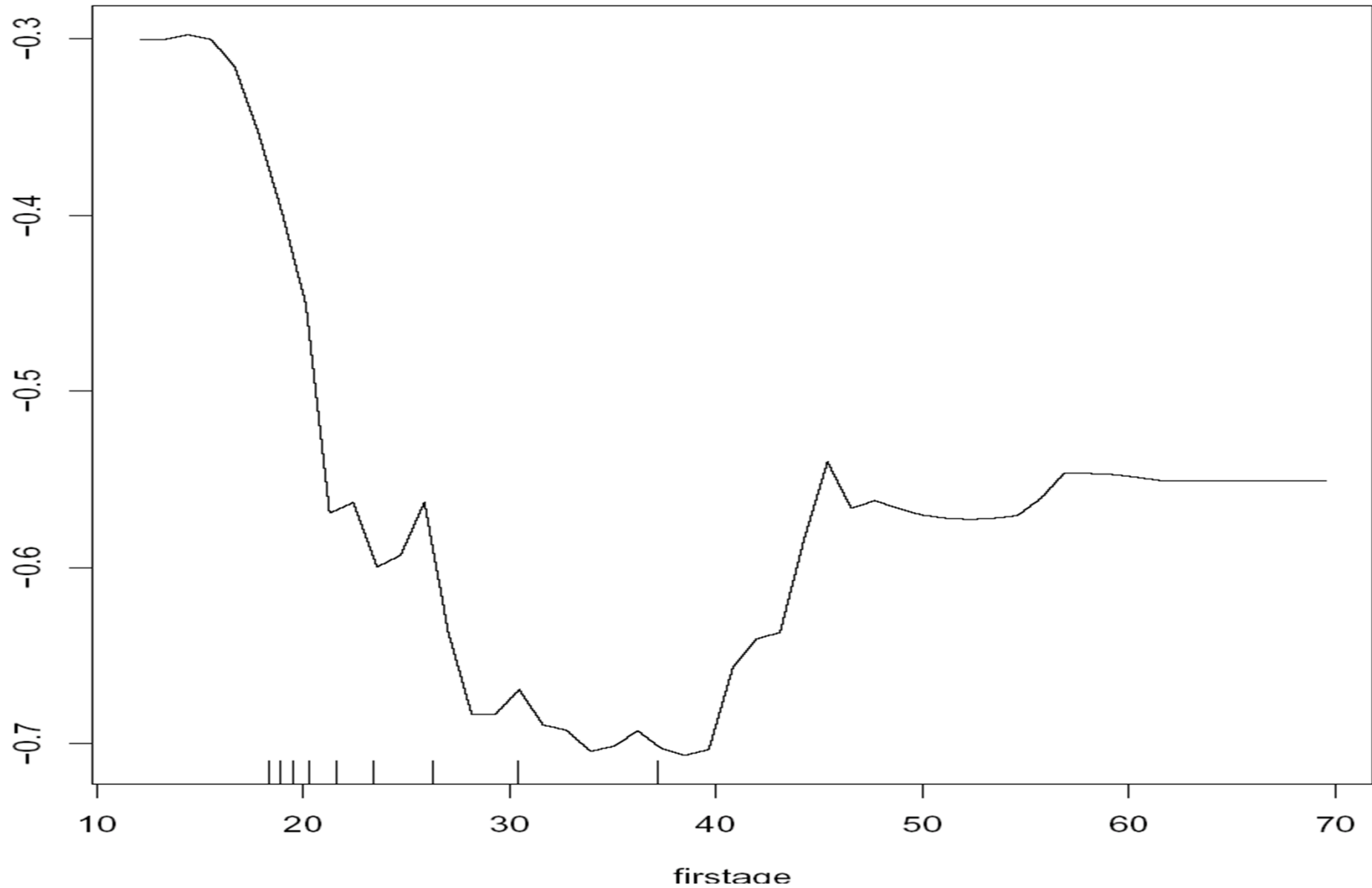


# Risk of Murder by Age at Time of Crime (Phila)

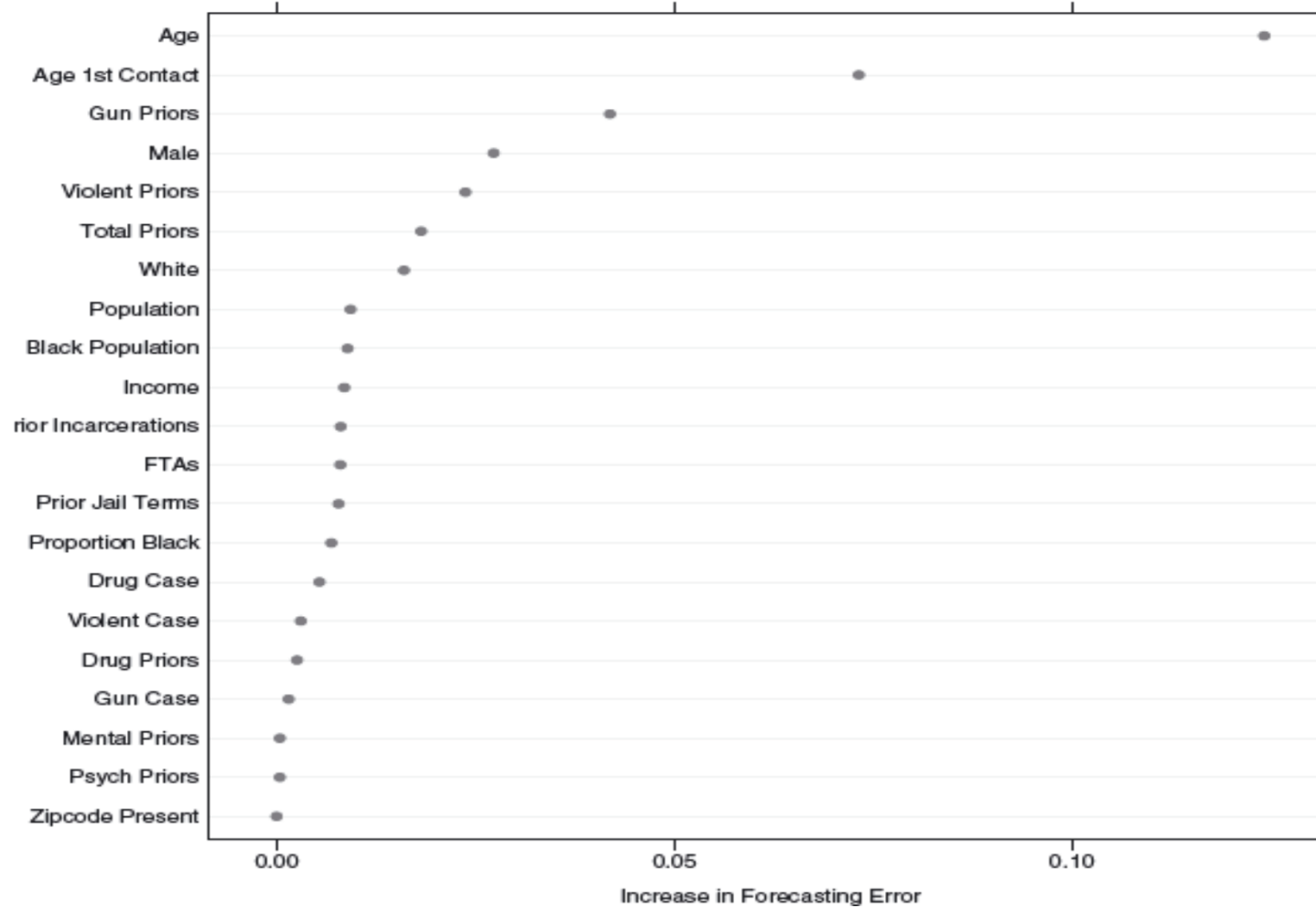
Partial Dependence on age



