

DATA SCIENCE, STATISTICS, AND PUBLIC ADMINISTRATION

MPA 630: Data Science for Public Management

September 6, 2018

PLAN FOR TODAY

What is all this stuff?

Why should we care about data?

Class philosophy

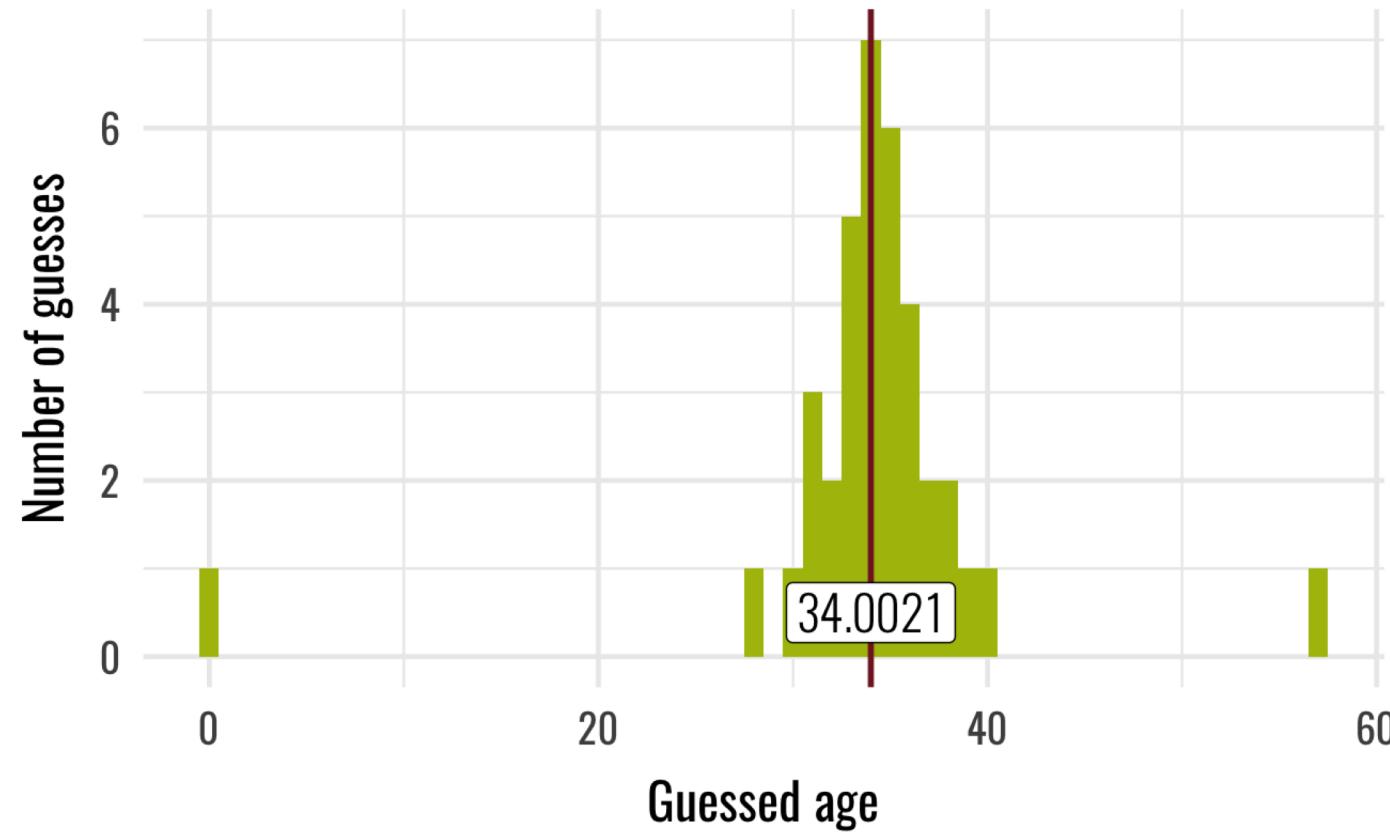
Class details

Birds and airports

WHAT IS
ALL THIS STUFF?

WISDOM OF THE CROWD

	guess
1	35.000
2	35.476
3	36.600
4	35.000
5	34.000
6	36.000
7	32.000
8	38.000
9	36.000
10	34.000
11	35.000
12	38.000
13	31.000



$$\frac{12,405}{365.25} = 33.963$$

WHO AM I?



§11 Now that we know the quiddity of truth through our knowledge of its definitions, let us learn the quality of truth, or how truth exists, and how it occurs and comes to be. We say that truth is a proposition with which the speaker's soul is tranquil,²⁶ knowing that what he said is indeed <as he said it> and that what he described is indeed as he described it. We also say that the truth is a proposition that the tongue articulates, whereby the soul informs another soul regarding something of which [the latter] is ignorant or of which it is content in knowing.²⁷ We also say that the truth is various modes that recount the form of beings and the existence of the intelligibles. We also say that truth is the ultimate verbal achievement of the soul // in its inquiry into whatever it did not know, as demonstrated in the following schema:

§12

*The quality of truth is one of four: *

The first: Truth is a proposition with which the speaker's soul is content, knowing that what he said is indeed as he said it and what he described is indeed how he described it. The second: Truth is a proposition that the tongue articulates, whereby the soul informs another soul regarding something of which it is ignorant or which it is content in knowing. The third: Truth recounts the form of beings and the existence of intelligibles. The fourth: Truth is the ultimate verbal achievement of the soul in its inquiry into whatever it did not know.

26. *Sukūn al-nafs*, meaning the state of “rest” that is a result of unwavering certainty (as opposed to the frantic searching “movement” that accompanies uncertainty), and hence, “tranquility” of the mind. Below (IM 2.11) al-Muqammas contrasts this content state with ignorance rather than with falsehood. For many instances, Abū ‘Ali al-Jubbā‘ī, *sukūn al-nafs* describes knowledge; see ‘Abd al-Jabbār, *Mughni*, 12:13. Al-Muqammas’s use of the antiquity of the term, and there is, therefore, no *al-Jabbār* of forcing it on Abū ‘Ali, as suggested by Vajda, 151 and n. 10. See also Vajda, “Autour de la théorie,” 139; i, 12:43, lines 9–10; and compare al-Qirqisānī in Hirschfeld, lines 8–13. On this concept, which has Stoic origins, see *peech*, 43 and n. 21, as well as 47–49; and Vajda “Saadya,” ted here as “informing,” is the silencing of the opponent (logical dead end (see Pines, “A Note on an Early Use of the and n. 77; see also al-Qirqisānī, *Kitāb al-anwār*, 484–86; and

