

TRUTH, BEAUTY, AND DATA

MPA 635: Data Visualization

September 4, 2018

PLAN FOR TODAY

Facts and truth and beauty

Data and truth and beauty

Beautiful visualizations

Class details

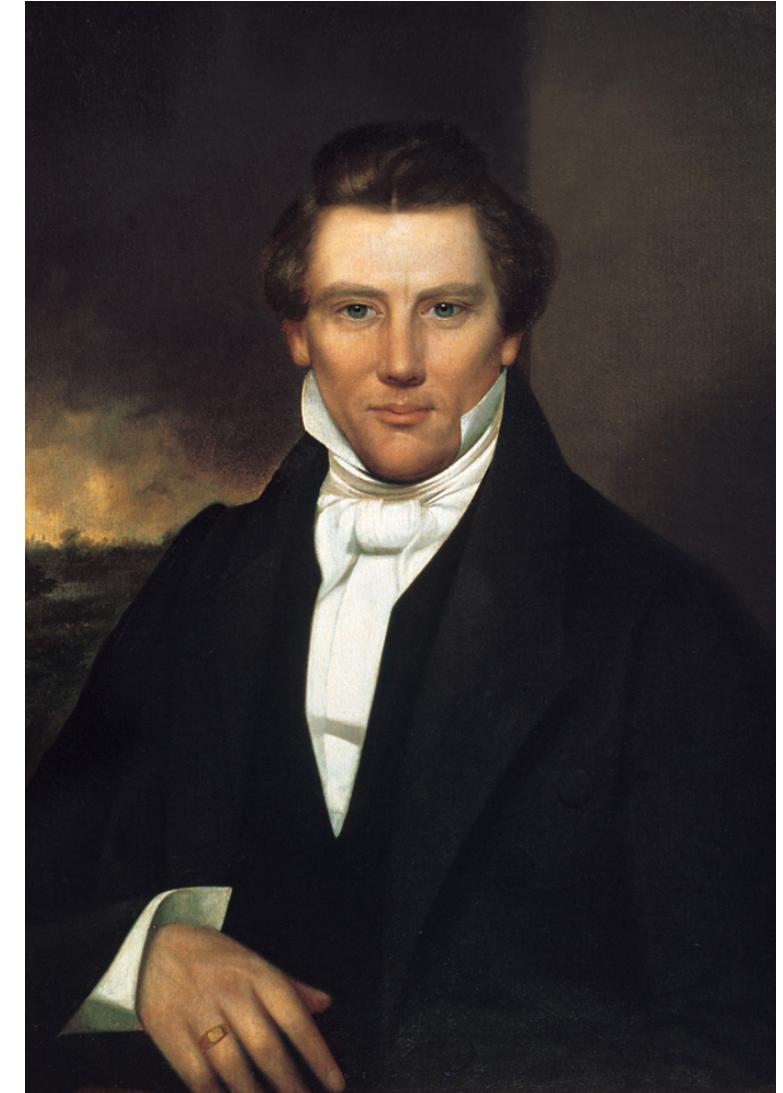
Playing with LEGO

FACTS AND
TRUTH AND BEAUTY

WHAT IS TRUTH?

“The first and fundamental principle of our holy religion is, that we believe that we have a right to embrace all, and every item of truth”

“[R]eceive truth, let it come from whence it may”



HOW DO WE FIND TRUTH?



Neil deGrasse Tyson

@neiltyson

Following



The good thing about Science is that it's true
whether or not you believe in it.

8:41 AM - 14 Jun 2013

15,148 Retweets 8,257 Likes



822

15K

8.3K



Scientism

CAN THERE BE TRUTH WITHOUT FACTS?



FACTS ≠ TRUTH



FACTS ≠ TRUTH

It "is of little significance as to whether Jonah [or Job] was a real individual or one chosen by the writer of the book" to illustrate "what is set forth therein."

What is important, [they] insisted, was not whether the books were historically accurate, but whether the doctrines were correct.

WHERE DOES TRUTH
COME FROM IF
THERE ARE NO FACTS?

