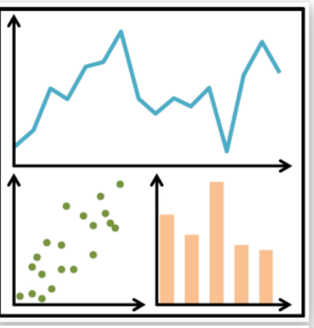
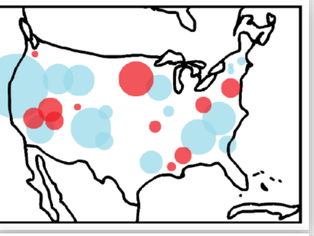
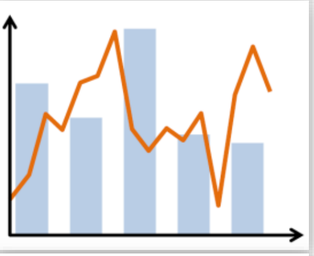
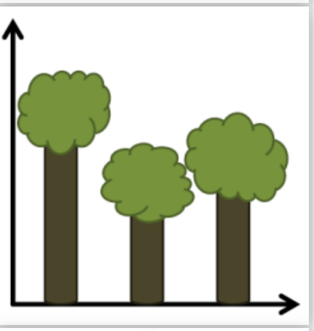
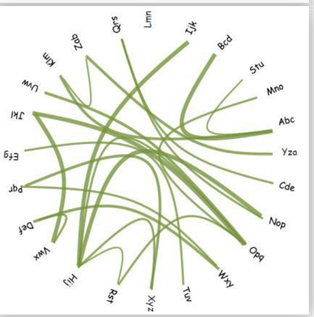






Lecture 1: Introduction

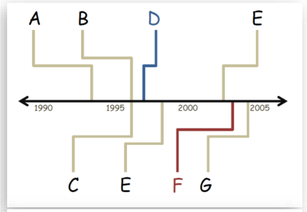
CS 7250

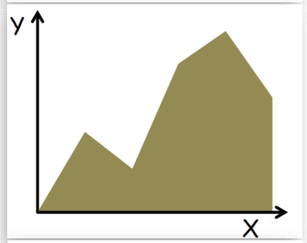
SPRING 2020

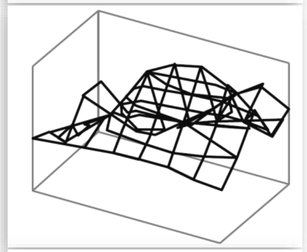
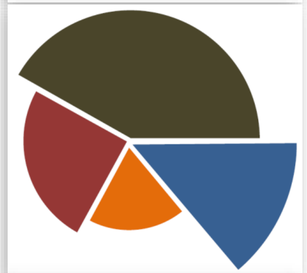
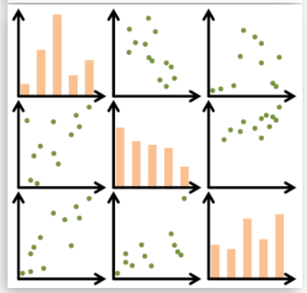
Prof. Cody Dunne

NORTHEASTERN UNIVERSITY

Slides and inspiration from Michelle Borkin, Krzysztof Gajos, Hanspeter Pfister, Miriah Meyer, Jonathan Schwabish, and David Sprague





Staff Introductions

Cody Dunne
Assistant Professor
Instructor

Sara Di Bartolomeo, CS
PhD
TA

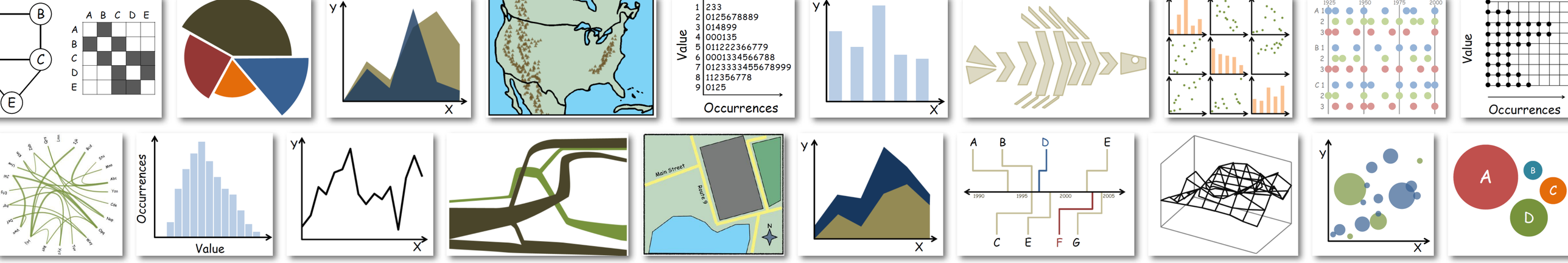
Gayathri Raj
UG
Service-Learning TA

Course Homepage

https://canvas.instructure.com/courses/1781732

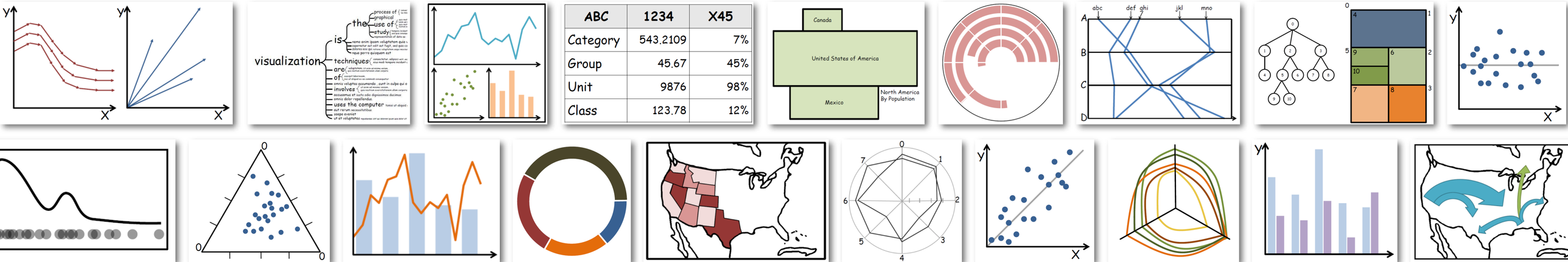
- If you don’t have an account on our Canvas yet: https://canvas.instructure.com/enroll/CMAPDM
- Use your name as known by the registrar and your @husky.neu.edu email.

What is visualization anyway?



(static or interactive) (abstract or spatial)