(١١) فإذا عرفنا ماهية الحق بمعرفتنا^{٤٣} حدوده،^{٤٤} فلتعرف الآن كيفية الحق، أو كيف يكون الحق ويعق ومحب. ونقول إنَّ الحق مقالٌ تسكن إليه النفس بعدها^{٤٥} لأنَّ ما قال <كما قال>^{٤٦} وما وصف كا وصف. ونقول أيضًا، إنَّ الحق مقالٌ ينطق به اللسان مخبر،^{٤٧} أعني النفس لاتقطع نفس أخرى في ما جهلت أو سكت. ونقول أيضًا إنَّ الحق ضرورٌ تحكي^{٤٨} صورة الموجودات وجود المعقولات، ونقول أيضًا إنَّ الحق غاية ما إليه تشير النفس من // [القول عن فصها عن ما كانت به جاهلة، وذلك على هذا [المثال]:

*كيفية الحق على أربعة أوجه *

(١٢)

[أ] جدها، أنَّ الحق مقال تسكن إليه النفس بعدها لأنَّ ما^{٤٩} قال كا قال وما وصف كا وصف. والثاني، أنَّ الحق مقال لأنَّ ينطق به اللسان مخبر، أعني النفس لاتقطع نفس أخرى في ما جهلت أو سكت. والثالث، أنَّ الحق يحكي صورة الموجودات وجود المعقولات. والرابع، أنَّ الحق غاية ما إليه تشير النفس من القول عن فصها عن ما كانت به جاهلة.

^{٤٣} ف: بمعرفنا. ^{٤٤} ف: حدورها. ^{٤٥} ف: بعدمها. ^{٤٦} المقايسة، ينظر لاحقًا الفقرة ٢. ^{٤٧} ف: موجود (المقايسة، ينظر لاحقًا الفقرة ٢). ^{٤٨} ر بما يحدُّر التصويب: سكت. ^{٤٩} ف: تحبي. ^{٥٠} ف: بـالـما (المقايسة، ينظر، بلا، النحو، المادة ٤٦)، ينظر، بلا، النحو، المادة ٥٩. ^{٥١} ر بما يحدُّر التصويب: سكت.

al-Maqdisi, *Kitāb al-bād*, 1:51, line 11ff.). It seems, therefore, that this definition is intended to explain in what sense one can speak of truth in a disputation. The last part of the definition—which includes *juhūl* and *sukūn*—is somewhat awkward. With minor correction (see n. 48 to the text) this sentence would read “... in order to help another soul out of a state of being either ignorant or silent (*sakatat*) about something.” On “silence” in disputation, see, for instance, al-Qirqisānī, *Kitāb al-anwār*, 485, line 19.



NEAL A. MAXWELL
INSTITUTE for
RELIGIOUS SCHOLARSHIP

THE

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[FIRST NEPHI 1]

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[FIRST NEPHI 1]

1 Ne 2.5

Lehi's Commission

⁴For it came to pass in the commencement of the first year of the reign of Zedekiah,^a king of Judah, (my father, Lehi, having dwelt at Jerusalem in all his days); and in that same year there came many prophets, prophesying unto the people that they must repent, or the great city Jerusalem must be destroyed.⁵Wherefore it came to pass that my father, Lehi, as he went forth prayed unto the Lord, yea, even with all his heart, in behalf of his people.⁶ And it came to pass as he prayed unto the Lord, there came a pillar of fire and dwelt upon a rock before him; and he saw and heard much; and because of the things which he saw and heard he did quake and tremble exceedingly.

⁷ And it came to pass that he returned to his own house at Jerusalem; and he cast himself upon his bed, being overcome with the Spirit and the things which he had seen.⁸ And being thus overcome with the Spirit, he was carried away in a vision, even that he saw the heavens open, and he thought he saw God sitting upon his throne, surrounded with numberless concourses of angels in the attitude of singing and praising their God.^b

⁹ And it came to pass that he saw One descending out of the midst of heaven, and he beheld that his luster was above that of the sun at noon-day.¹⁰ And he also saw twelve others following him, and their brightness did exceed that of the stars in the firmament.¹¹ And they came down and went forth upon the face of the earth; and the first came and stood before my father, and gave unto him a book, and bade him that he should read.¹² And it came to pass that as he read, he was filled with the Spirit of the Lord.¹³ And he read, saying, "Wo,^c wo, unto Jerusalem, for I have seen thine abominations!" Yea, and many things did my father read concerning Jerusalem—that it should be destroyed, and the inhabitants thereof; many should^d perish by the sword, and many should be carried away captive into Babylon.

¹⁴ And it came to pass that when my father had read and seen many great and marvelous things, he did exclaim many things unto the Lord, such as:

"Great and marvelous are thy works, O Lord God Almighty!
Thy throne is high in the heavens,
and thy power, and goodness, and mercy
are over all the inhabitants of the earth.
And because thou art merciful,
thou wilt not suffer those who come unto thee
that they shall perish!"

¹⁵ And after this manner was the language of my father in the praising of his God; for his soul did rejoice, and his whole heart was filled, because of the things which he had seen, yea, which the Lord had shown unto him.

¹⁶ And now I, Nephi, do not make a full account of the things which my father hath written, for he hath written many things which he saw in visions and in dreams; and he also hath written many things which he prophesied and spake unto his children, of which I shall not make a full account.¹⁷ But I shall make an account of my proceedings in my days. Behold, I make an abridgment of the record of my father, upon plates which I have made with mine own hands; wherefore, after I have abridged the record of my father then will I make an account of mine own life.

Lehi Prophesies to the Jews

¹⁸ Therefore, I would that ye should know, that after the Lord had shown so many marvelous things unto my father, Lehi, yea, concerning the destruction of Jerusalem, behold he went forth among the people, and began to prophesy and to declare unto them concerning the things which he had both seen and heard.¹⁹ And it came to pass that the Jews did mock him because of the things which he testified of them; for he truly testified of their wickedness and their abominations; and he testified that the things which he saw and heard, and also the things which he read in the book, manifested plainly of the coming of a Messiah,^a and also the redemption of the world.²⁰ And when the Jews heard these things they were angry with him; yea, even as with the prophets of old, whom they had cast out, and stoned, and slain; and they also sought his life, that they might take it away.

But behold, I, Nephi, will show unto you that the tender mercies of the Lord are over all those whom he hath chosen, because of their faith, to make them mighty even unto the power of deliverance.^b

Into the Wilderness

² For behold, it came to pass that the Lord spake unto my father, yea, even in a dream, and said unto him, "Blessed art thou Lehi, because of the things which thou hast done; and because thou hast been faithful and declared unto this people the things which I commanded thee, behold, they seek to take away thy life."² And it came to pass that the Lord commanded my father, even in a dream, that he should take his family and depart into the wilderness.³ And it came to pass that he was obedient unto the word of the Lord, wherefore he did as the Lord commanded him.

⁴ And it came to pass that he departed into the wilderness. And he left his house, and the land of his inheritance, and his gold, and his silver, and his precious things, and took nothing with him, save it were his family, and provisions, and tents, and departed into the wilderness.⁵ And he came down by the borders near the shore of the Red Sea; and he traveled in the wilderness in the borders which are nearer the Red Sea; and he did travel in the wilderness with his family, which consisted of my mother, Sariah, and my elder brothers, who were Laman, Lemuel, and Sam.