# Risk of Future Murder By Age of First Adult Disposition



# Value of Each Murder Predictor



# How Does This Work?

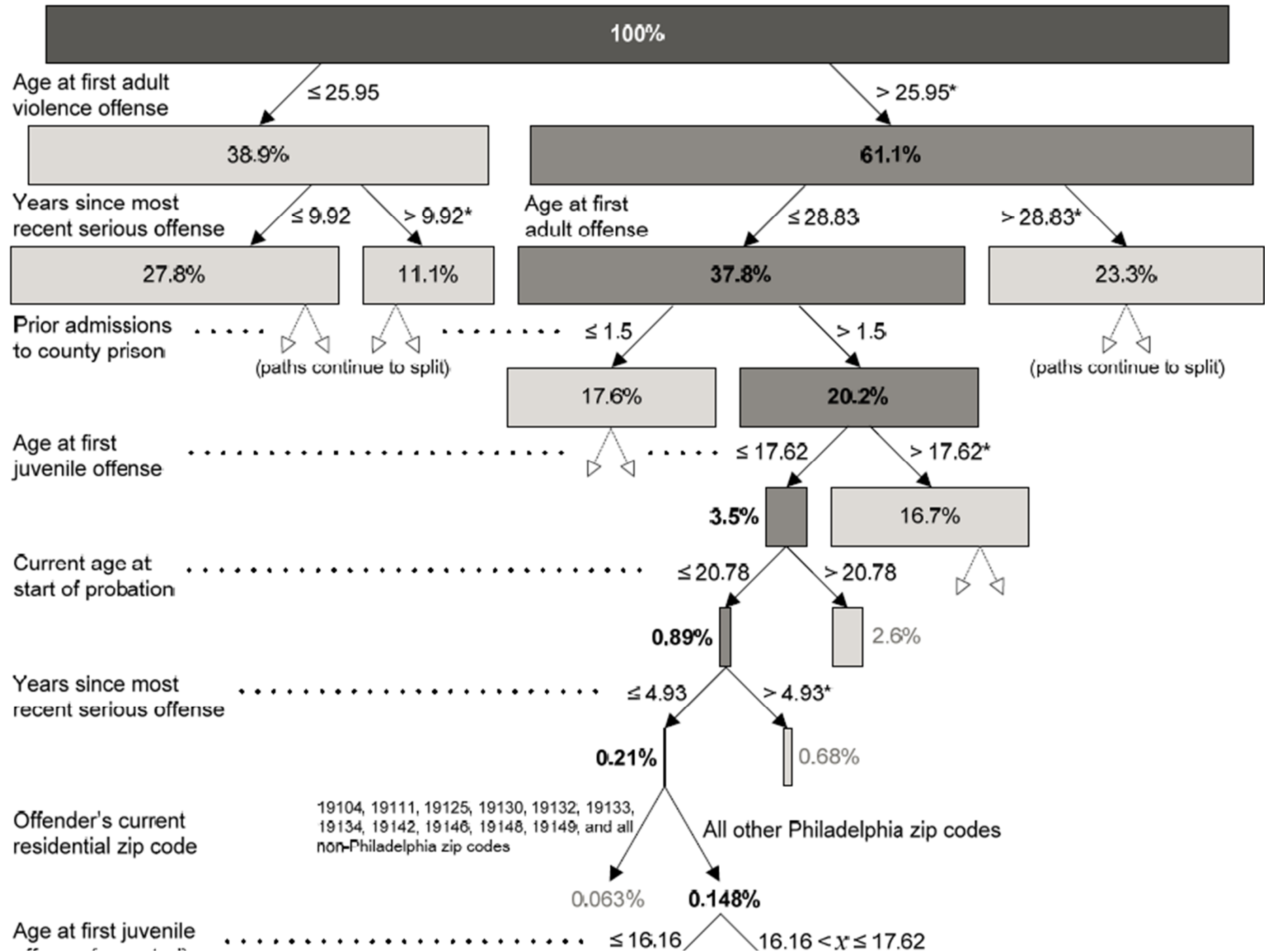
## Barnes and Hyatt, 2012

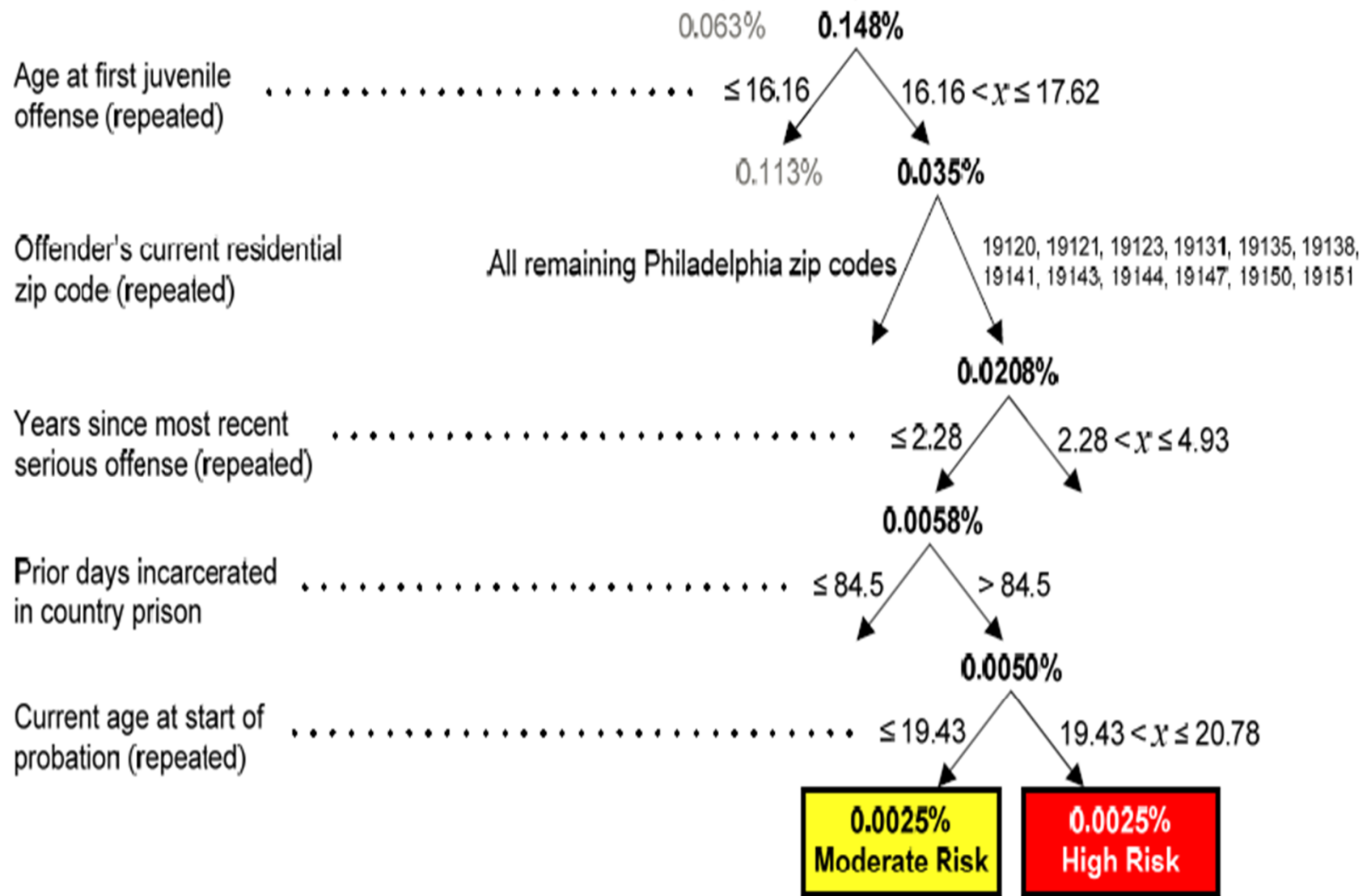
**Table 1: Simplified confusion matrix for the most recent Philadelphia forecasting model (i.e., Model C), based on construction sample**

	Actual High	Actual Non-High	Totals	Percent
Forecast High Risk	<b>A</b> 7,112	<b>B</b> 11,700	18,812	15.7%
Forecast Non-High	<b>C</b> 4,468	<b>D</b> 96,655	101,123	84.3%
Totals	11,580	108,355	119,935	
Percent	9.7%	90.3%		