Beauty

RHETORIC

λόγος

Res

Content

Essence

λέξις

Verba

Form

Structure

CONTENT + FORM

Art is how we translate
core, essential **content**
to different **forms**
for specific **audiences**

TRUTH IS BEAUTIFUL

Truth ≠ facts

Truth comes from aesthetic
combination of content and form

Facts require
beauty to be true

DATA AND
TRUTH AND BEAUTY

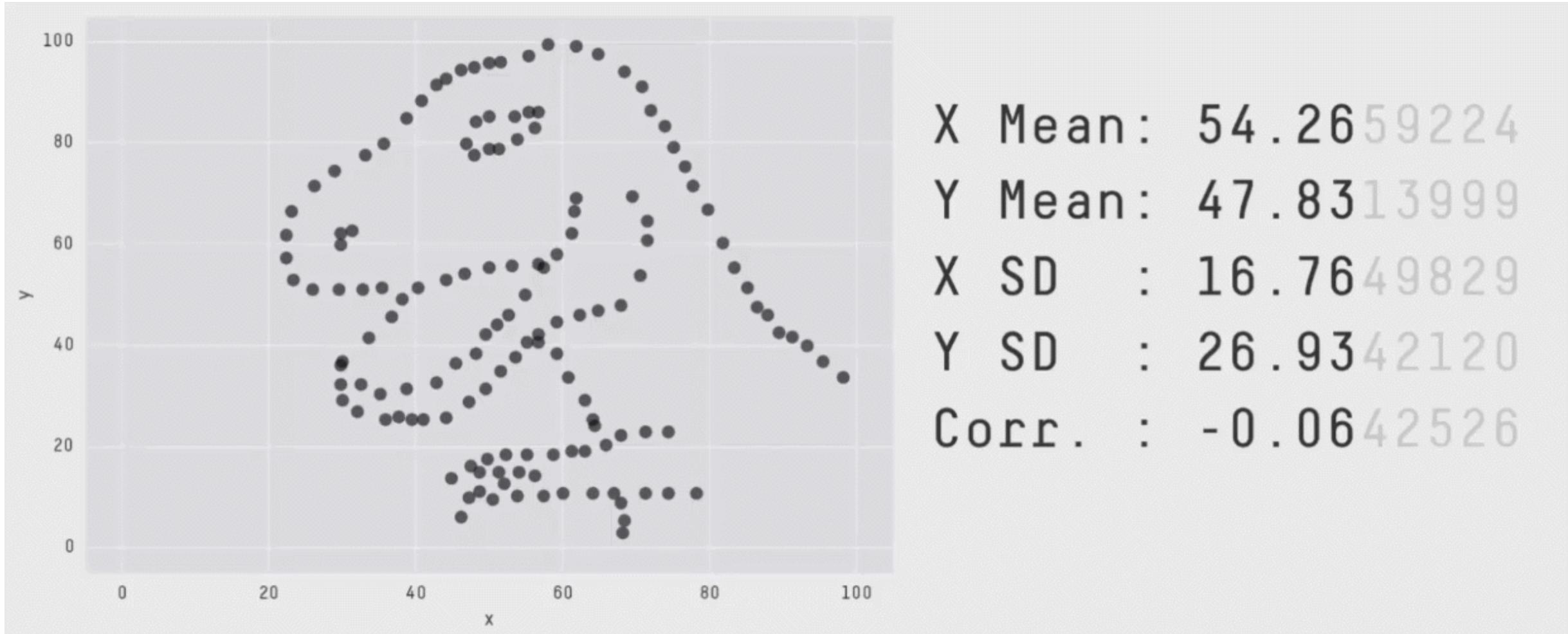
BEAUTY-FREE RAW DATA

x	y
55.3846	97.1795
51.5385	96.0256
46.1538	94.4872
42.8205	91.4103
40.7692	88.3333
38.7179	84.8718
35.641	79.8718
33.0769	77.5641
28.9744	74.4872
26.1538	71.4103
23.0769	66.4103
22.3077	61.7949
22.3077	57.1795
23.3333	52.9487
25.8974	51.0256
29.4872	51.0256
32.8205	51.0256
35.3846	51.4103
40.2564	51.4103
44.1026	52.9487
46.6667	54.1026
50.0	55.2564
53.0769	55.641
56.6667	56.0256
59.2308	57.9487
61.2821	62.1795
61.5385	66.4103
61.7949	69.1026

```
> mean(new_data$x)
[1] 54.26327
> mean(new_data$y)
[1] 47.83225
> sd(new_data$x)
[1] 16.76514
> sd(new_data$y)
[1] 26.9354
> cor(new_data$x, new_data$y)
[1] -0.06447185
```

No correlation!