^{a4} 597 BC ^{b8} The twenty-one words "saw God . . . praising their God" are quoted exactly at Alma 36.22.
^{c13} Both *wo* and the standard spelling *woe* occur in the Book of Mormon. ^{d13} Or *concerning Jerusalem: that it should be destroyed; and the inhabitants thereof—many should*

^{e19} Hebrew "*anointed one*"; *Christ* is the Greek translation of *messiah*. ^{f20} The Lord's mercies are a major theme in the Book of Mormon, from the first chapter to the last; see Moro 10.3.

Mother's Milk

Poems in search of
Heavenly Mother

By Rachel Hunt Steenblik
with Ashley Mae Hoiland,
Illustrator

**BCC
PRESS**



What Søren Aabye Taught Me

When the child needed to be weaned,
the Mother cried.

How She Broke Her Own Heart

The Mother held me tightly
and said, *I'm sorry,*
Mama's milk is all gone,
as I sobbed and sobbed.

The Very Hungry Girl

One Monday evening, the
cool moon came up, and out
of the womb came a tiny and
very hungry girl. She started to
look for her Mother.

Mother's Milk
10

Questions

I asked my daughter two questions
the day that she was born.

- 1) Did she remember me—
my voice, my smell,
my beating heart?
- 2) Did she remember the one
we both call Mother—
Her voice, Her Smell, Her heart?
I can't remember anything.



ALL HUMANITIES UNTIL...

