Introduction

SI 649 W20: Information visualization

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School of Information

University of Michigan

1. Fill out this survey: https://tinyurl.com/sfw5hkp

2. Join this slack: https://tinyurl.com/uhaxkwy

3. Fill out the attendence form (see board)

4. Close your laptop

(laptops)

[Sana, Weston, & Cepeda. Laptop multitasking hinders classroom learning for both users and nearby peers, Computers & Education, Volume 62, 2013. https://doi.org/10.1016/j.compedu.2012.10.003]

A little bit about me

Master's and Bachelor's in CS (Fine Art minor) from the University of Waterloo

PhD in CSE from the University of Washington

My work draws upon human–computer interaction, visualization, design, and statistics

# What I would like to do today

Motivate why visualization is important.

Give an overview of what you will learn.

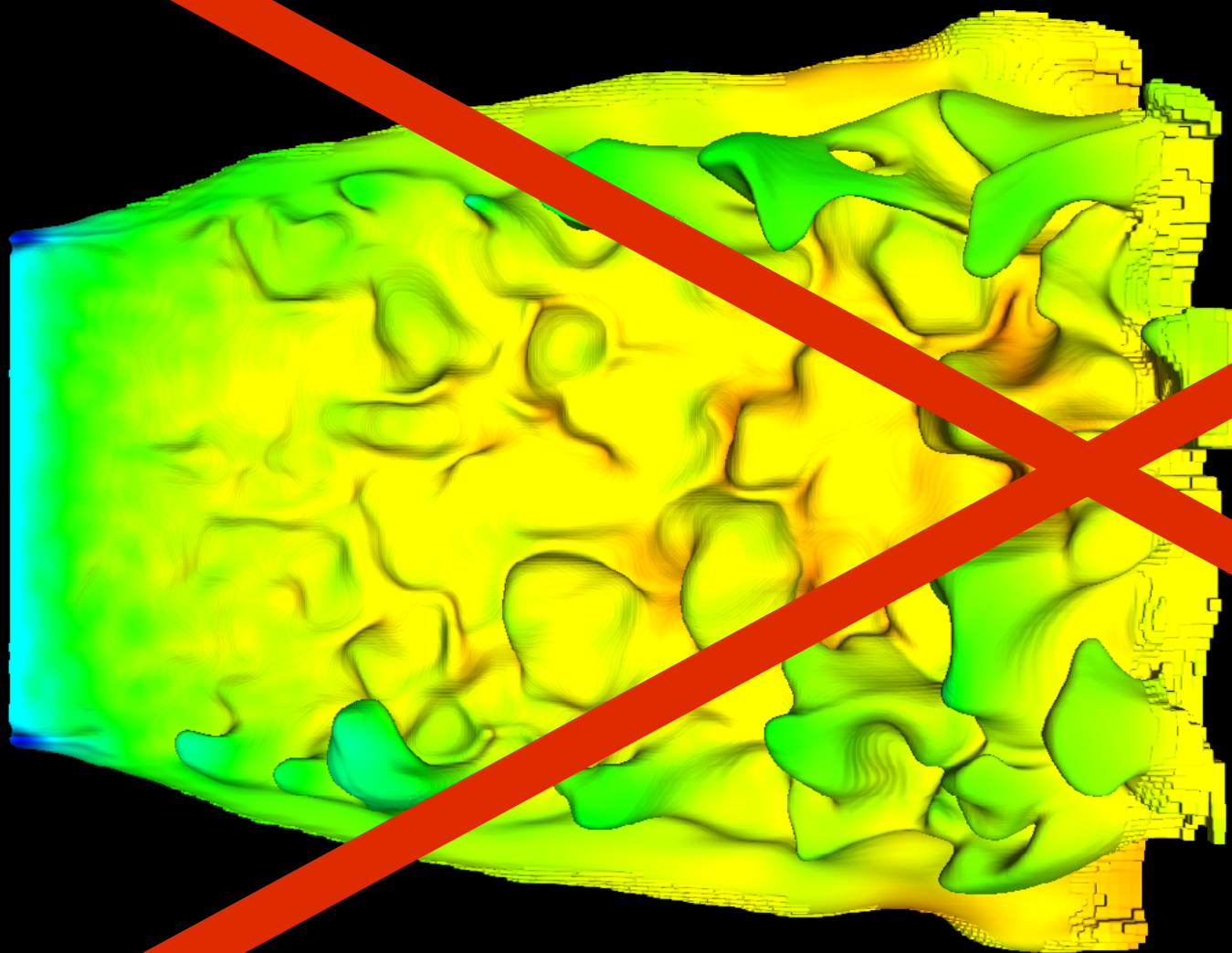Describe how you will learn it (class structure).