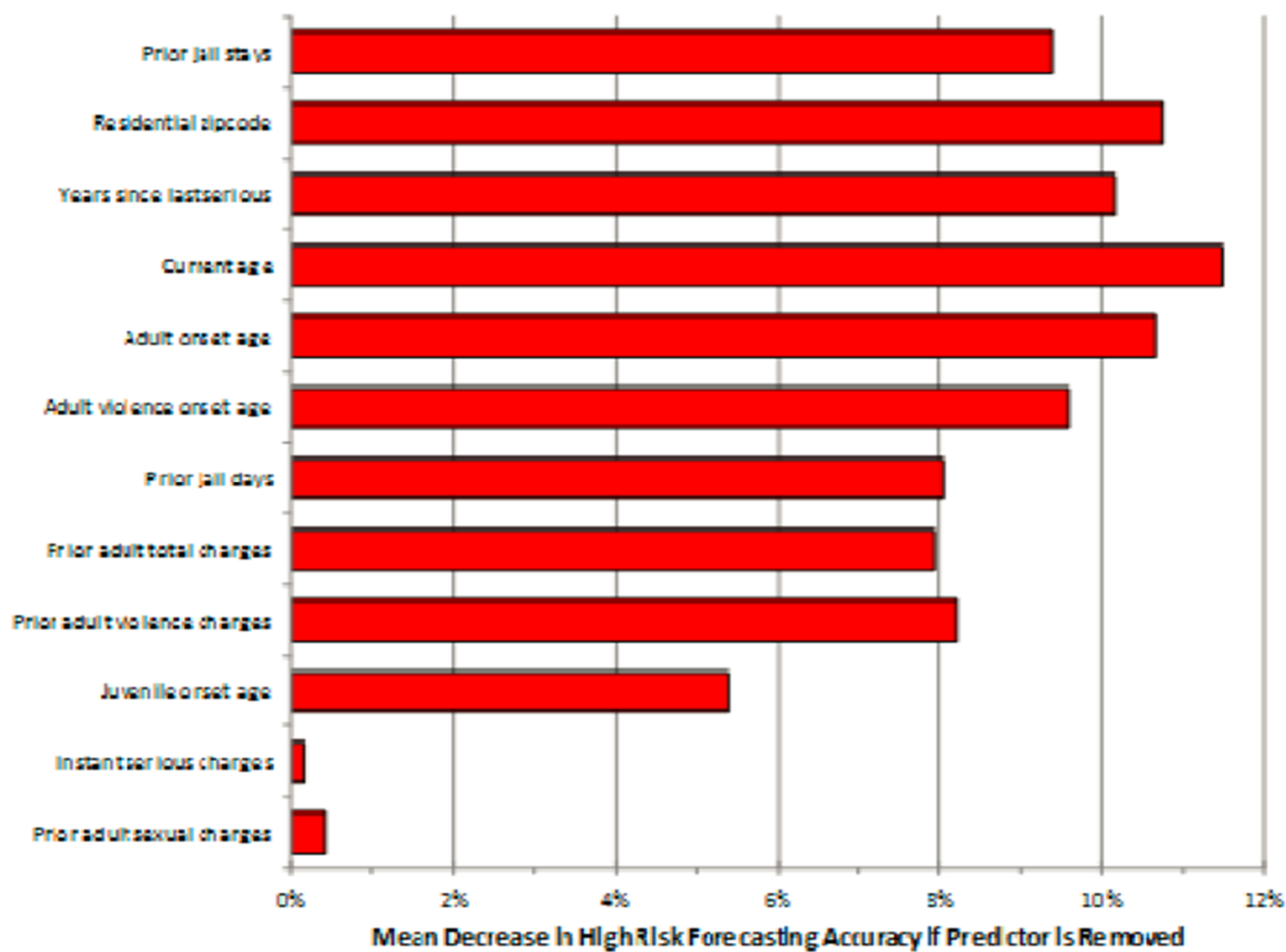
119,988 New Probation Case Starts, 2002-2007





\* including offenders with no prior record within the indicated offense category

**Figure 1: An example of one path through one tree in Philadelphia's latest random forest model**



# Announcing England & Wales

- 100,000 cases
- Convictions in year 2000
- Ten years of Followup
- Data Mining for Serious Offending
- Also for identifying low HARM cases
- Even with high risk of repeats (LOW harm)