visualization: the visual representation of data to reinforce human cognition

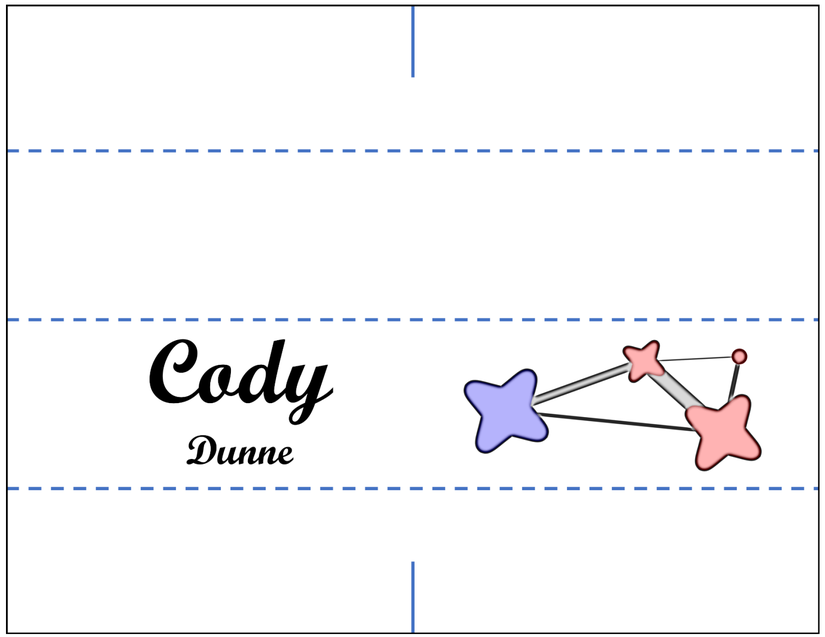


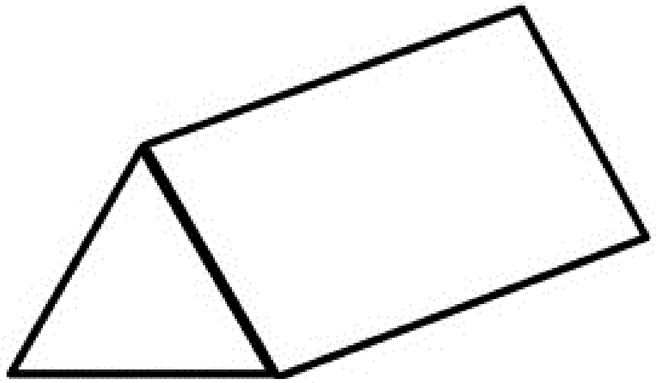
IN-CLASS EXERCISE

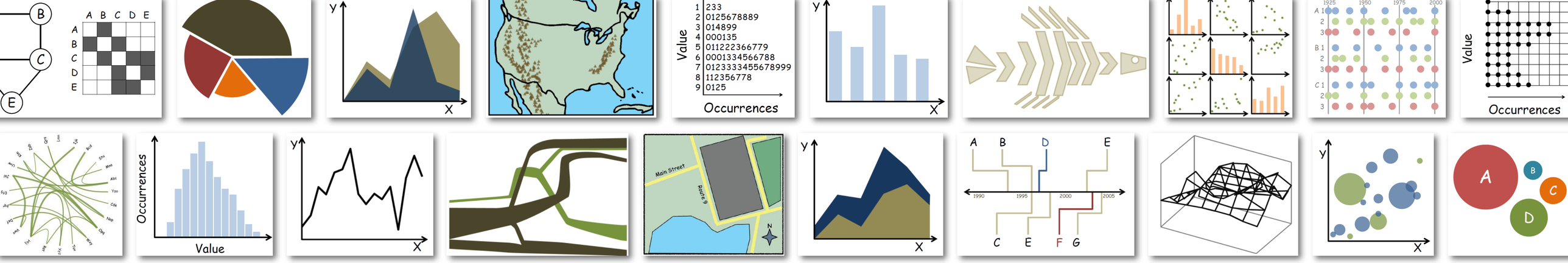
In-Class Sketching — Table Tents

15 min

https://canvas.instructure.com/courses/1781732/assignments/13386377







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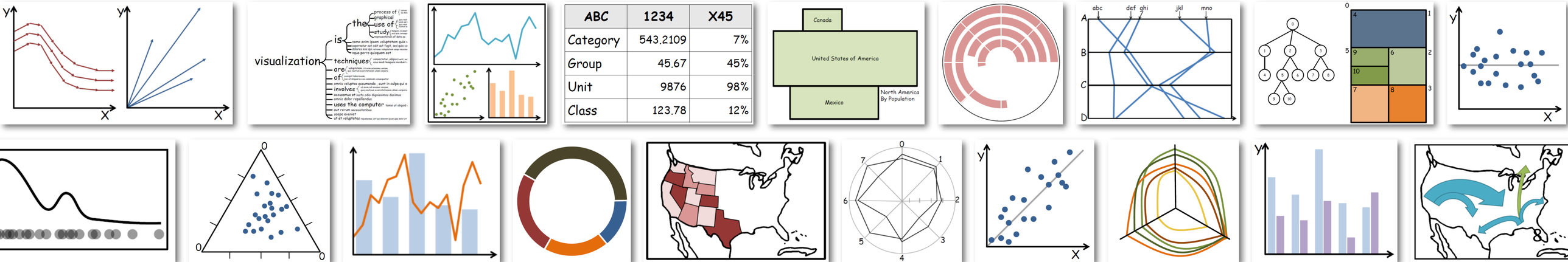
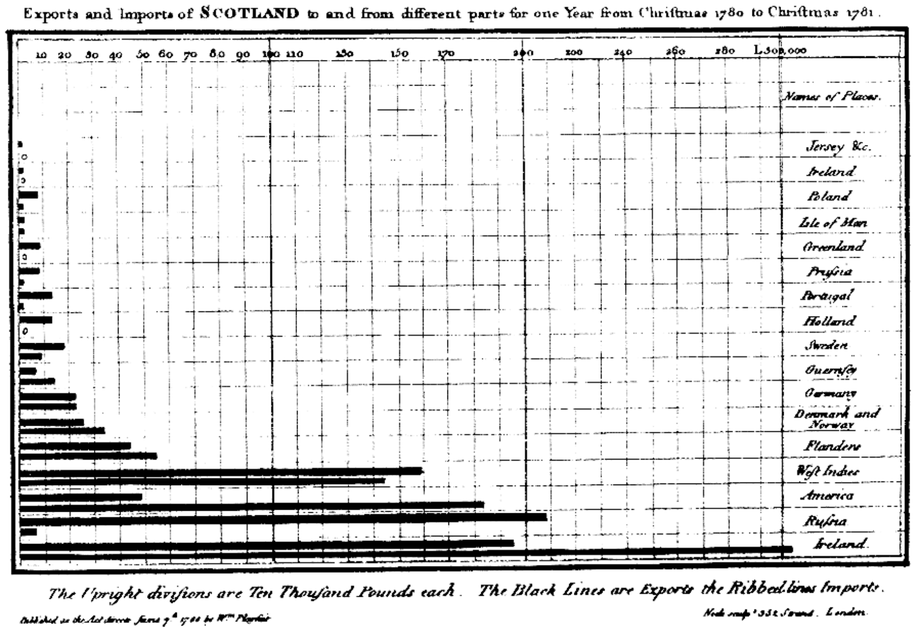
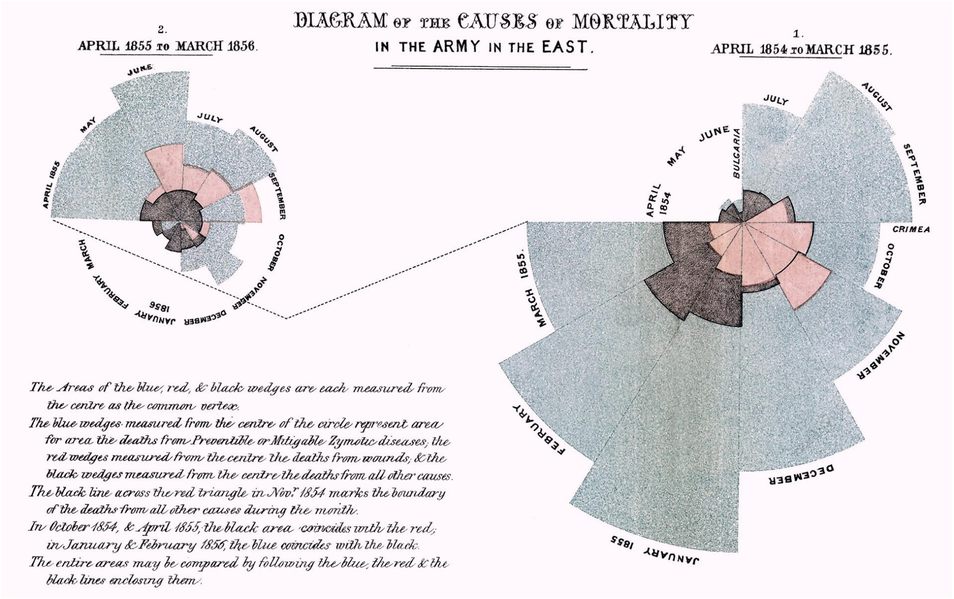
visualization: the visual representation of data to reinforce human cognition



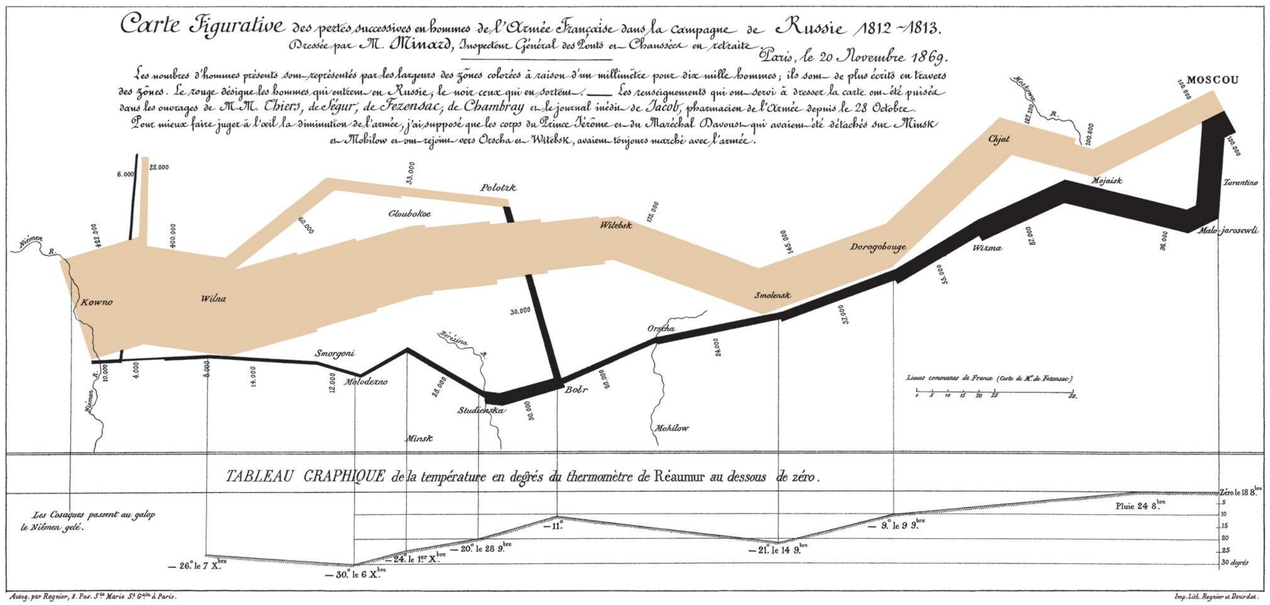
PTOLEMY (C. 150)