What is information visualization?

Visualization

The use of computer-supported,
(possibly) interactive,
visual representations of data
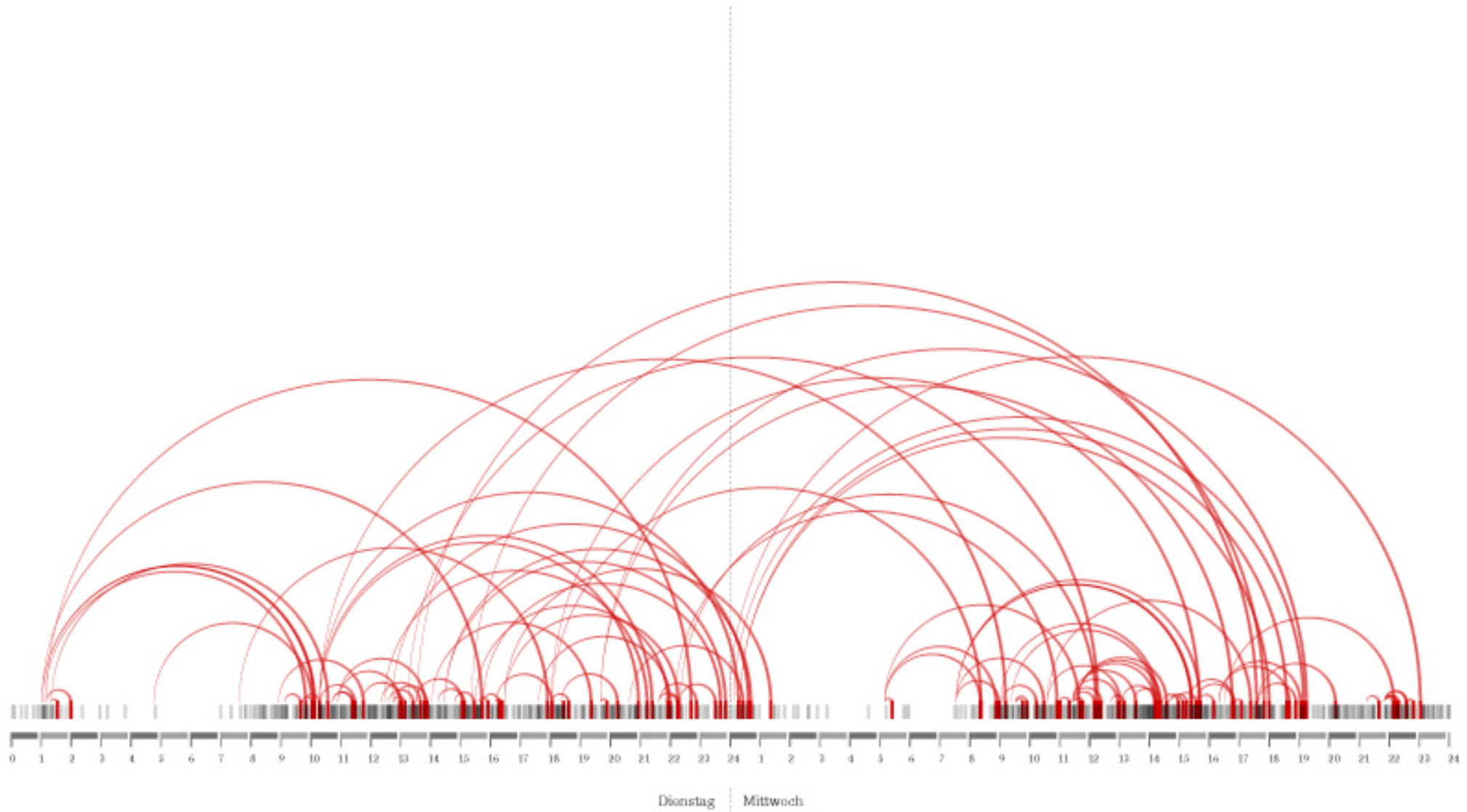to amplify cognition.