BEAUTY-FREE RAW DATA



HUMANS LOVE PATTERNS

frontiers in
NEUROSCIENCE

REVIEW ARTICLE
published: 22 August 2014
doi: 10.3389/fnins.2014.00265



Superior pattern processing is the essence of the evolved human brain

Mark P. Mattson^{1,2*}

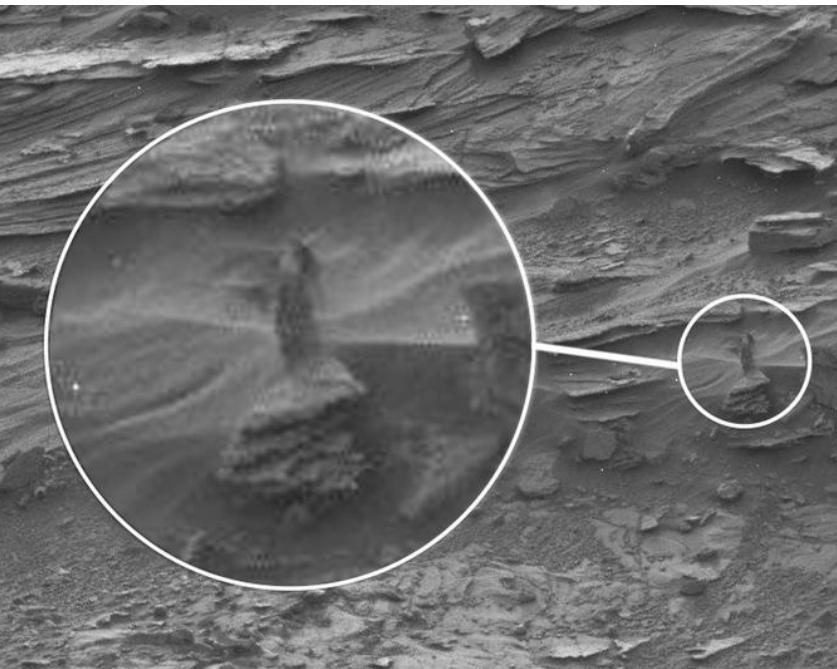
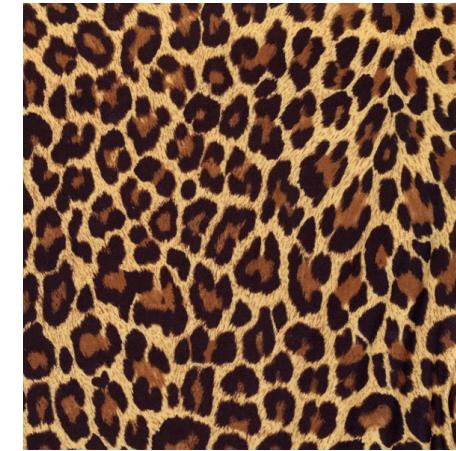
¹ Laboratory of Neurosciences, National Institute on Aging Intramural Research Program, Baltimore, MD, USA

² Department of Neuroscience, Johns Hopkins University School of Medicine, Baltimore, MD, USA

Edited by:

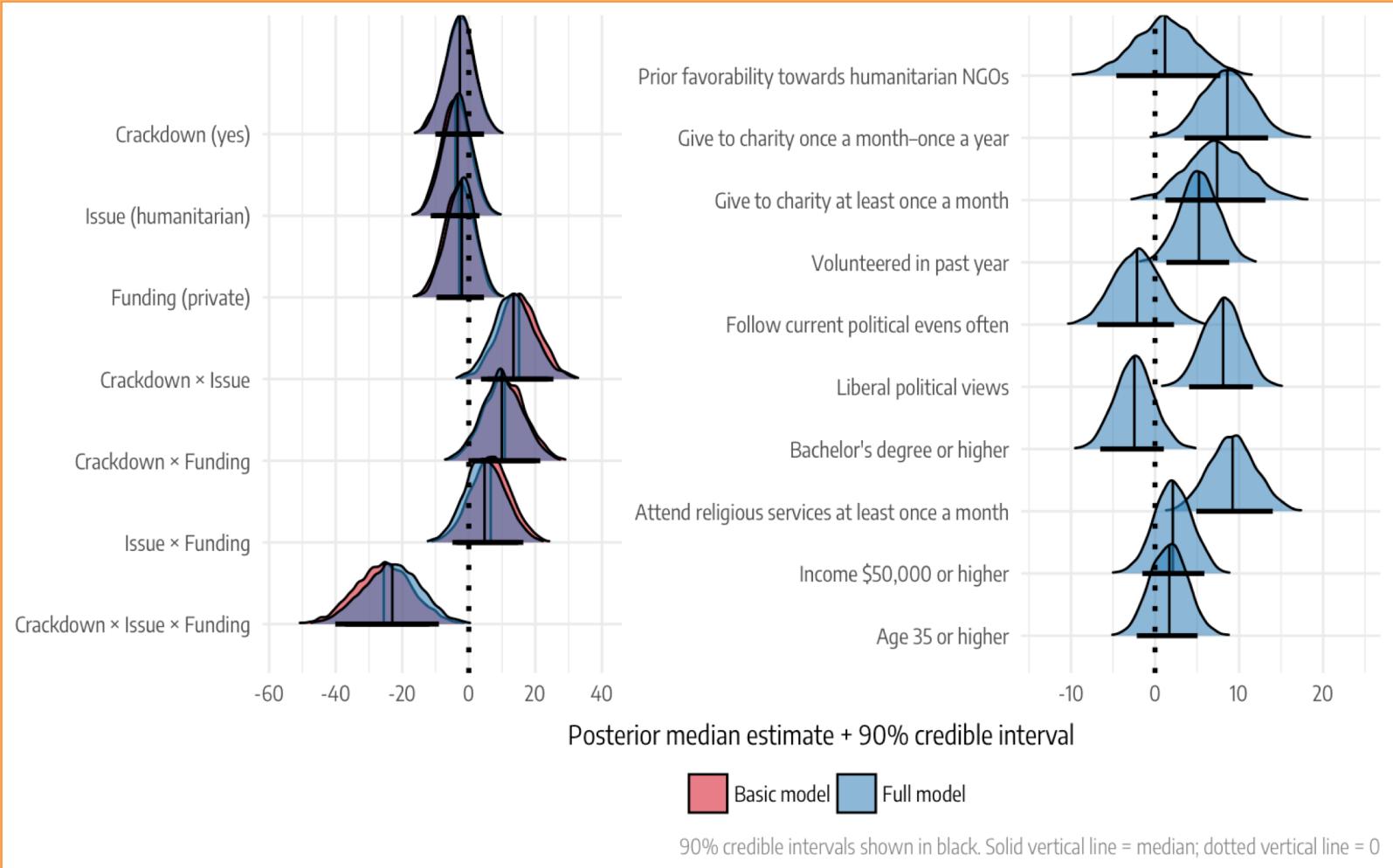
J. Michael Williams, Drexel University, USA

Humans have long pondered the nature of their mind/brain and, particularly why its capacities for reasoning, communication and abstract thought are far superior to other species, including closely related anthropoids. This article considers superior pattern



BEAUTY IS NECESSARY TO SEE PATTERNS

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	20.207	20.641	22.033	4.324	4.740	6.146
	(1.597)	(2.239)	(3.049)	(4.514)	(4.938)	(5.207)
Crackdown (yes)	3.797	2.636	-2.692	3.178	2.349	-2.676
	(2.254)	(3.055)	(4.337)	(2.108)	(3.057)	(4.227)
Issue (humanitarian)	-0.993	-4.030		-1.138	-3.359	
	(3.094)	(4.312)		(3.059)	(4.245)	
Funding (private)		-2.867			-2.108	
		(4.444)			(4.279)	
Crackdown × Issue	2.418	15.090		1.851	13.427	
	(4.366)	(5.969)		(4.263)	(6.023)	
Crackdown × Funding		10.831			9.920	
		(6.274)			(6.090)	
Issue × Funding		6.595		4.747		
		(6.013)		(6.082)		
Crackdown × Issue × Funding	-25.544			-22.980		
	(8.628)			(8.702)		
Prior favorability towards humanitarian NGOs		1.220	1.340	1.177		
		(3.691)	(3.739)	(3.762)		
Give to charity once a month–once a year		8.650	8.667	8.608		
		(3.184)	(3.150)	(3.083)		
Give to charity at least once a month		7.435	7.470	7.388		
		(3.696)	(3.875)	(3.669)		
Volunteered in past year		5.480	5.519	5.230		
		(2.293)	(2.359)	(2.264)		
Follow current political events often		-2.809	-2.728	-2.152		
		(2.798)	(2.933)	(2.822)		
Liberal political views		8.270	8.267	8.105		
		(2.340)	(2.291)	(2.386)		
Bachelor's degree or higher		-2.445	-2.536	-2.464		
		(2.218)	(2.263)	(2.236)		
Attend religious services at least once a month		9.817	9.833	9.230		
		(2.696)	(2.724)	(2.796)		



BEAUTIFUL VISUALIZATIONS

WHAT MAKES A GREAT DATA VISUALIZATION?