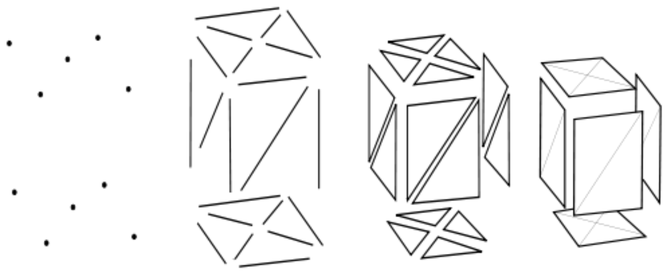
WILLIAM PLAYFAIR (C. 1786)



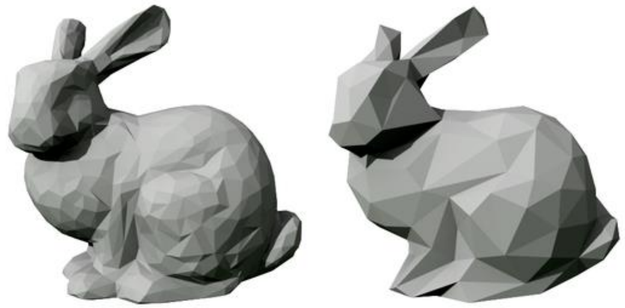
FLORENCE NIGHTINGALE (C. 1858)



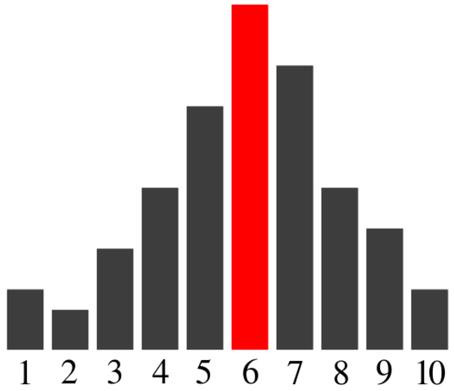
CHARLES MINARD (C. 1869)