Methane flame simulation
http://www-vis.lbl.gov/Research/svPerfGL/
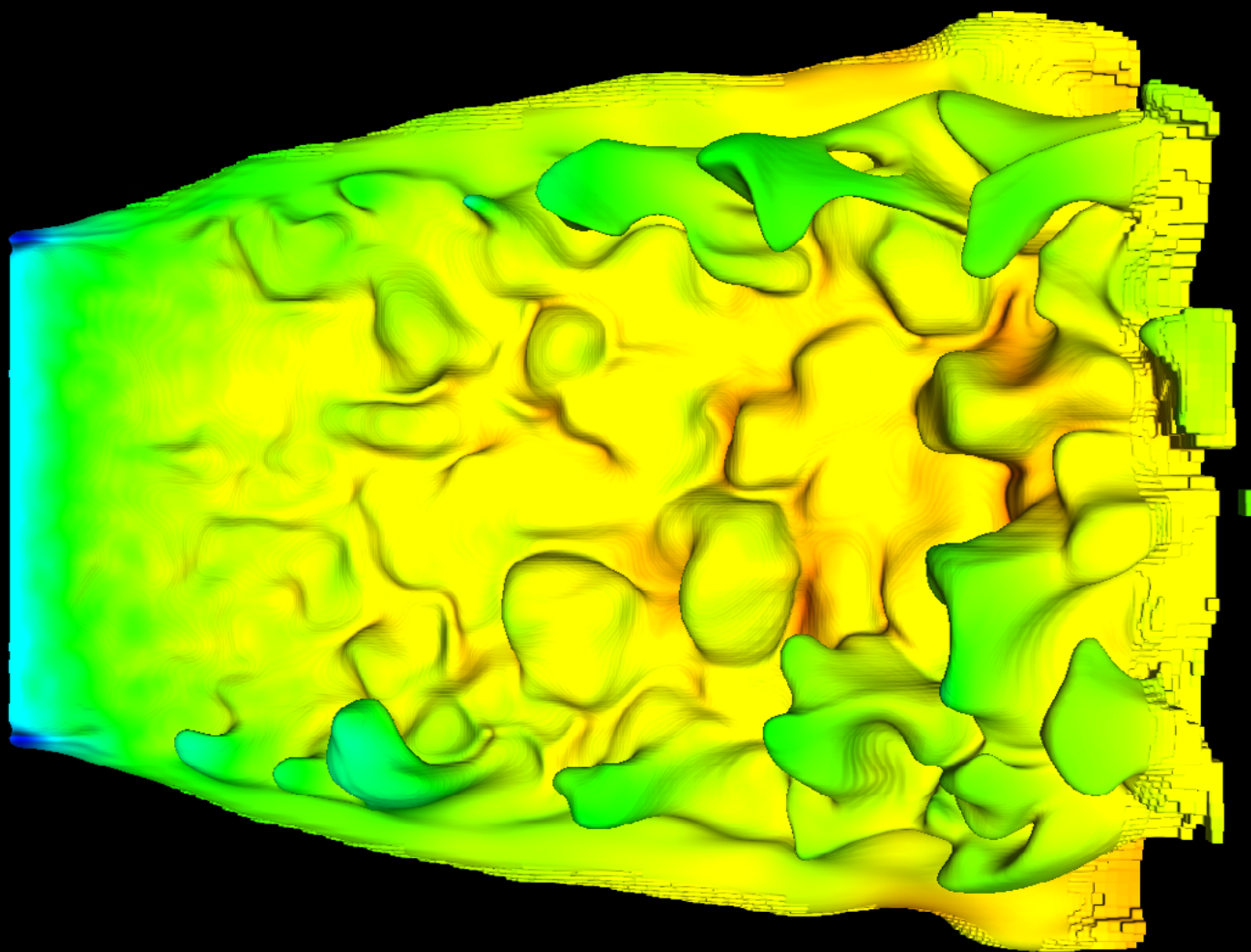
Methane flame simulation
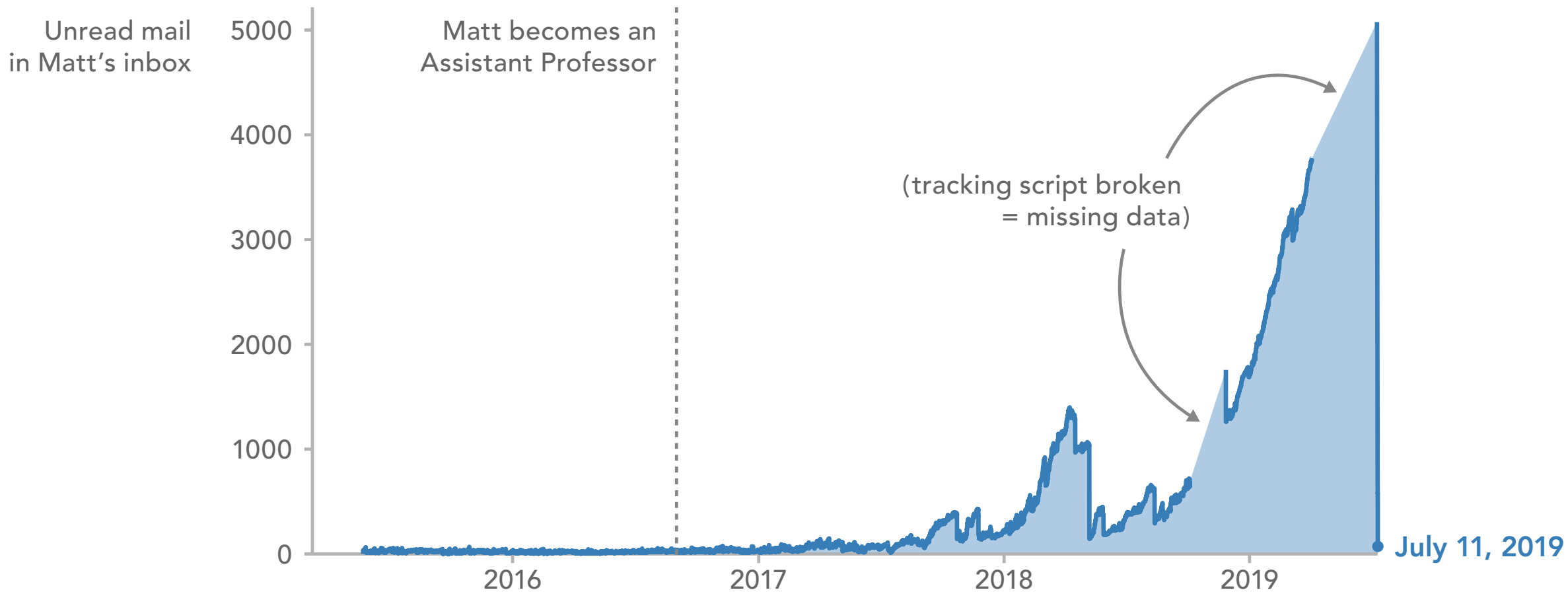*http://www-vis.lbl.gov/Research/PerfGL/*