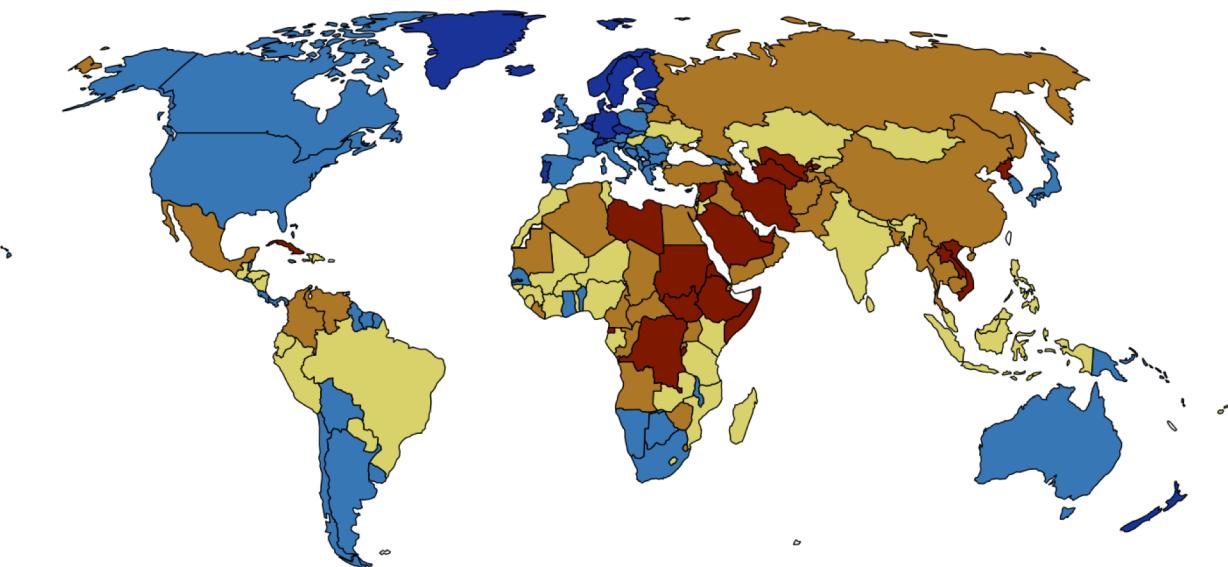


Economics

Statistics

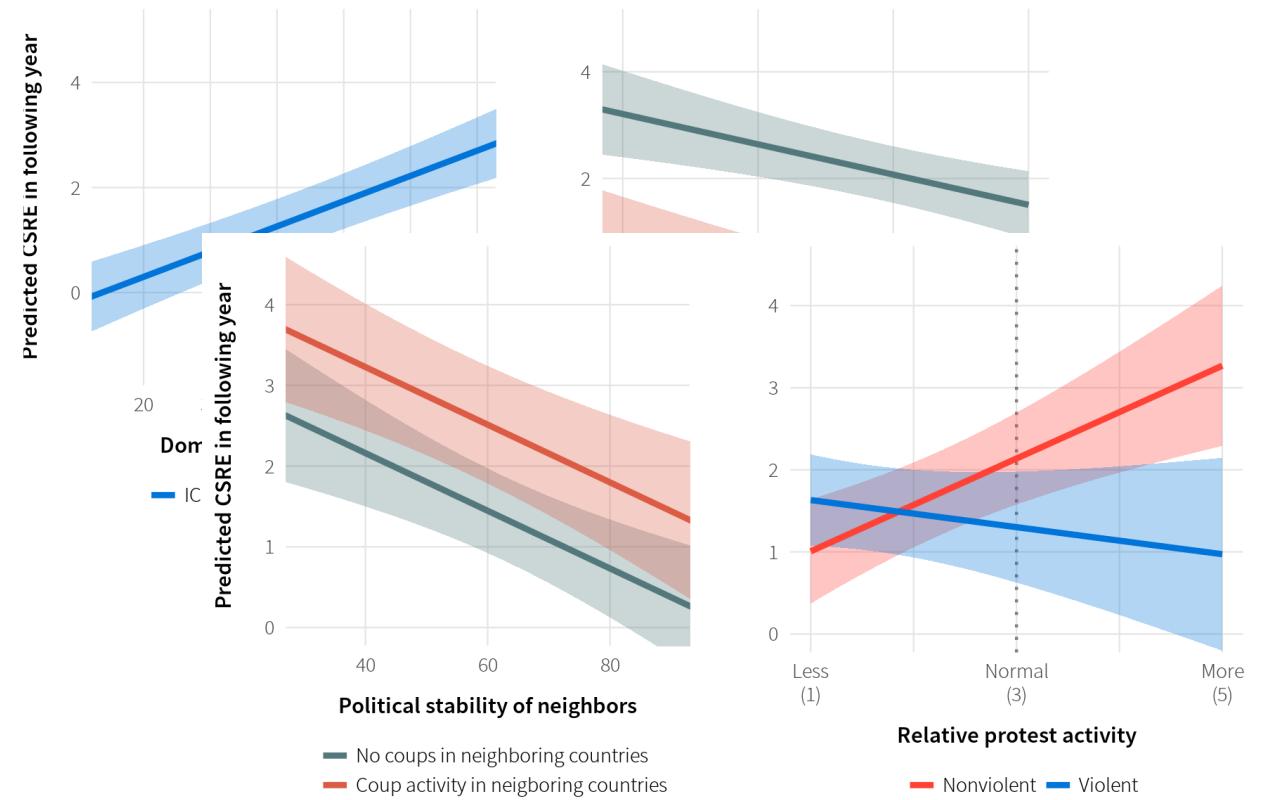
Accounting

180°



Civic space

- Open
- Narrowed
- Obstructed
- Repressed
- Closed

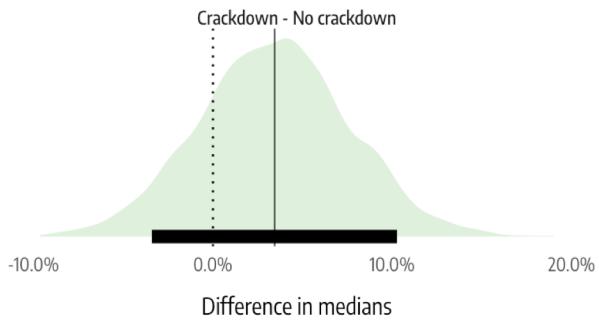


NGOS AND REPRESSION

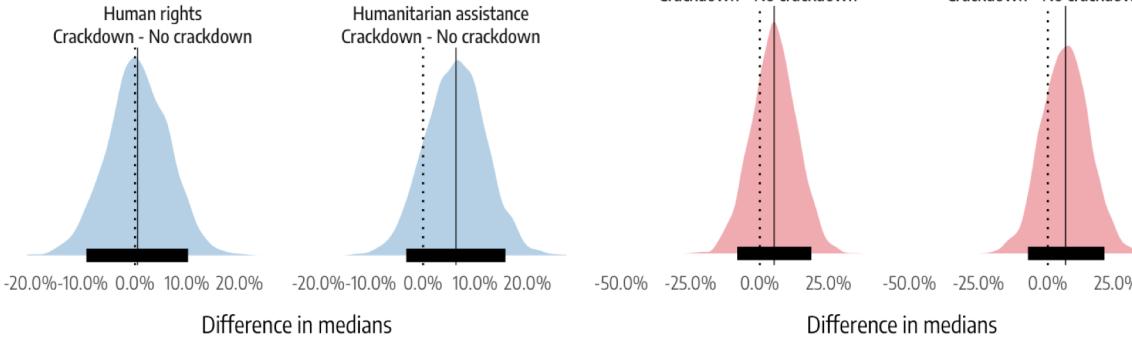
Differences in donation likelihood in control and crackdown groups,
conditioned by other experimental groups

90% credible intervals shown in black. Solid vertical line = median; dotted vertical line = 0

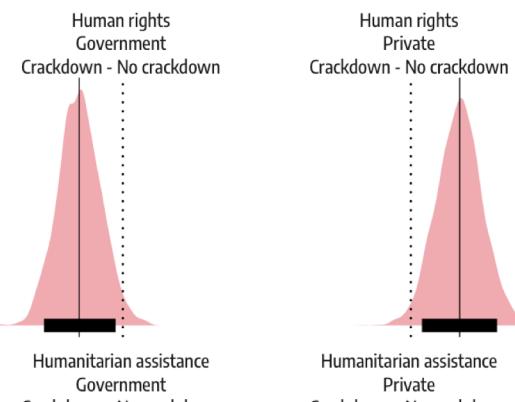
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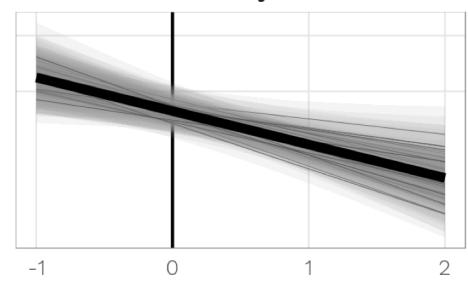
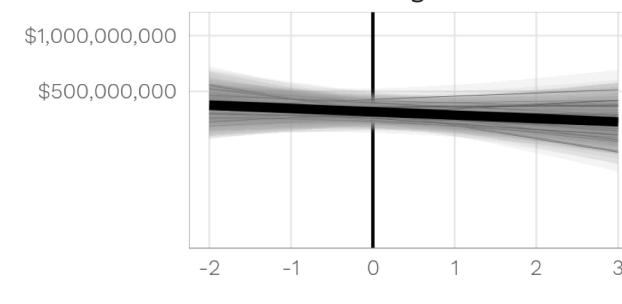
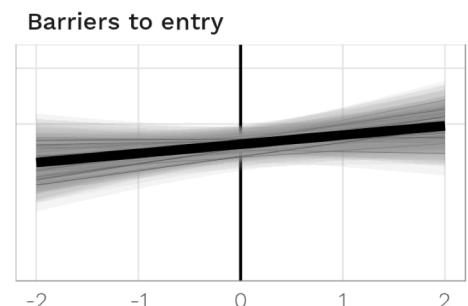
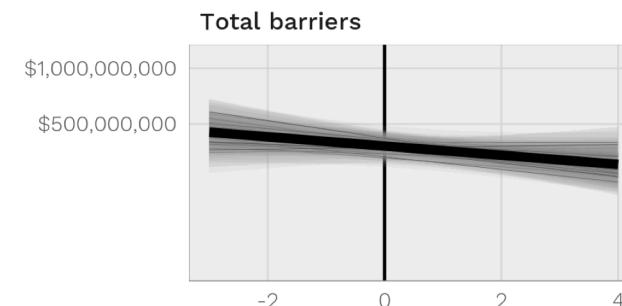
B



C



Predicted ODA in the following year



Difference from average number of anti-NGO barriers in country (within effects)

LOLZ

romney institute
BRIGHAM YOUNG UNIVERSITY

Economics

Statistics

Accounting

WHAT IS “STATISTICS”?

Collecting and analyzing data from a representative sample in order to make inferences about a whole population

WHAT IS “DATA SCIENCE”?

Big data

Algorithms

Machine
learning

Data mining

Cloud computing

Neural
networks

Artificial
intelligence

PR-speak for
“statistics”

WHAT IS “DATA SCIENCE”?