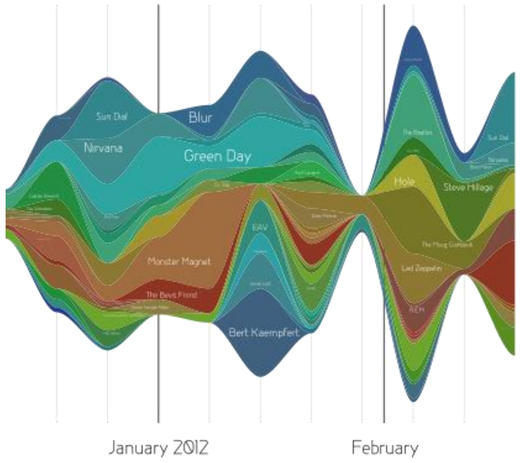


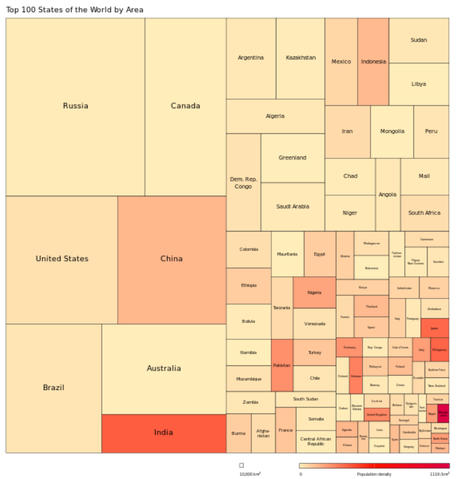
computer graphics

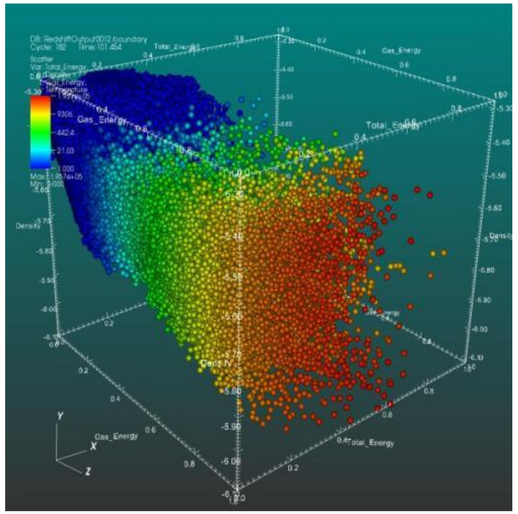


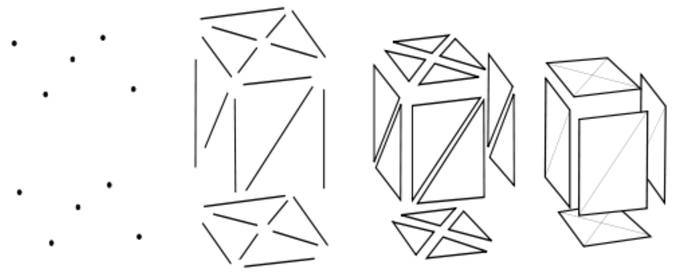
visualization



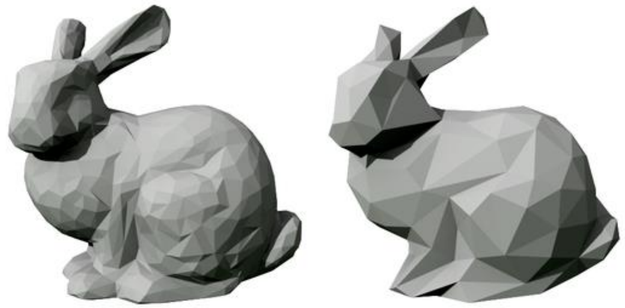




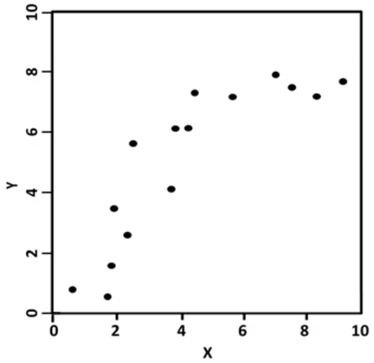


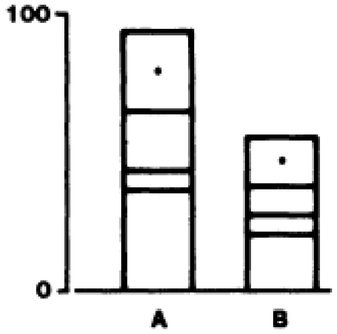


computer graphics

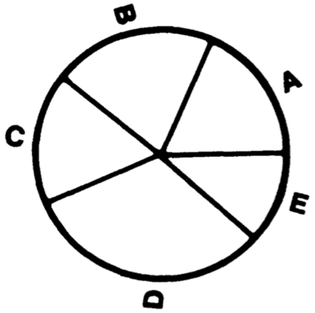


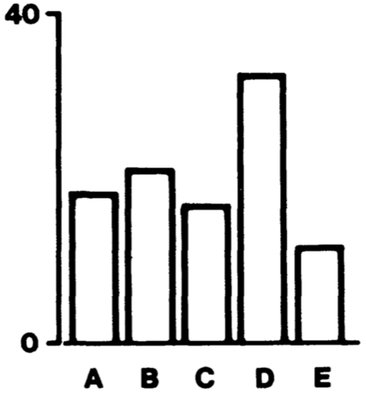
visualization

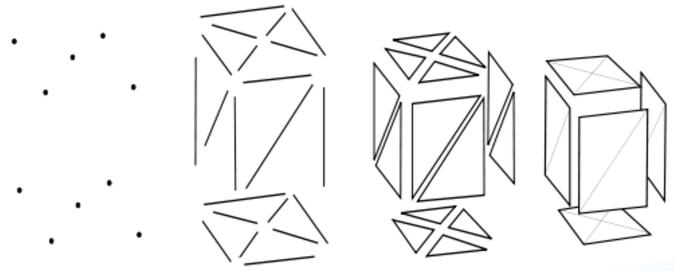




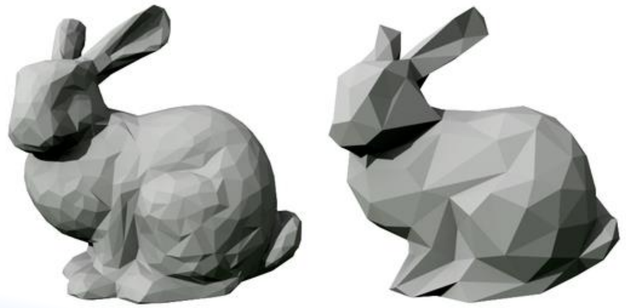
statistics







computer graphics



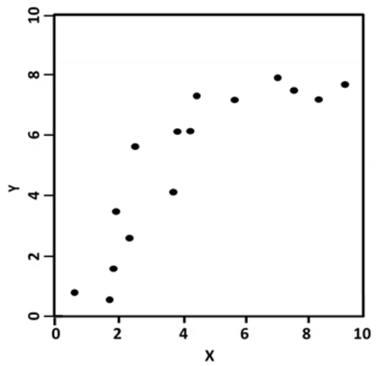
HCI

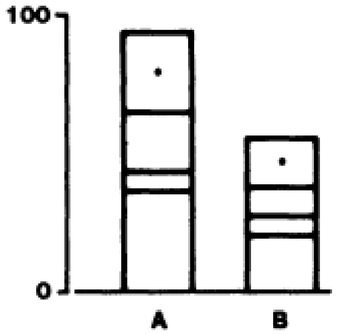
design

visualization

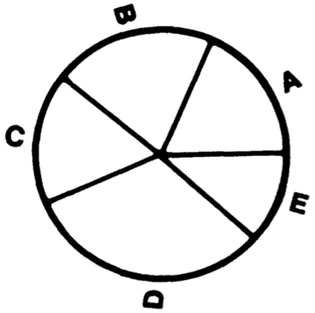
psychology

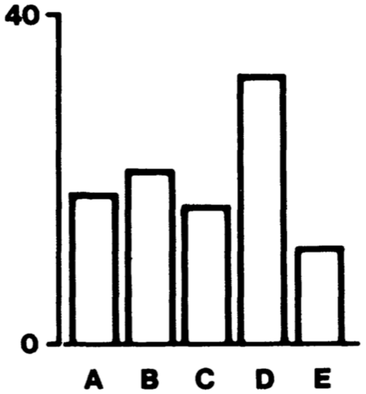
art





statistics

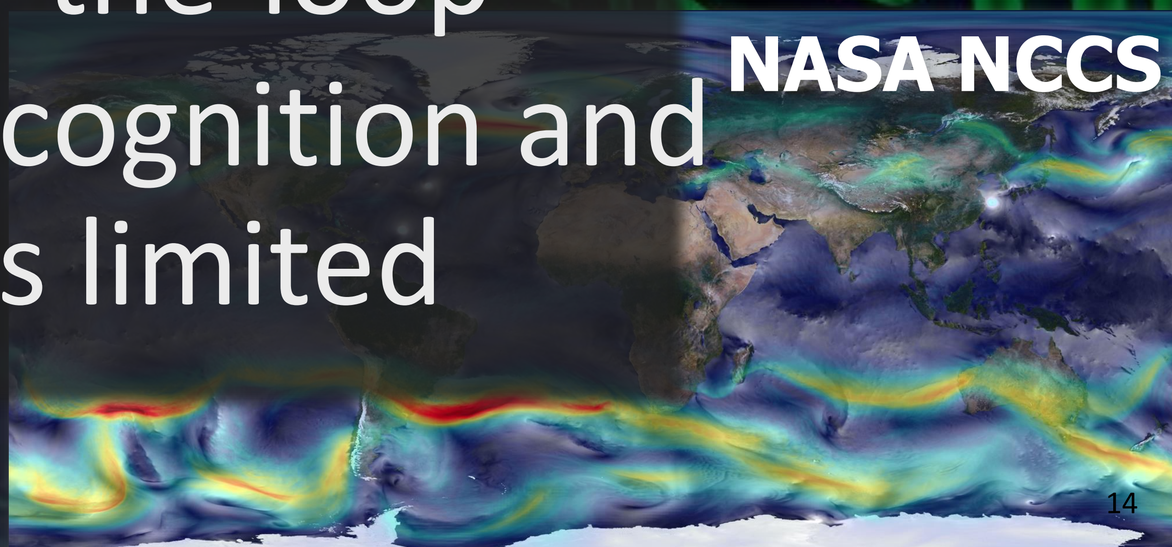




Ok, but why do we need visualization?

CHALLENGES:

- Scalability
- Complexity reduction
- Humans in-the-loop
  - → human cognition and memory is limited



q t f j n i x i g j u n a s b b t g r

k c l b v t x j x z x m x r g k l x

q h m z y w t e y j w n o

q t f j n i x i g j u n a s b b t g r

k c l b v t x j x z x m x r g k l x

q h m z y w t e y j w n o

“change blindness”

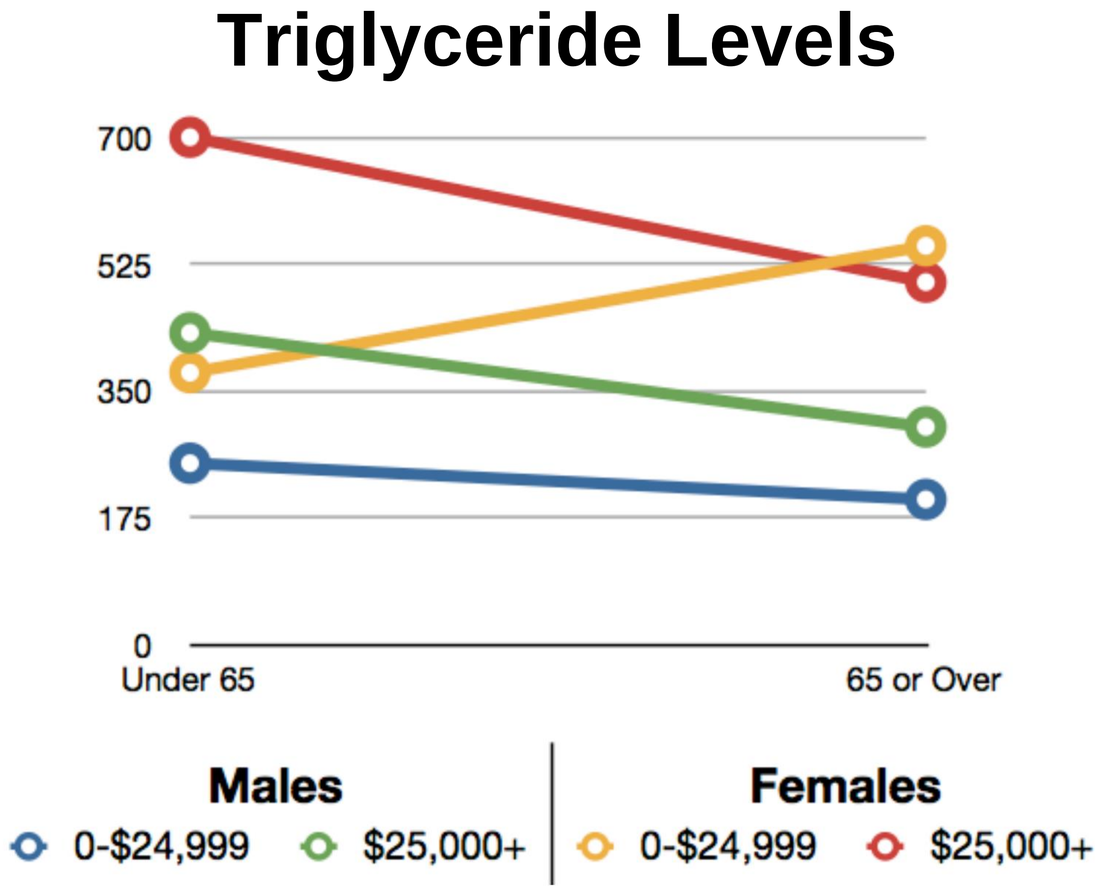
https://www.youtube.com/watch?v=FWSxSQsspiQ

Which gender and income level shows a different effect of age on triglyceride levels?