Visualization

The use of computer-supported,
(possibly) interactive,
visual representations of data
to amplify cognition.

Information Visualization

The use of computer-supported,
(possibly) interactive,
abstract visual representations of data
to amplify cognition.

[Email response times, http://www.matthiasdittrich.com/projekte/dliste/visualisations/index.html]

Unread mail
in Matt's inbox

Matt becomes an
Assistant Professor

5000

4000

3000

(tracking script broken
= missing data)

2000

1000

0

2016   2017   2018   2019

July 11, 2019

Why visualize?

Visualize for analysis

Visualize for analysis: Anscombe's quartet

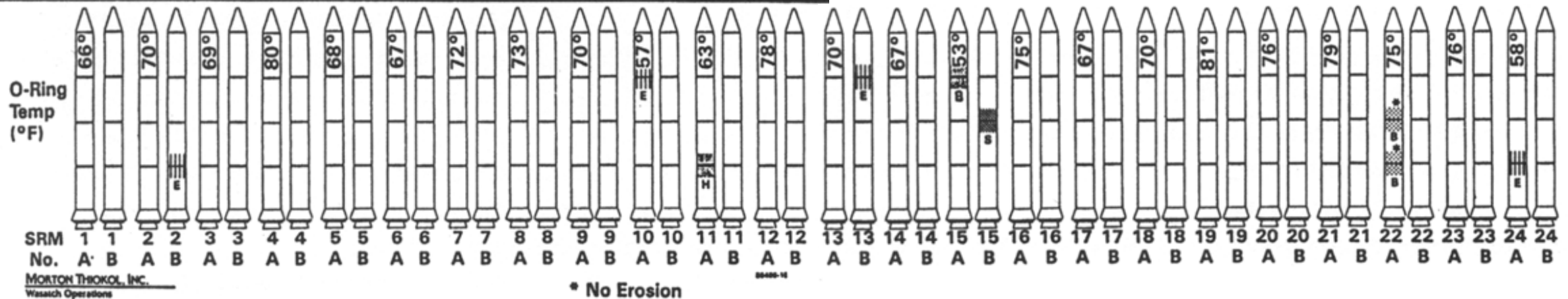| I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