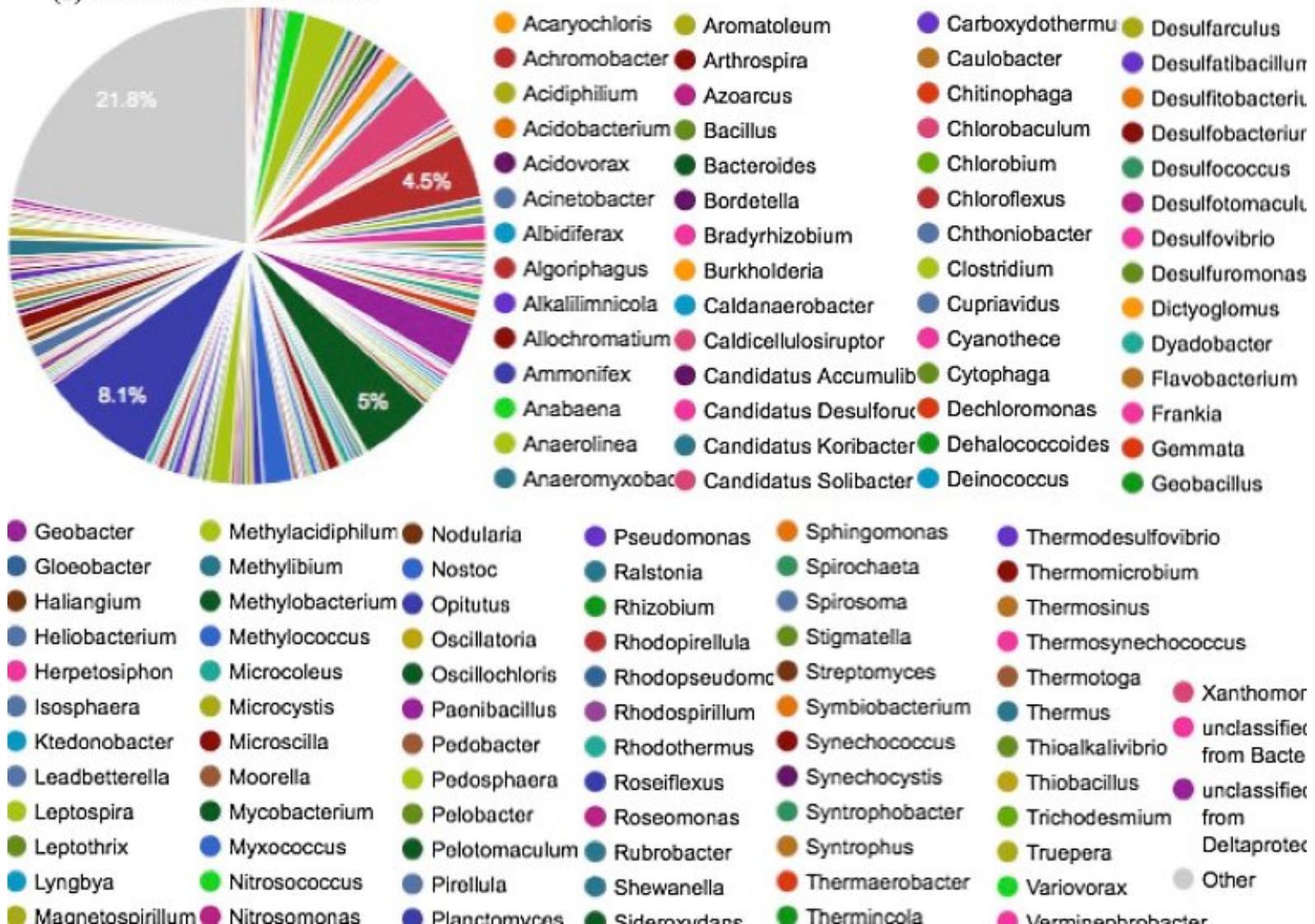
Cairo

Healy