Triglyceride Levels

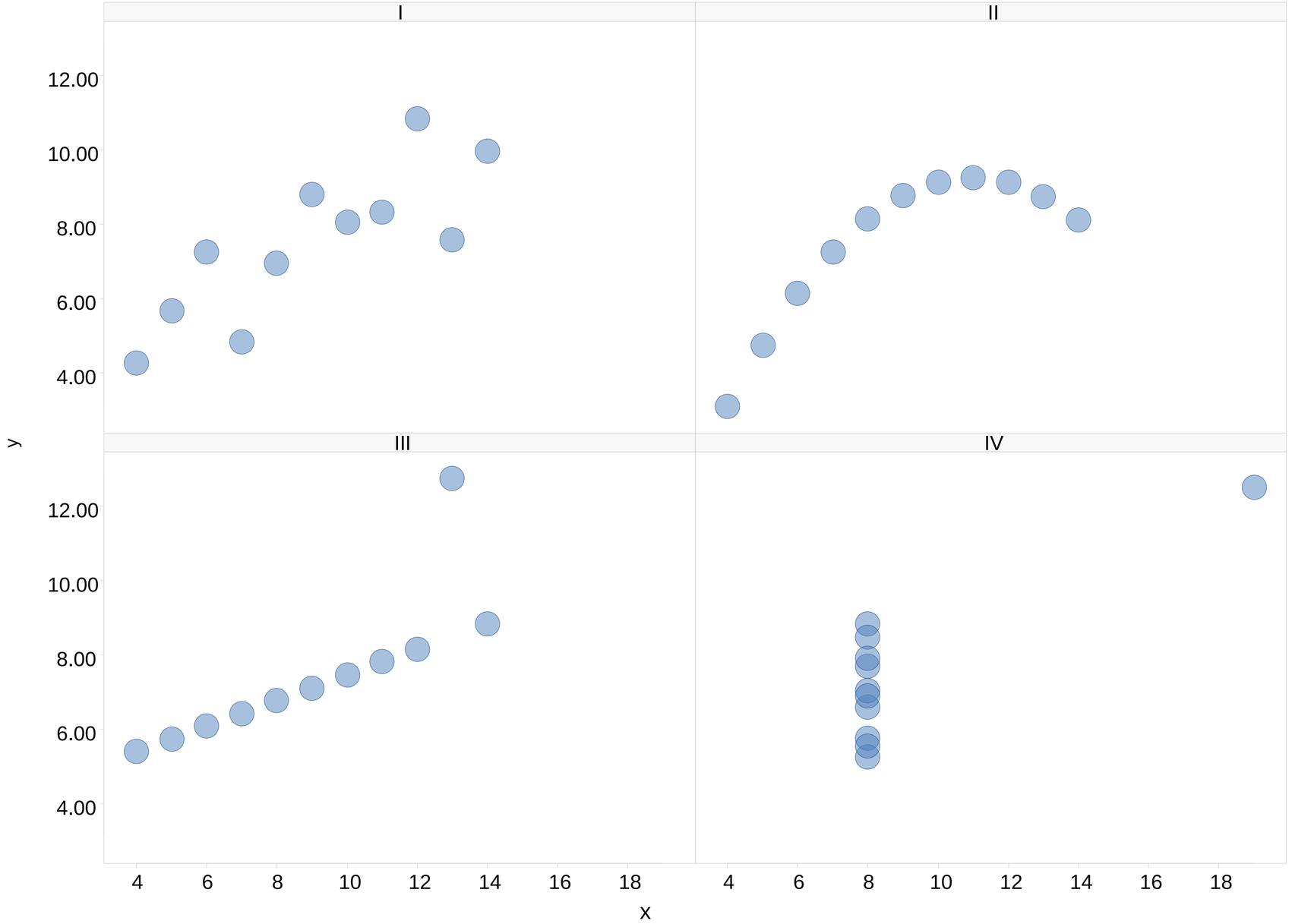
	Males		Females	
Income Group	Under 65	65 or Over	Under 65	65 or Over
0-$24,999	250	200	375	550
$25,000+	430	300	700	500

Which gender and income level shows a different effect of age on triglyceride levels?



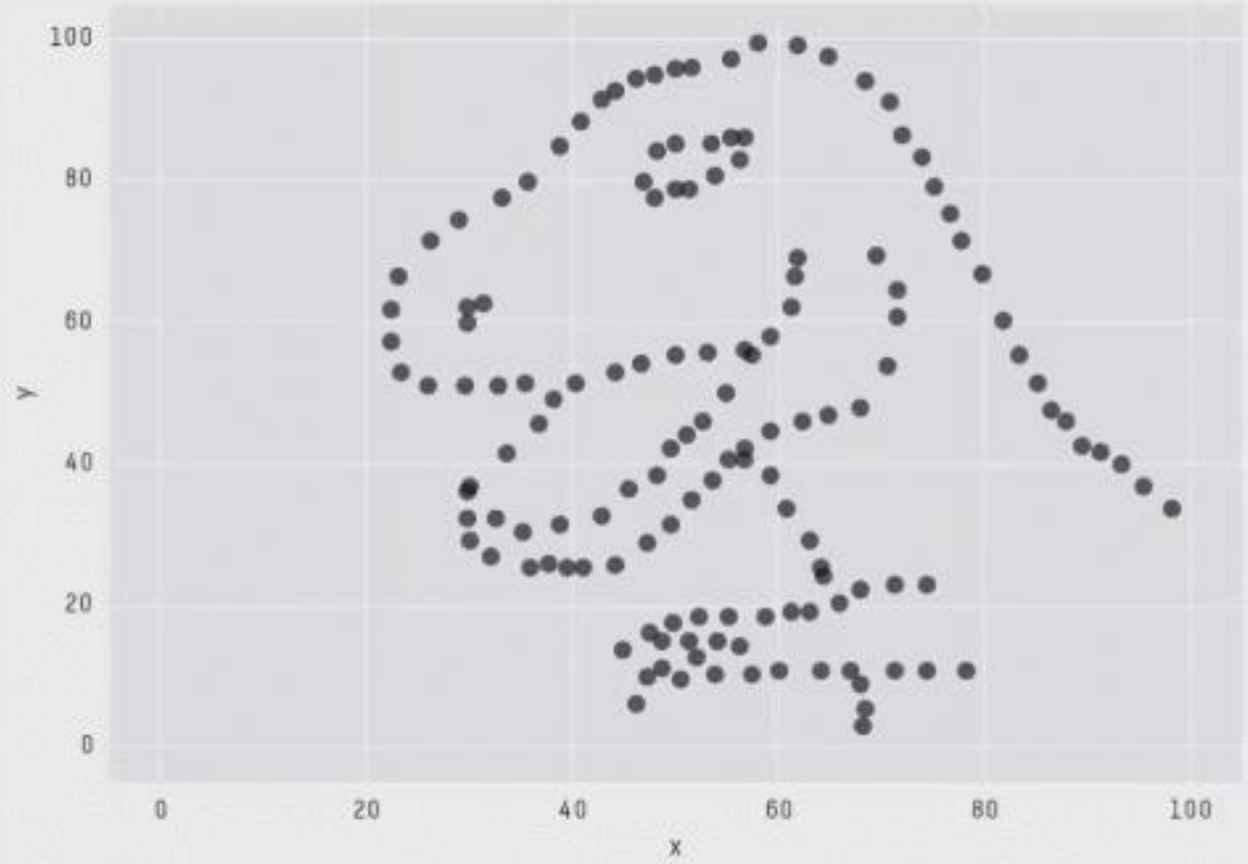
I		II		III		IV	
x	y	x	y	x	y	x	y
10.00	8.04	10.00	9.14	10.00	7.46	8.00	6.58
8.00	6.95	8.00	8.14	8.00	6.77	8.00	5.76
13.00	7.58	13.00	8.74	13.00	12.74	8.00	7.71
9.00	8.81	9.00	8.77	9.00	7.11	8.00	8.84
11.00	8.33	11.00	9.26	11.00	7.81	8.00	8.47
14.00	9.96	14.00	8.10	14.00	8.84	8.00	7.04
6.00	7.24	6.00	6.13	6.00	6.08	8.00	5.25
4.00	4.26	4.00	3.10	4.00	5.39	19.00	12.50
12.00	10.84	12.00	9.13	12.00	8.15	8.00	5.56
7.00	4.82	7.00	7.26	7.00	6.42	8.00	7.91
5.00	5.68	5.00	4.74	5.00	5.73	8.00	6.89

	Value	Equality
X Mean	9	=
Y Mean	7.50	.00
X Variance	11	=
Y Variance	4.12	.00
Correlation	0.816	.000
Linear regression line	y = 3.00 + 0.500x	.00 and .000


I
II
III
IV
y
x
12.00
10.00
8.00
6.00
4.00
4
6
8
10
12
14
16
18

There are three types of lies: lies, damned lies, and statistics

Mark Twain (maybe)

