

# MIS 0855 Fall 2016 – Data Science *Day 2 – Data and Science*

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# Data and Science

- Why do you think this course is called “Data *Science*”?
- What is science?
  - A collection of *proven* knowledge that
  - *explains* what is happening and
  - *predicts* what will happen.



<http://escience.washington.edu/blog/uw-berkeley-nyu-collaborate-378m-data-science-initiative>

## Data, Information, and Knowledge

- For knowledge to be useful for informed decision making,
- it needs to be based on facts substantiated by data and information.
- So, how to build knowledge from data and information in a *scientific* manner?
- by devising formal hypotheses and testing them with data

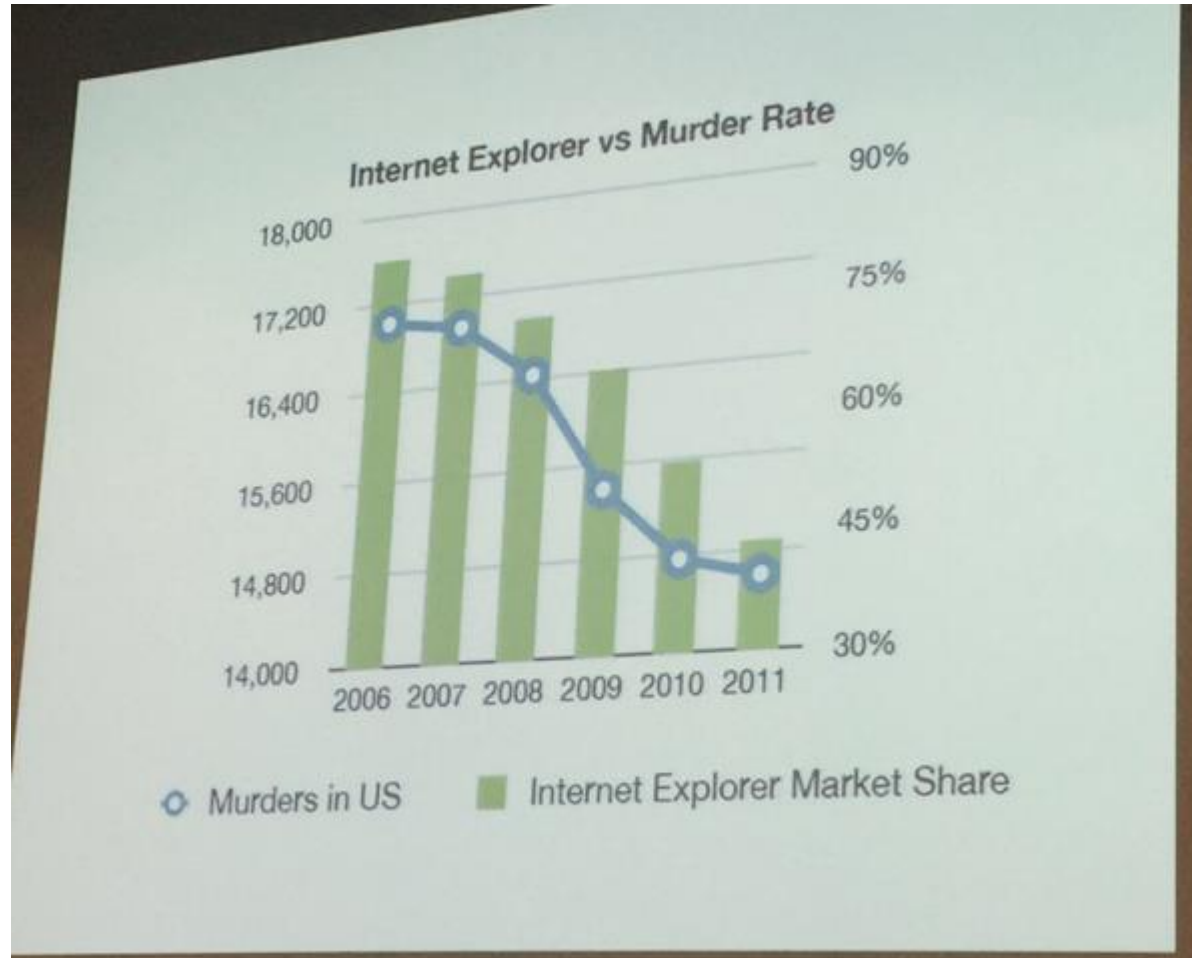
## A Hypothesis Should Be (1/2)

- *Testable* – be able to be measured by data
- *Falsifiable* – be able to be proven false by data
- *Grounded in a theory* – be able to be explained by sensible rationale(s)

## A Hypothesis Should Be (2/2)

	<b>Good</b>	<b>Bad</b>
<b>Testable</b>	iPhone users download more apps each month than Android users.	iPhone users are better than Android users.
<b>Falsifiable</b>	There are no vampires living in Louisiana.	There are vampires living in Louisiana.
<b>Grounded in a theory</b>	Students who attend class more often get better grades.	Students who are taller attend class more often.