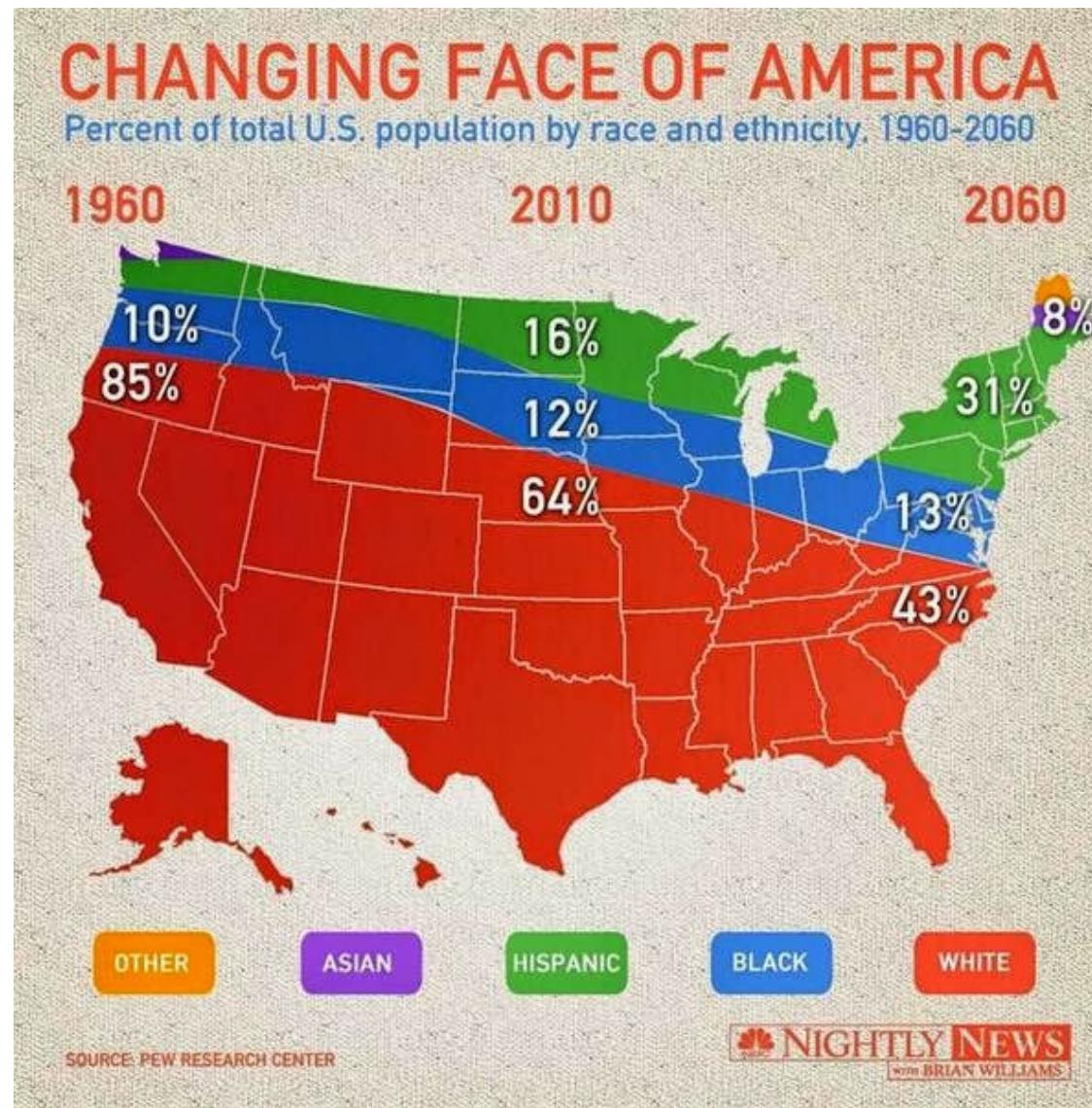
Tufte

WHAT'S WRONG?