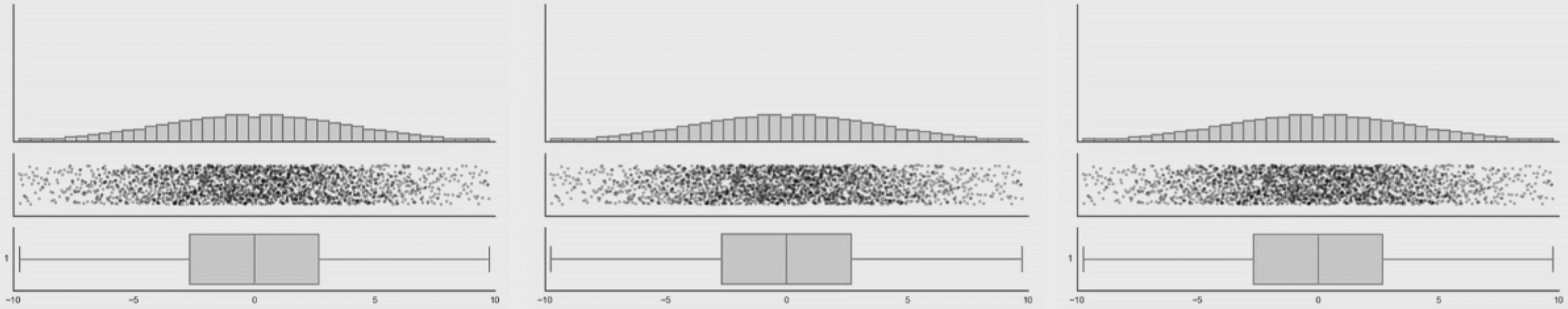


X Mean: 54.2659224
Y Mean: 47.8313999
X SD : 16.7649829
Y SD : 26.9342120
Corr. : -0.0642526

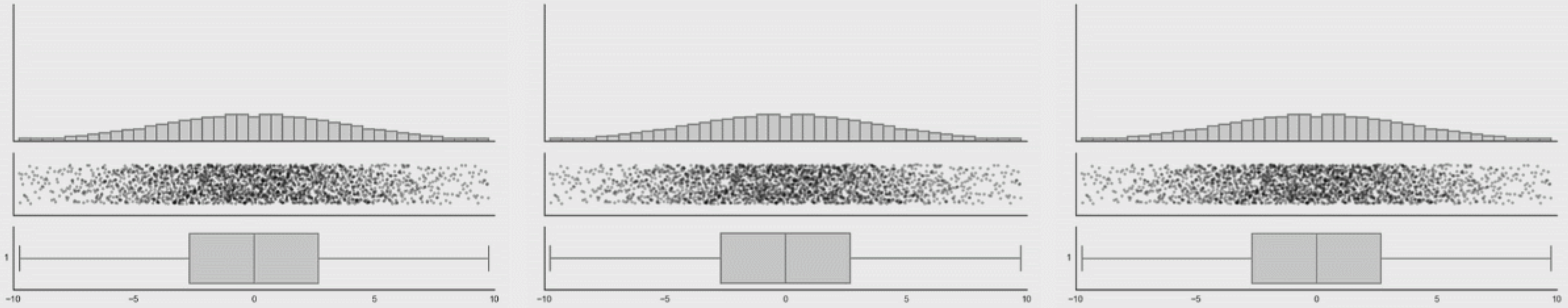
Matejka &Fitzmaurice, 2017

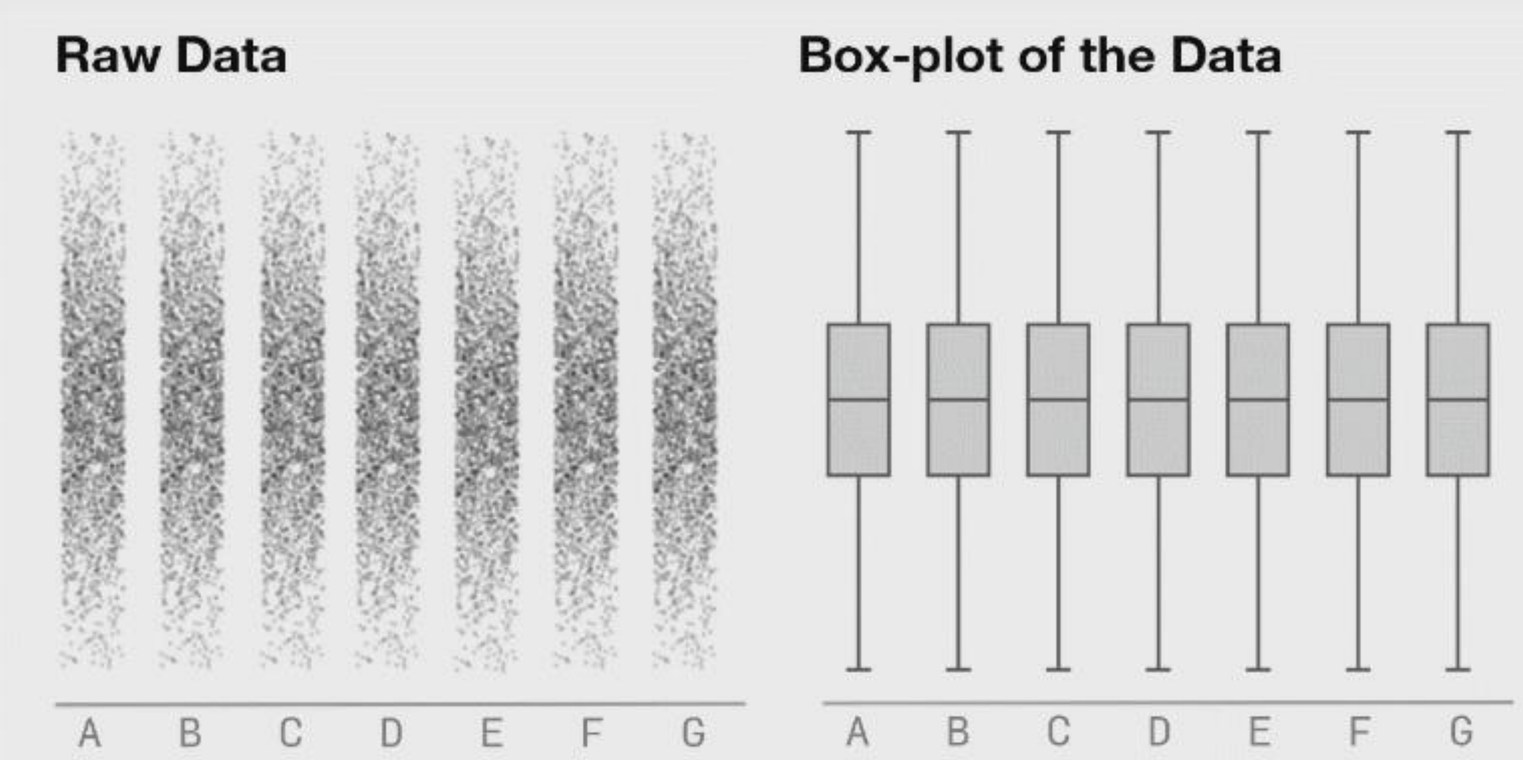
No catalogue of techniques can convey a willingness to look for what can be seen, whether or not anticipated. Yet this is at the heart of exploratory data analysis. ... the picture-examining eye is the best finder we have of the wholly unanticipated.

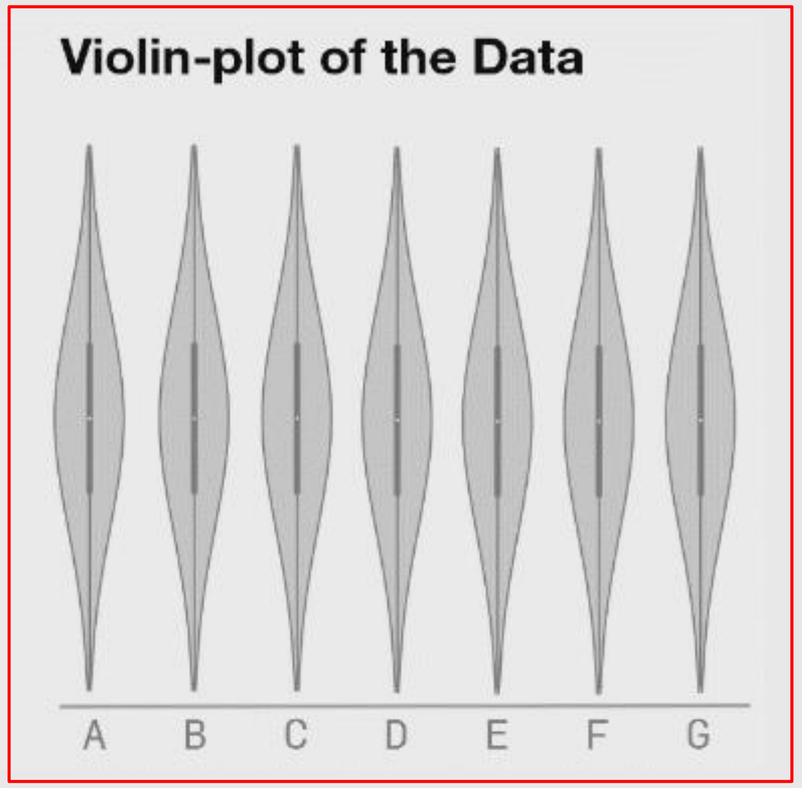
– Tukey, 1980



Matejka &Fitzmaurice, 2017







Matejka &Fitzmaurice, 2017

Ok, but why do we need visualization?