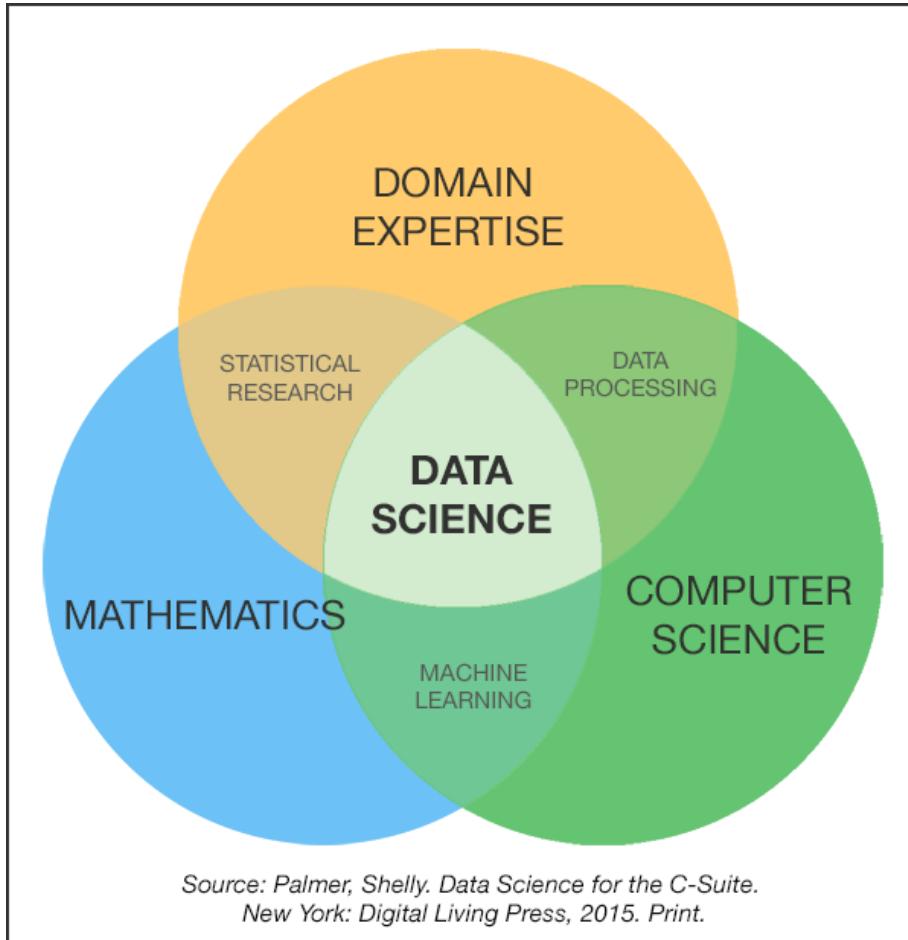
Turning raw data into
understanding, insight,
and knowledge

Collect

Analyze

Communicate

WHAT'S THE DIFFERENCE?



Statistics

Collect

Analyze

Communicate

WHY SHOULD WE CARE ABOUT DATA?

Just hire a bunch of quant nerds to do it for you!

WHY DO WE MAKE YOU TAKE THIS ~~AWFUL PAINFUL~~ CLASS?

EXCITING AND FUN

1. Data is everywhere. We have to understand its limits, uses, and ethics.

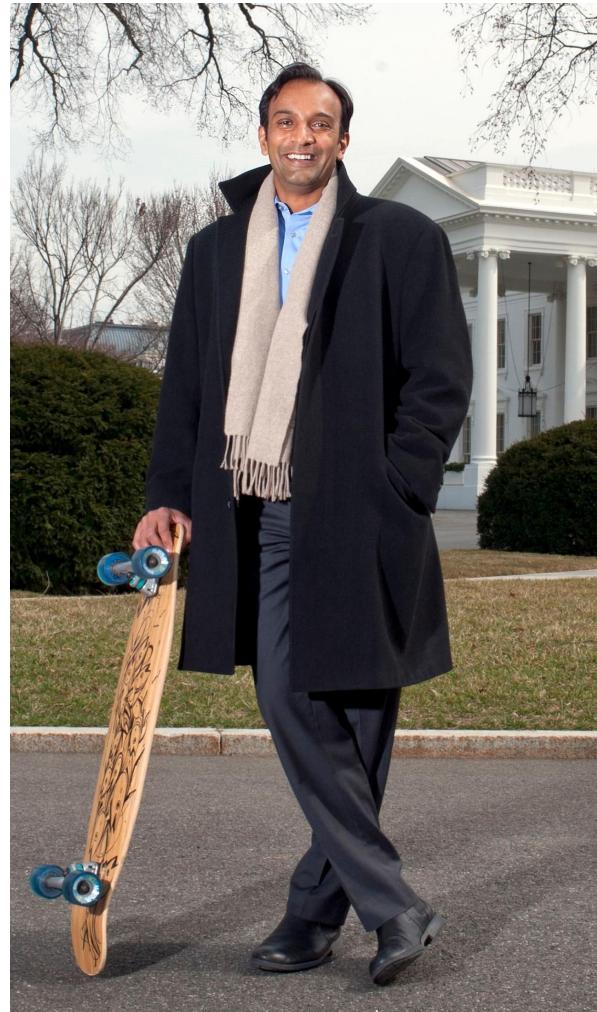
2. Data can improve public services and public policy.

WHY UNIVERSITIES NEED 'PUBLIC INTEREST TECHNOLOGY' COURSES

POLICYMAKERS AT ALL levels of government are struggling to thoughtfully harness data in the service of public values. Many public servants grew up in an era of firmly separate disciplines: You were either an engineer or an economist, either a programmer or a social worker, but never both. In an era in which data is everything, the risks to core democratic principles—equity, fairness, support for the most vulnerable, delivery of effective government services—caused by technological illiteracy in policymakers, and policy illiteracy in computer scientists, are staggering.

field aimed at addressing precisely this gap in interdisciplinary opportunities. This new area, "public interest technology," is still being defined; it encompasses designing public policy and laws with an awareness of how technology actually works, as well as ensuring that technology is being used to serve public values of fairness and equity. It means consciously thinking about the welfare of society in general, rather than the incentives of a single company.

DATA AND GOVERNMENT



“To responsibly unleash the power of data to benefit all Americans”

The White House

Office of the Press Secretary

For Immediate Release

June 30, 2016

FACT SHEET: Launching the Data-Driven Justice Initiative: Disrupting the Cycle of Incarceration

"[O]ur criminal justice system isn't as smart as it should be. It's not keeping us as safe as it should be. It is not as fair as it should be.