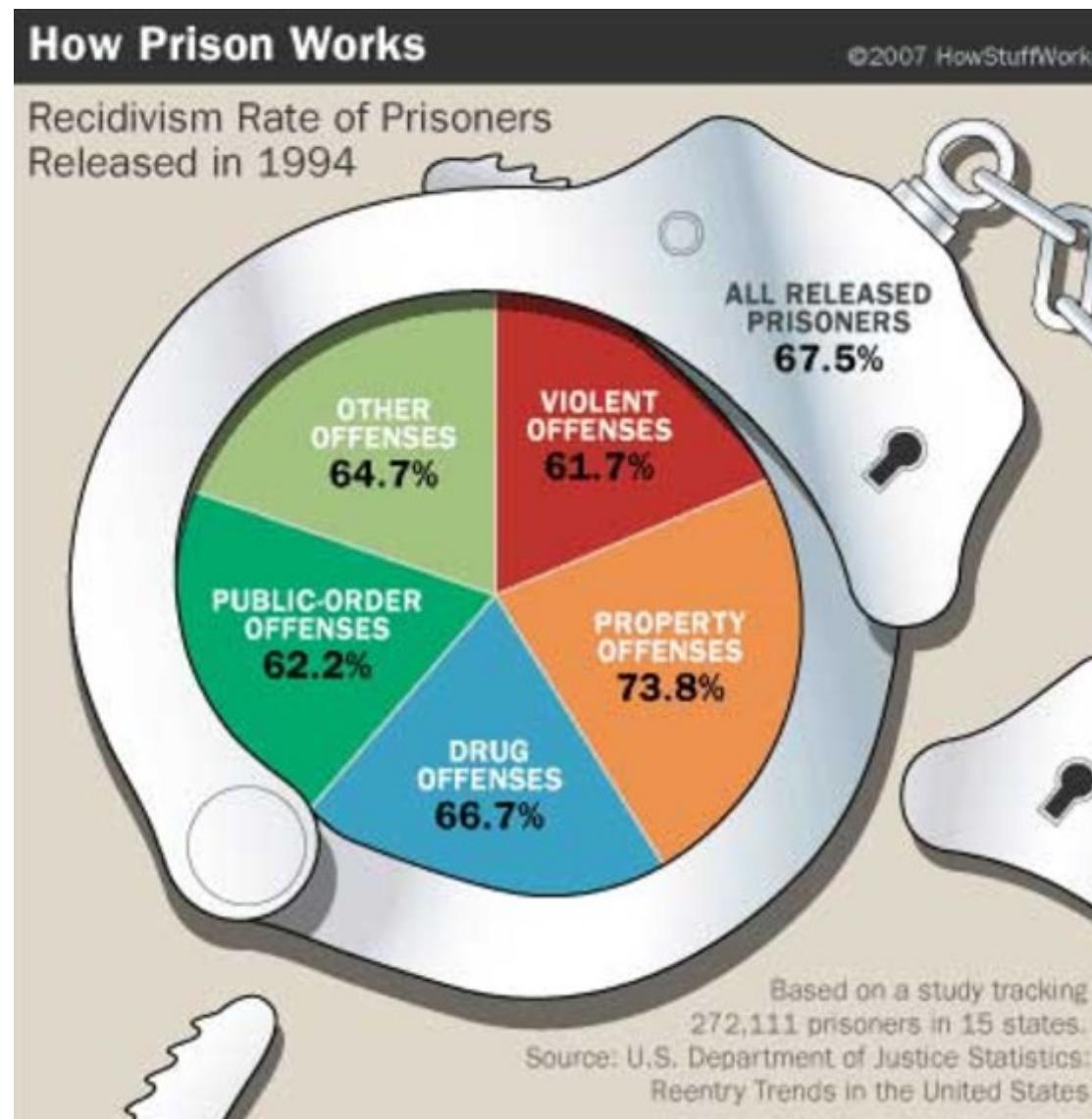
(f) Distribution of Genus



WHAT'S WRONG?



WHAT'S WRONG?