Why visualize your data?

- Help cognition
- Expand memory
- Generate hypotheses
- Answer questions
- Make decisions
- Find patterns
- Record
- Clarify
- Communicate
- Inspire

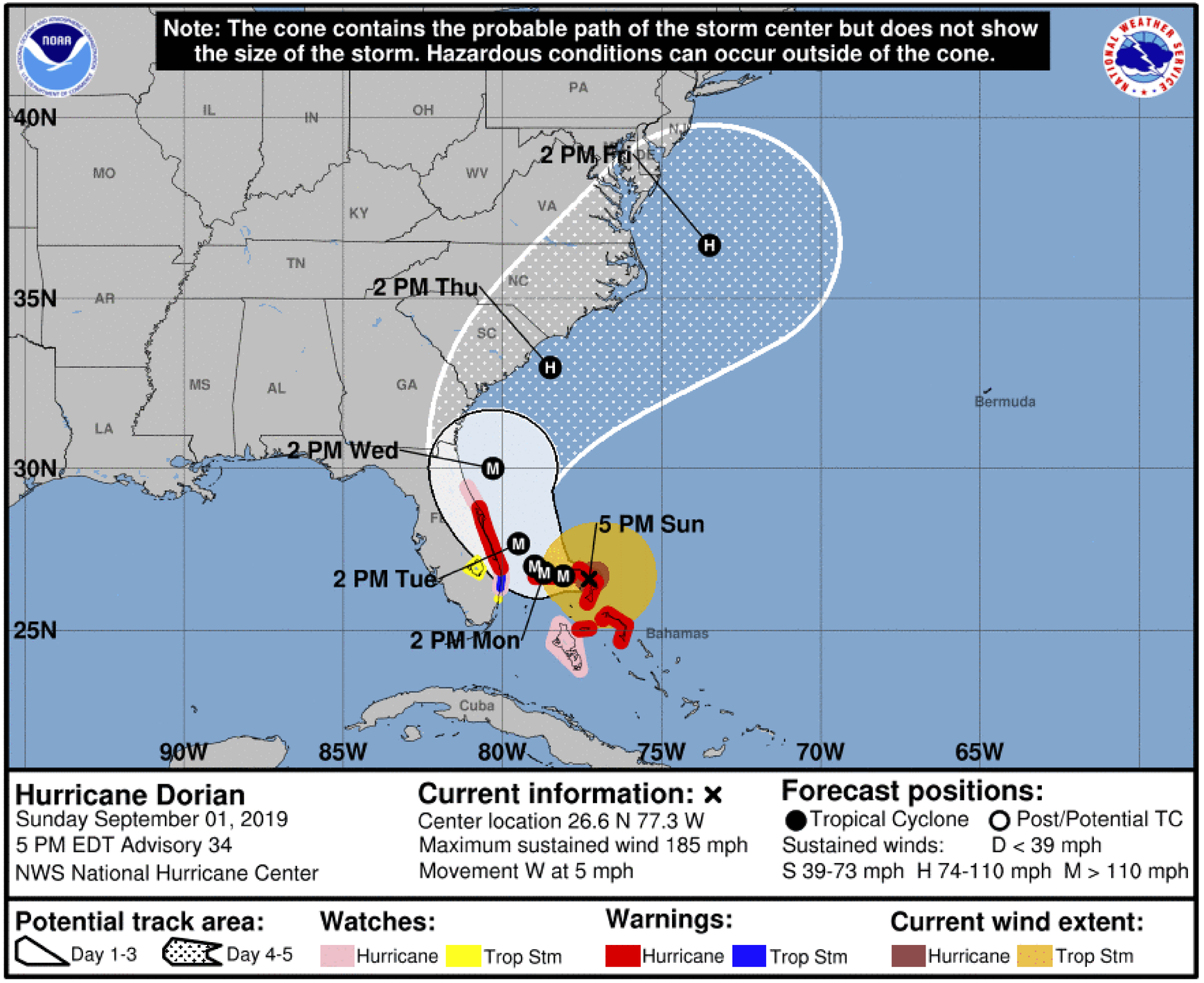
Why visualize your data?

https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen

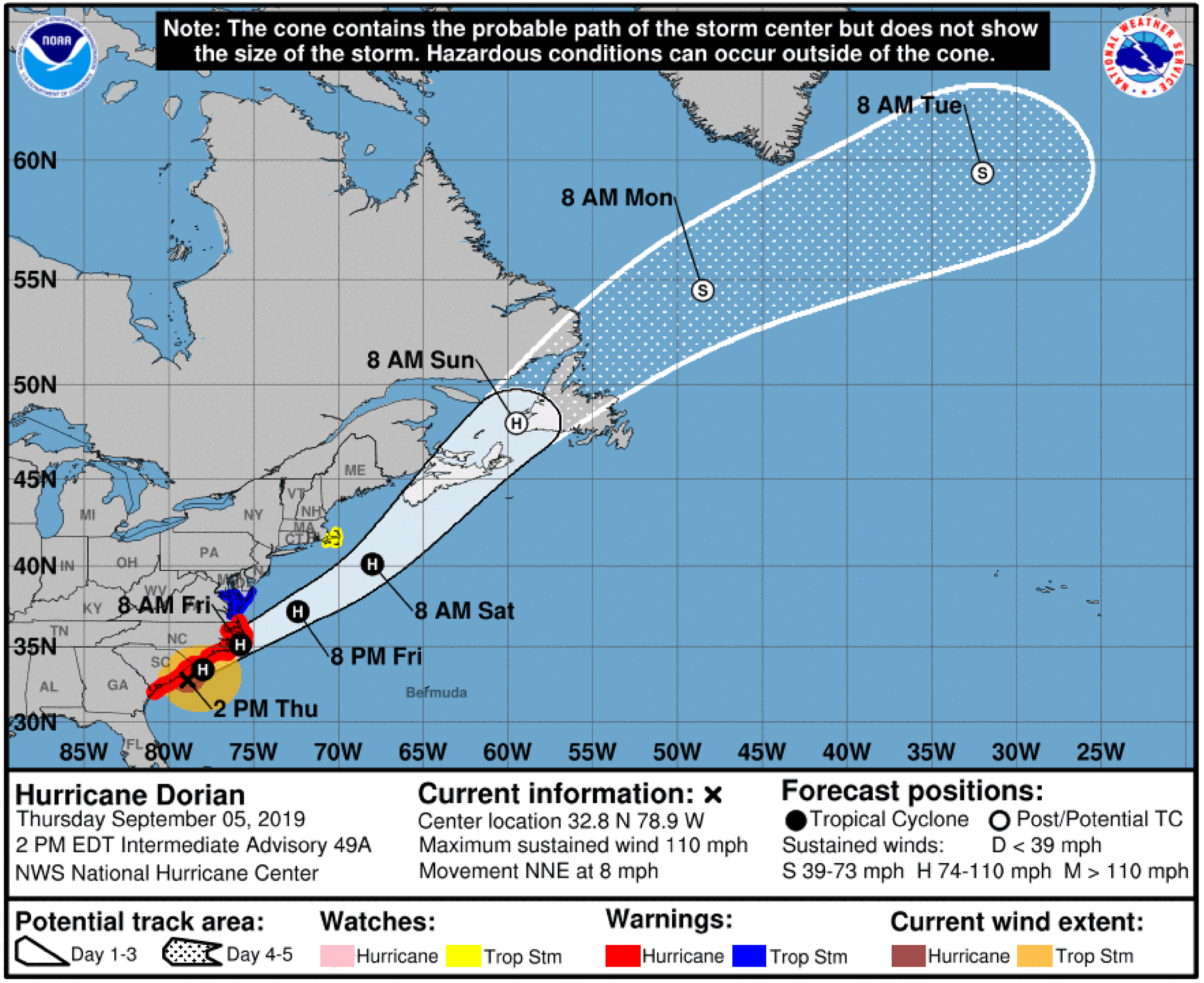
Why visualize your data?