Mass incarceration makes our country worse off, and we need to do something about it." -

President Barack Obama, July 14, 2015





U.S. CITY OPEN DATA CENSUS

POWERED BY OPEN DATA CENSUS

Salt Lake City, UT



Breakdown

Dataset	Breakdown	Year	Score	🔗
Budget		2018	100%	
Business Listings		2018	100%	
Construction Permits		2018	100%	
Crime Reports		2018	100%	
Parcels		2018	100%	
Police Use-of-Force		2018	100%	
Spending		2018	100%	
Service Requests		2018	83%	
Emergency Calls		2018	78%	
Traffic Crashes		2018	78%	
Zoning		2018	78%	
Restaurant Inspections		2018	61%	
Code Violations				
Employee Salaries				
Lobbyist Activity				
Procurement Contracts				
Property Assessment		2018	0%	

Google Dataset Search

Beta

Search for Datasets



Try [boston education data](#) or [weather site:noaa.gov](#)

Google Dataset Search

salt lake city



Salt Lake City Police Department
moto.data.socrata.com

Updated Aug 26, 2018

Salt Lake City Police Department

[moto.data.socrata.com](#)

254 scholarly articles cite this dataset ([View in Google Scholar](#))



Precipitation Depth Table from
Salt Lake City Zoo Station
[www.hydroshare.org](#)

Dataset created Dec 2, 2015

Dataset updated Aug 26, 2018

Dataset published Dec 2, 2015



Data from: Case Outcomes
Following Investigative
Interviews of Suspected...
[www.icpsr.umich.edu](#)
[datamed.org](#)

Available download formats from providers

CSV , RSSXML , RDFXML , XML

Description

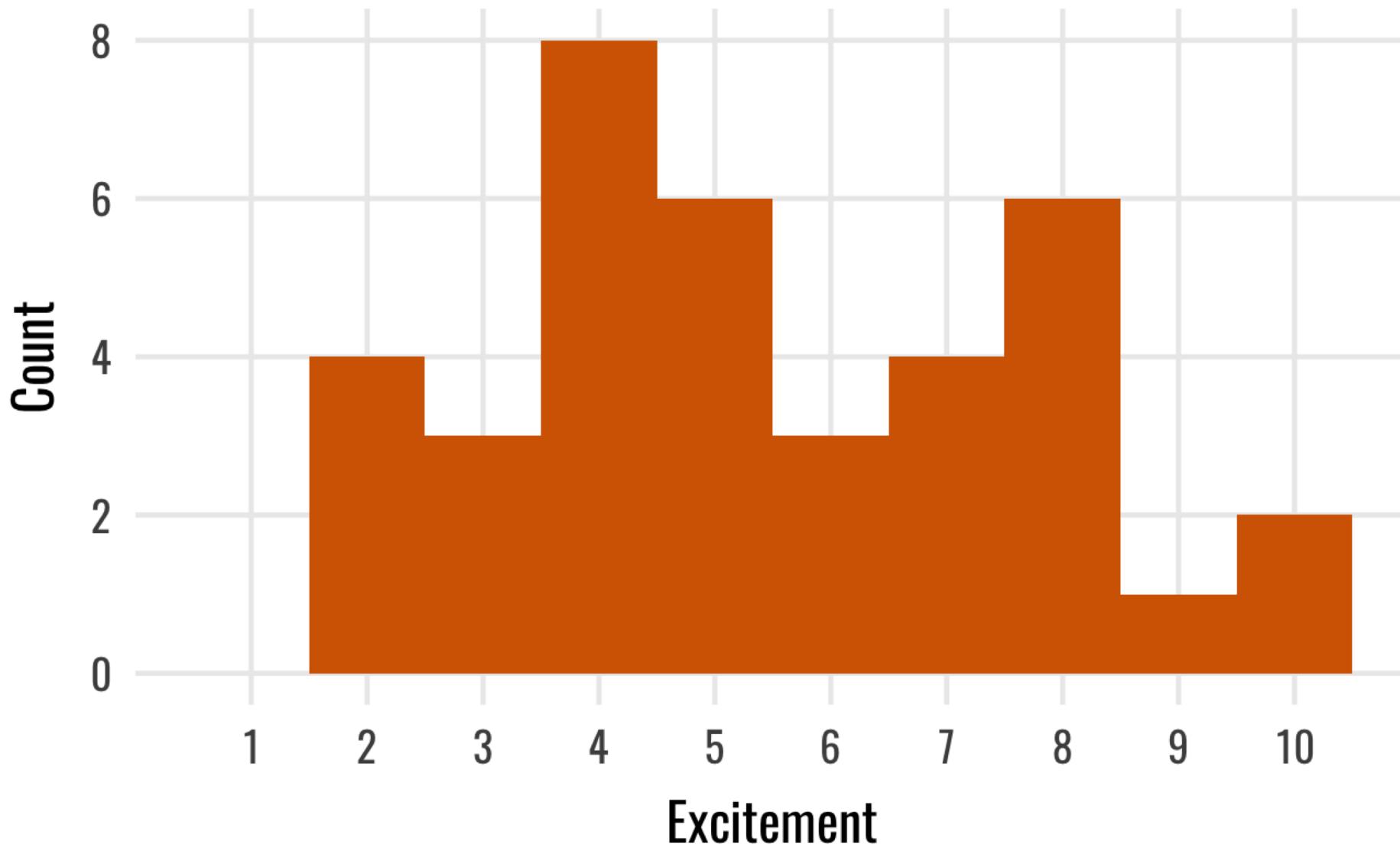
Salt Lake City Police Department incident dataset

HOW DO YOU START USING ALL THIS DATA?

Take this class

**WHAT IS YOUR
BIGGEST FEAR
ABOUT THIS CLASS?**

Y'ALL ARE NERVOUS



YOU CAN DO THIS.

CLASS PHILOSOPHY

CLASSICAL STATISTICS CLASSES

Mean

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

Standard deviation

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$$

Correlation

$$r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}}$$

CLASSICAL STATISTICS CLASSES

- Research design
- Probability
- Random variables
- Central limit theorem
- One/two sample mean and proportion hypothesis tests
- Chi-square tests
- ANOVA
- Simple linear regression
- Multiple linear regression
- Logistic regression
- **All with pre-cleaned data**



