## Defining success in data science

## Brian Caffo, Jeff Leek, Roger Peng

@bcaffo

www.bcaffo.com

#### Success versus failure in data science

#### Positive results of a data science experiment:

- New knowledge is created
- Decisions are made based on the outcome of the data analysis
- Impact
- Knowledge that the data cannot inform the decision or answer the question is obtained

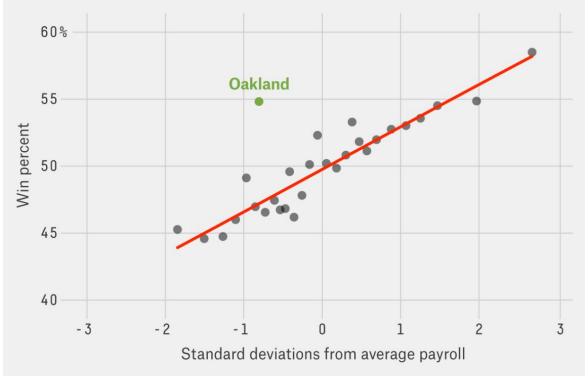
#### Negative results:

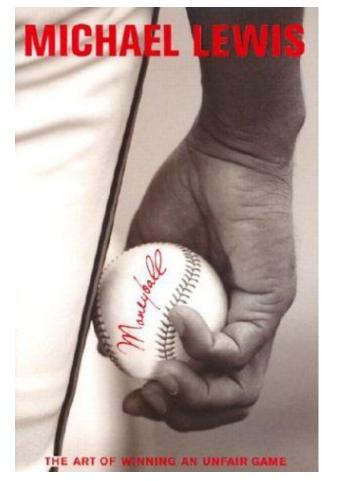
- Decisions are made against clear evidence
- Results are equivocal
  - Study is underpowered so that lack of clear results cannot be ascertained to be the data or lack of an effect
- Decision is not obvious
- Uncertainty prevents new knowledge from being created

Plug for Data Science in Real Life course

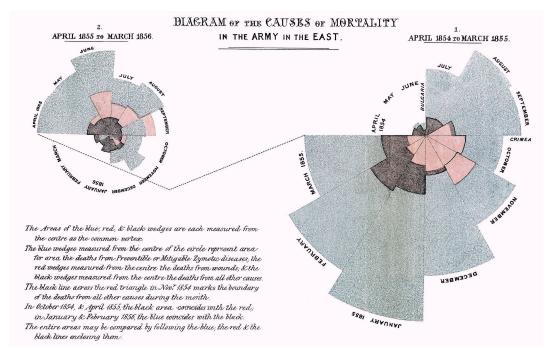
### Season Win Percent vs. Relative Payroll

Standard deviations above/below league average (15 team bins)





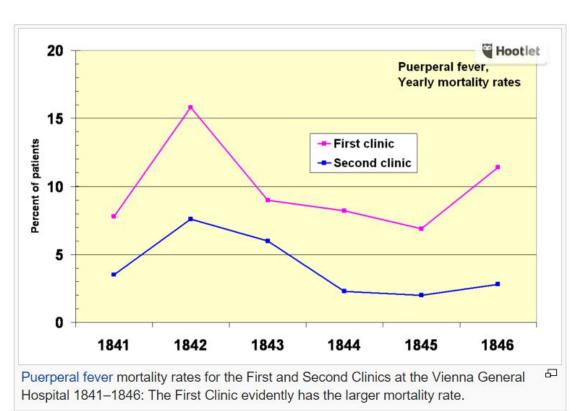
### Florence Nightingale

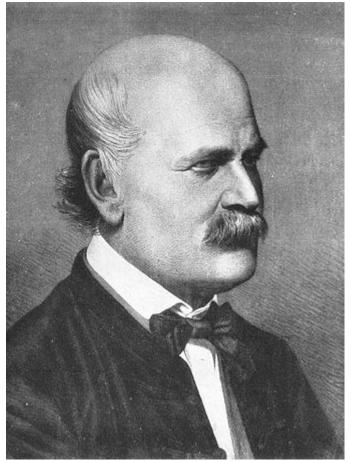




https://en.wikipedia.org/wiki/Florence\_Nightingale

### Ignoring the data





https://en.wikipedia.org/wiki/Ignaz Semmelweis



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# HOPE for HIV-infected patients awaiting life-saving organ transplants

Johns Hopkins research helps overturn decades-old U.S. ban on transplanting HIV-infected organs

# American Journal of Transplantation

### Estimating the Potential Pool of HIV-Infected Deceased Organ Donors in the United States

B. J. Boyarsky<sup>1</sup>, E. C. Hall<sup>1,2</sup>, A. L. Singer<sup>1</sup>, R. A. Montgomery<sup>1</sup>, K. A. Gebo<sup>3,4,5</sup> and D. L. Segev<sup>1,4,\*</sup>

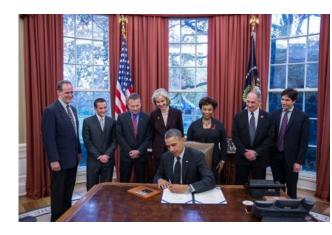
Article first published online: 28 MAR 2011 DOI: 10.1111/j.1600-6143.2011.03506.x

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American Journal of Transplantation

Volume 11, Issue 6, pages 1209–1217, June 2011





### The Right Match: A Short Documentary



Andrew Rozario

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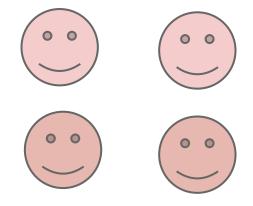




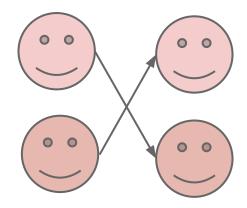




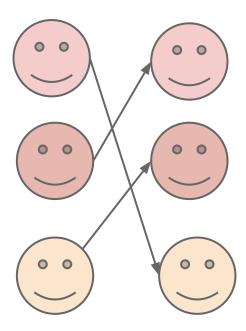
### Paired kidney donation



## Paired kidney donation



## Paired kidney donation



## Neuroimage

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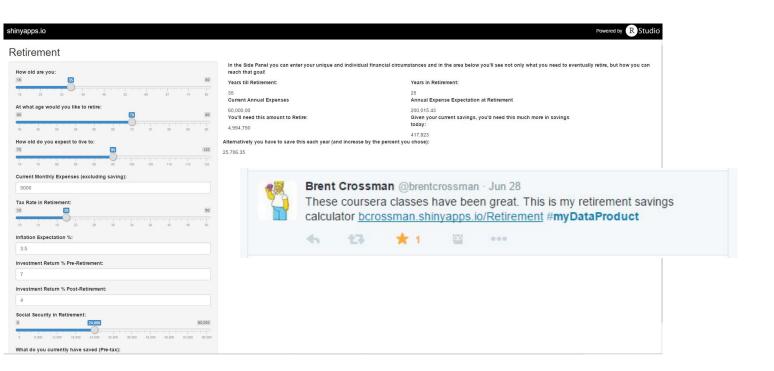
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Modeling the Hemodynamic Response Function in fMRI: Efficiency, Bias and Mismodeling

Martin A. Lindquist, Ji Meng Loh, [...], and Tor D. Wager



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