Generate hypotheses, Answer questions, Find patterns, Record, Clarify, Communicate, Inspire

https://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen

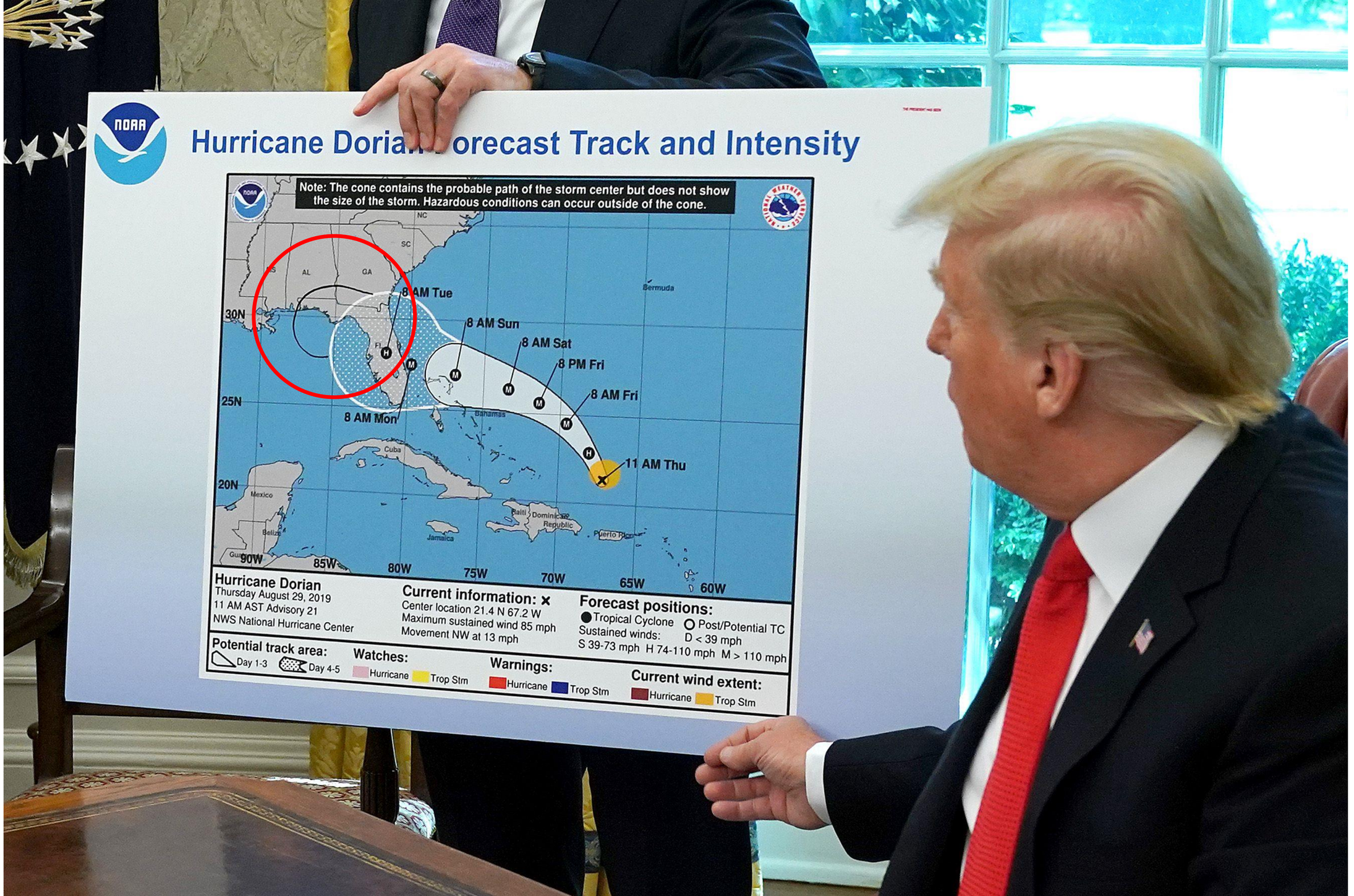


https://www.nhc.noaa.gov/refresh/graphics_at5+shtml/155815.shtml?cone#contents



https://www.nhc.noaa.gov/refresh/graphics_at5+shtml/155815.shtml?cone#contents


Hurricane Dorian Forecast Track and Intensity
Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.
NOAA
8 AM Tue
8 AM Sun
8 AM Sat
8 PM Fri
8 AM Fri
11 AM Thu
30N
75W
70W
65W
60W
Bermuda
Bahamas
Haiti
Dominican Republic
Puerto Rico
Jamaica
Forecast positions:
Tropical Cyclone
Post/Potential TC
D < 39 mph


Hurricane Dorian Forecast Track and Intensity
Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.
NC
SC
AL
GA
FL
Bermuda
Bahamas
Cuba
Haiti
Dominican Republic
Puerto Rico
Jamaica
Mexico
Belize
Guatemala
30N
25N
20N
90W
85W
80W
75W
70W
65W
60W
8 AM Tue
8 AM Sun
8 AM Sat
8 PM Fri
8 AM Fri
8 AM Mon
11 AM Thu
Hurricane Dorian
Thursday August 29, 2019
11 AM AST Advisory 21
NWS National Hurricane Center
Current information:
Center location 21.4 N 67.2 W
Maximum sustained wind 85 mph
Movement NW at 13 mph
Forecast positions:
Tropical Cyclone
Post/Potential TC
Sustained winds:
D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph
Potential track area:
Day 1-3
Day 4-5
Watches:
Hurricane
Trop Stm
Warnings:
Hurricane
Trop Stm
Current wind extent:
Hurricane
Trop Stm

Opinion

Those Hurricane Maps Don't Mean What You Think They Mean

We use hurricane forecasts to warn people. Why do we misinterpret them so often?

By Alberto Cairo

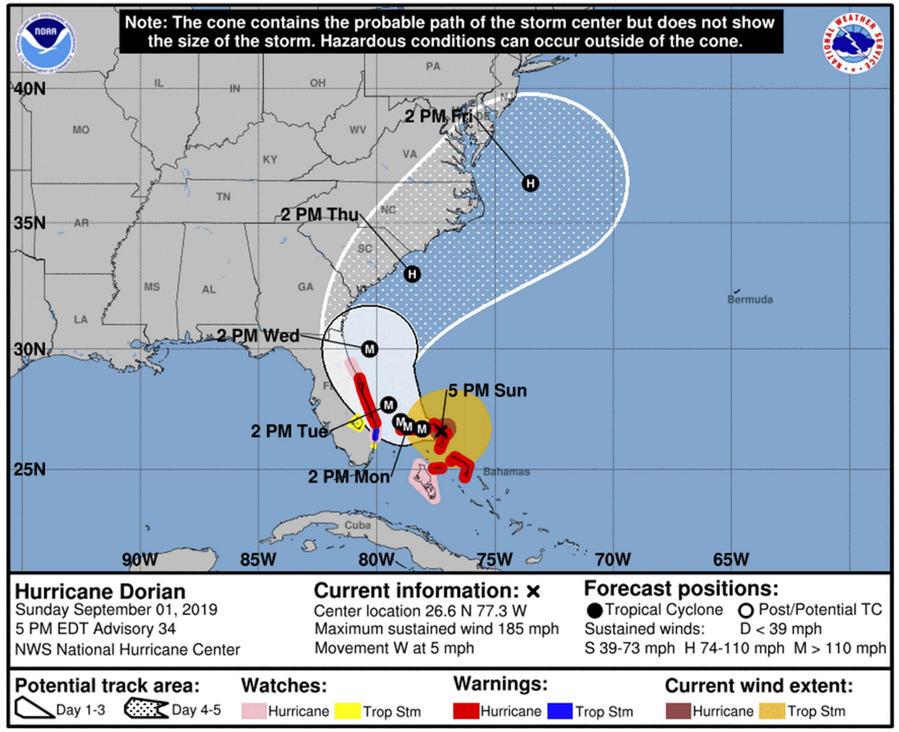
With Tala Schlossberg

https://www.nytimes.com/interactive/2019/08/29/opinion/hurricane-dorian-forecast-map.html

In-Class Redesign — Hurricane Funnels

35 min

https://canvas.instructure.com/courses/1781732/assignments/13386302



https://www.nhc.noaa.gov/refresh/graphics_at5+shtml/155815.shtml?cone#contents

Upcoming Assignments & Communication

https://canvas.instructure.com/courses/1781732

If you don't have an account on our Canvas yet:
https://canvas.instructure.com/enroll/CMAPDM
Use your name as known by the registrar and your @husky.neu.edu email.

Look at the upcoming assignments and deadlines (12:01am)!

- Textbook, Readings & Reading Quizzes
- Assignment 1a,b,c
- Projects

Everyday Required Supplies:

- 5+ colors of pen/pencil
- White paper
- Laptop and charger
- Table tent

Use Canvas Discussions for general questions, email the instructor/TAs for questions specific to you.