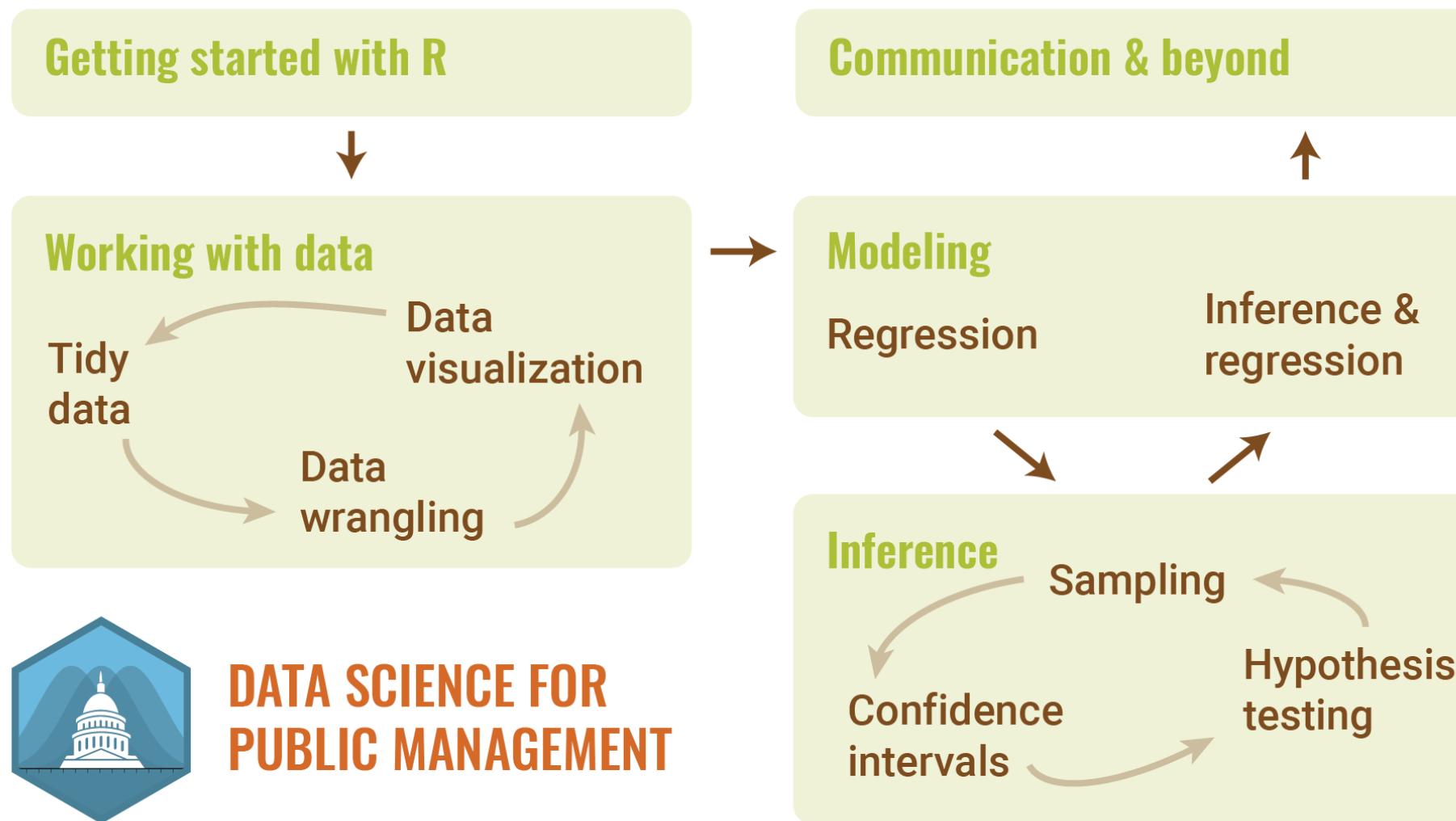
MODERN SUPER COOL STATISTICS CLASSES

```
mean(employee_salaries)
```

```
sd(employee_salaries)
```

```
cor(employee_salaries,  
employee_experience)
```

MODERN SUPER COOL STATISTICS CLASSES



DATA SCIENCE FOR
PUBLIC MANAGEMENT

MODERN SUPER COOL STATISTICS CLASSES

Modern and practical

Centered on data and tools

Quantitative, but not too mathy

Challenging, but not intimidating

CLASS TECHNOLOGY



THE TIDYVERSE

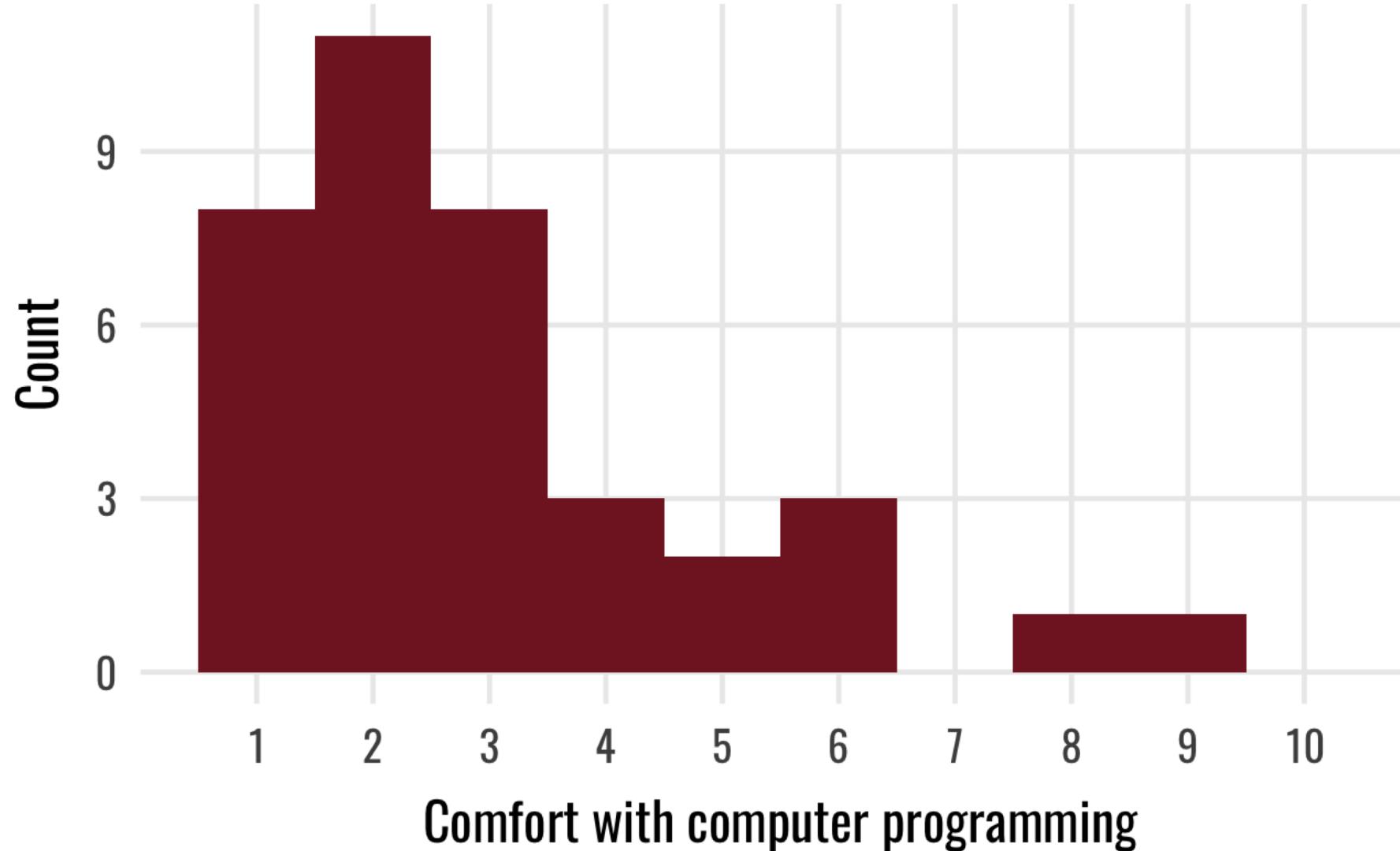


MODERN SUPER COOL STATISTICS CLASSES

```
strike_damages_month <- bird_strikes %>%
  group_by(Month) %>%
  summarize(total_damages = sum(Cost, na.rm = TRUE),
            average_damages = mean(Cost, na.rm = TRUE))

ggplot(data = strike_damages_month,
        mapping = aes(x = Month, y = total_damages)) +
  geom_col() +
  scale_y_continuous(labels = dollar) +
  labs(x = "Month",
       y = "Total damages",
       title = "Really expensive collisions happen in the fall?",
       subtitle = "Don't fly in August or October?",
       source = "Source: FAA Wildlife Strike Database")
```

THIS IS GREAT!