# Any Theory or Rationale Behind This? (1/4)



## Any Theory or Rationale Behind This? (2/4)

Daily **Mail**  
.com

### **Fatherhood makes men FAT: New dads gain an average of 4lbs in the years after their first child is born**

- Men who became fathers saw an average 2.6 per cent rise in their BMI
- For a 6ft man, is equivalent of putting on 4.4lb (2kg) from birth of first child
- However men who had no children actually lost around 1.4lb in weight



[http://www.ozy.com/acumen/in-sickness-and-in-health-but-not-in-debt/38366?utm\\_source=A1&utm\\_medium=pp&utm\\_campaign=pp](http://www.ozy.com/acumen/in-sickness-and-in-health-but-not-in-debt/38366?utm_source=A1&utm_medium=pp&utm_campaign=pp)  
<https://www.pinterest.com/pin/218072806933122983/>

# Any Theory or Rationale Behind This? (3/4)

THE WALL STREET JOURNAL.

LAW BLOG

## Study Links Police Bodycams to Increase in Shooting Deaths



PHOTO: ASSOCIATED PRESS

<http://blogs.wsj.com/law/2016/08/12/study-links-police-bodycams-to-increase-in-shooting-deaths/>



## Any Theory or Rationale Behind This? (4/4)

- A Philadelphia neighborhood with more tree experiences fewer violent crimes per resident than other neighborhoods.
- When there are more bike lanes in a Philadelphia neighborhood, its violent crime rate is lower.

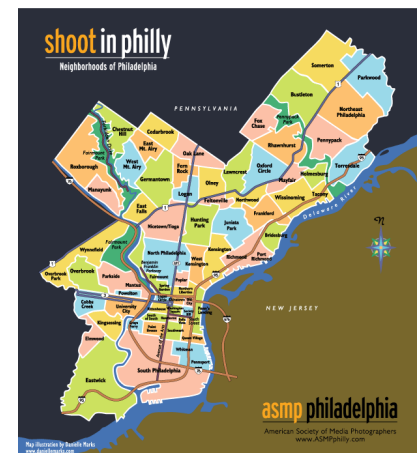


<https://www.fs.fed.us/pao/news/2013/stories/03/eco-smart-tree.shtml>

<http://nyc.streetsblog.org/2016/09/22/good-riddance-to-the-prospect-park-west-bike-lane-lawsuit/>

## Create your own hypotheses (1/3)

- “Neighborhood A in Philadelphia is more dangerous to live in than Neighborhood B.”
- How would you make this more testable?
- What is the theory/rationale behind your hypothesi(e)s?



<http://www.daniellemarks.com/Philly%20Neighborhoods.html>

## Create your own hypotheses (2/3)

- “Temple University is greater than Drexel University.”
- How would you make this more testable?
- What is the theory/rationale behind your hypothesi(e)s?



## Create your own hypotheses (3/3)

- “A hitter is more important than a slugger in baseball.”
- How would you make this more testable?
- What is the theory/rationale behind your hypothesi(e)s?



<http://www.slugger.com/en-us/who-is-swinging-slugger>  
<http://probabesballinsider.com/advantages-of-being-a-left-handed-hitter/>

# In-Class Exercise (Group) – What is a Theory or Rationale Behind This?

## In Sickness and in Health ... but Not in Debt



**Couples spend \$30,000 on average planning their Big Day ... but the more you spend, the shorter your marriage is.**

- *Guys, investing between \$2,000 and \$4,000 on an engagement ring means you're 1.3 times more likely to get divorced compared with the more frugal fellows who only allocate between \$500 and \$2,000.*
- *For both sexes, spending more than \$20,000 on the wedding ups the odds of divorce by 3.5 times compared with couples who keep it between \$5,000 and \$10,000.*