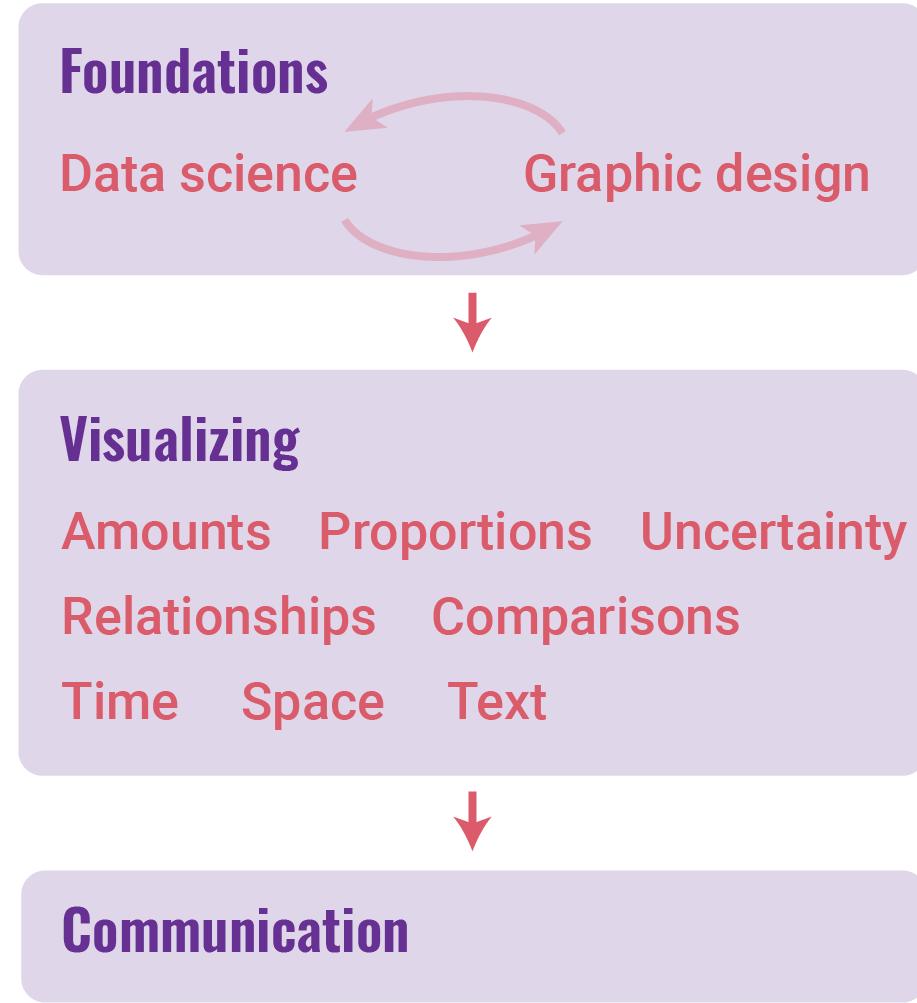


CLASS DETAILS

GOAL FOR THE CLASS

**Recognize and create
beautiful and truthful
visualizations with real
world data**

PLAN FOR THE CLASS



MISCELLANEA

Readings and reflections

Problem sets and projects

Class expectations

Late work

Technology

Participation

Other?

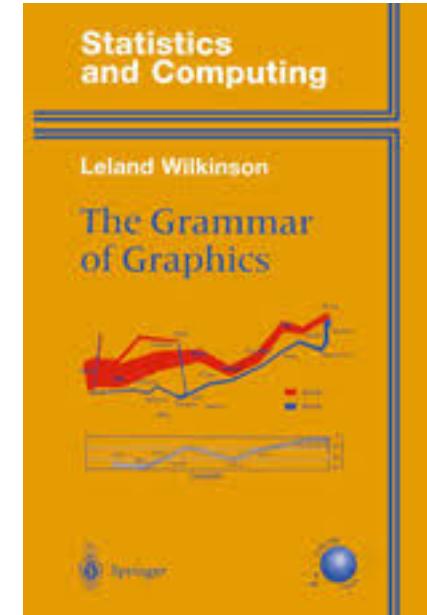
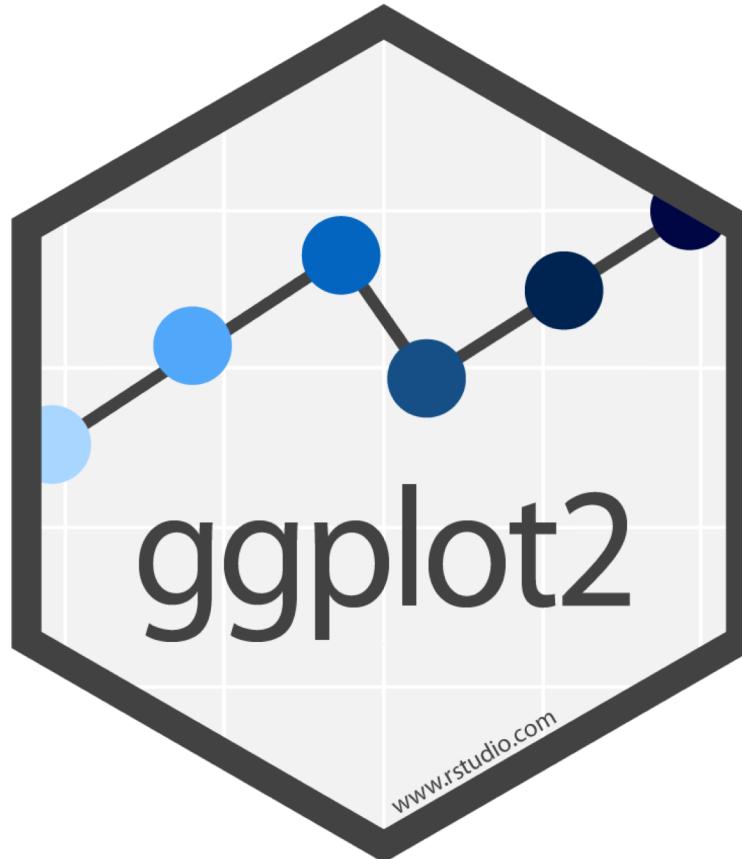
CLASS TECHNOLOGY

Flexibility
and
power



Barrier to entry (amount of coding required)

CLASS TECHNOLOGY



Coordinates
Statistics
Facets
Geometries
Aesthetics
Data



THE TIDYVERSE



S U C K I N G

There is no way of 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

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



225

PLAYING WITH LEGO

<https://andhs.co/635rstudio>