S U C K I N G

There is no way to go from knowing nothing about a subject to knowing something about a subject without going through a period of much frustration and suckiness

Push through. You'll suck less.

Hadley Wickham, author of ggplot2 and the tidyverse

SUCKING



Dude, sucking at something is the first step towards being sort of good at something

The New York Times

Opinion

SPORTING

(It's Great to) Suck at Something

By Karen Rinaldi

April 28, 2017



LEARNING R



Jesse Maegan

@kierisi

Following



My **#rstats** learning path:

1. Install R
2. Install RStudio
3. Google "How do I [THING I WANT TO DO] in R?"

Repeat step 3 ad infinitum.

7:19 AM - 18 Aug 2017

CLASS DETAILS

GOAL FOR THE CLASS

**Provide a gateway experience to
doing impactful work with data**

**Answer your own questions
with real world data**

Change the world with data

PREREQUISITES

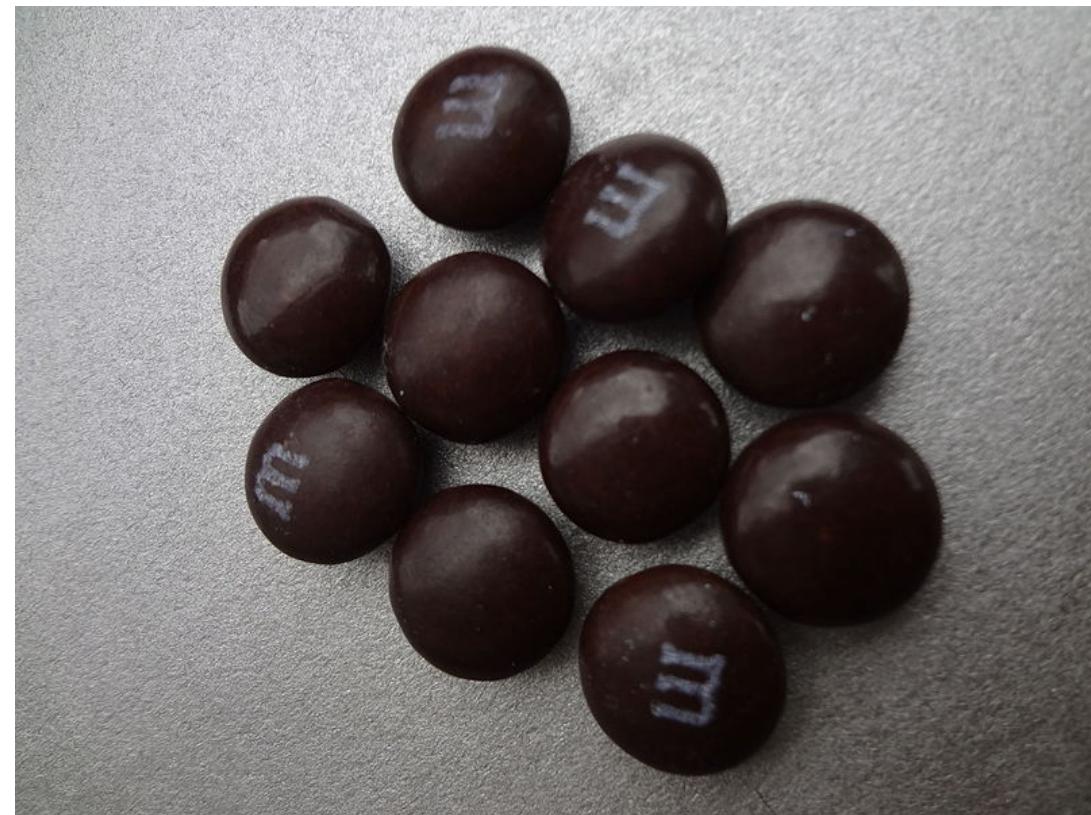
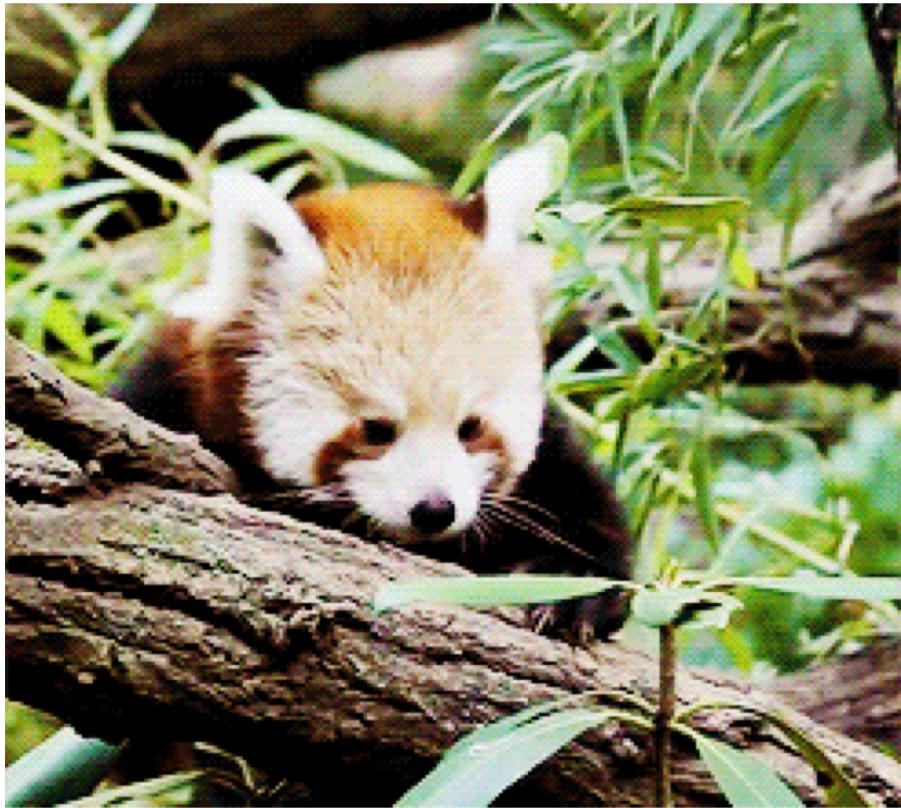
Math skills

None

Computer science skills

None

MISCELLANEA



MISCELLANEA

Class representative

Class expectations

Late work

Technology

Participation

Other?

B R E A K

BIRDS AND AIRPORTS

<https://andhs.co/630rstudio>