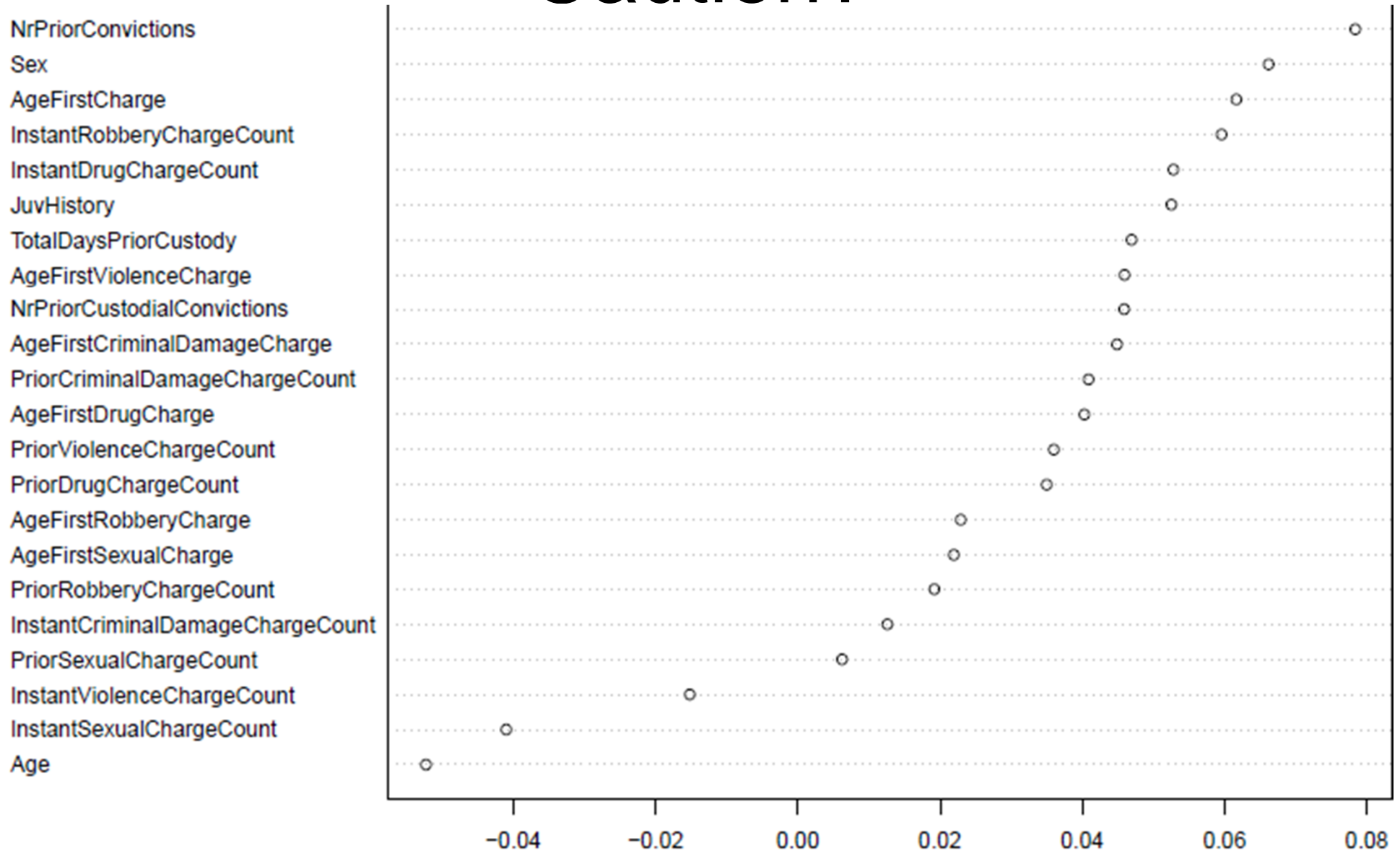
# 2-year Definitions: England and Wales

Low Harm = NO new crimes over 2 years

Medium Harm = No SERIOUS crimes 2 yrs

High Harm = Violence, Sex crime, robbery

# In England, Who Is Safe to Caution?



# Error of Low-Harm Forecast

39,598 forecast to be low harm

799 were actually high-harm = 2% off

98% Accurate

6719 were high or medium = 17%

83% accurate

# The Moral Issues

- False Positive—money, fairness
- False negative—danger, harm
- Half of all convictions police-finalized
- Prosecutions are very expensive



# Moral Balance

- Fair predictions—not INTUITION (bias)
- Give suspects fair chance at diversion
- Unbiased estimate of their dangerousness
- Reduce costs of prosecution for low-risk
- Save costs for high-harm
- Avoid cautioning high-harm; prosecute
- Overall, fewer prosecuted, or prison

# Police Landscape

- Emphasis on risk assessment accepted
- Clinical Risk assessment-- low accuracy
- Data Mining—high accuracy
- Now make it widely available
- Test police offender management strategies
- Legitimacy of best evidence for selection



Thank You



***Reshaping the Police  
Landscape with  
Forecasting***

Lawrence Sherman  
*Cambridge University*