4 datasets, same means, variances, correlation
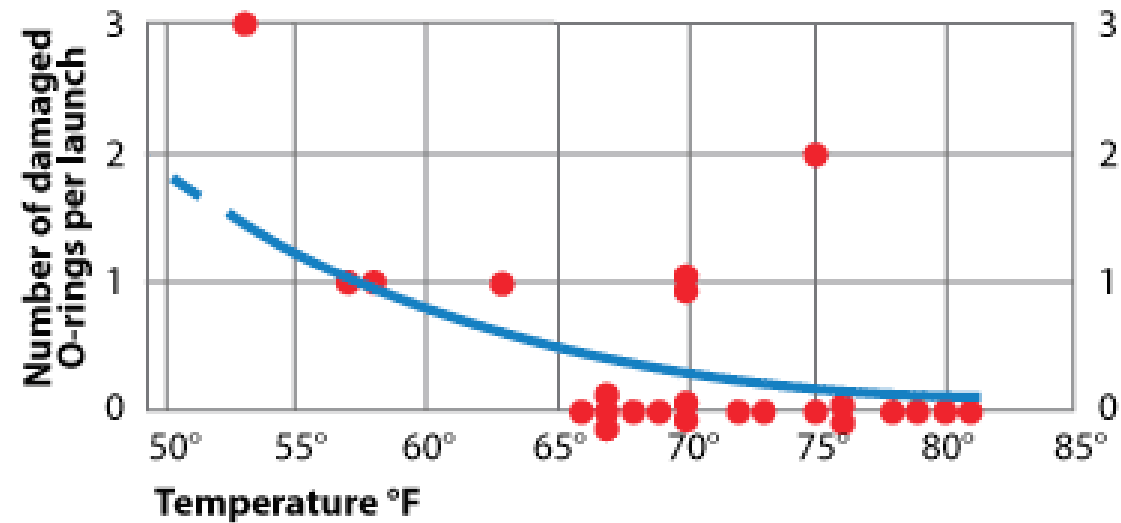
Visualize for analysis: Anscombe's quartet
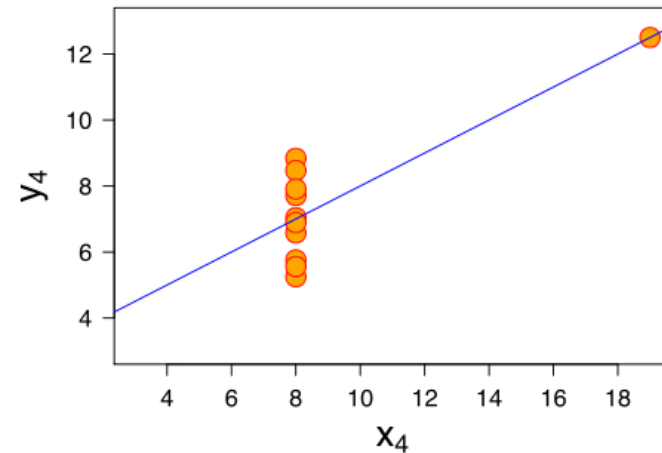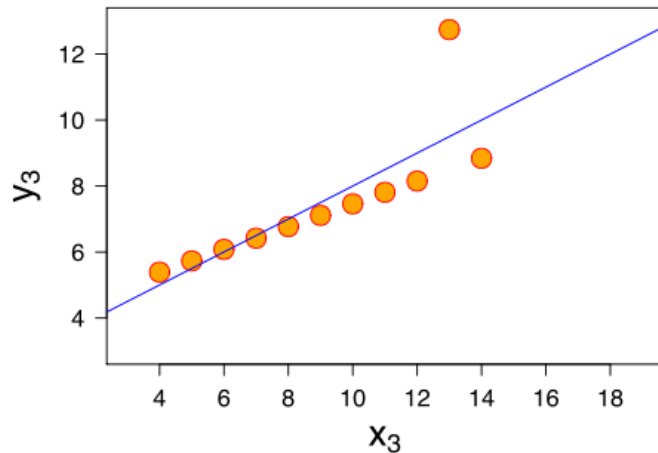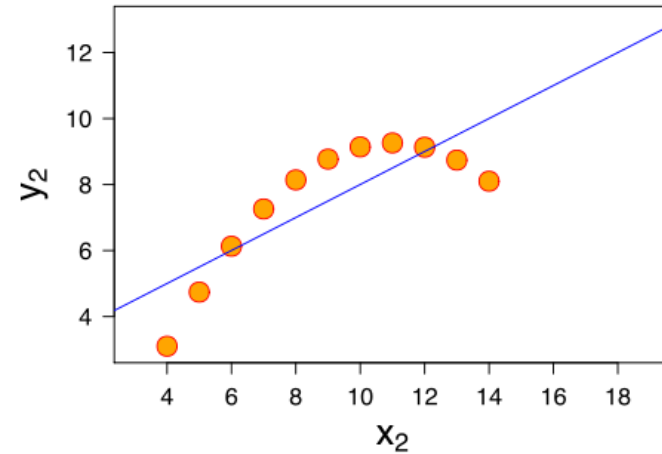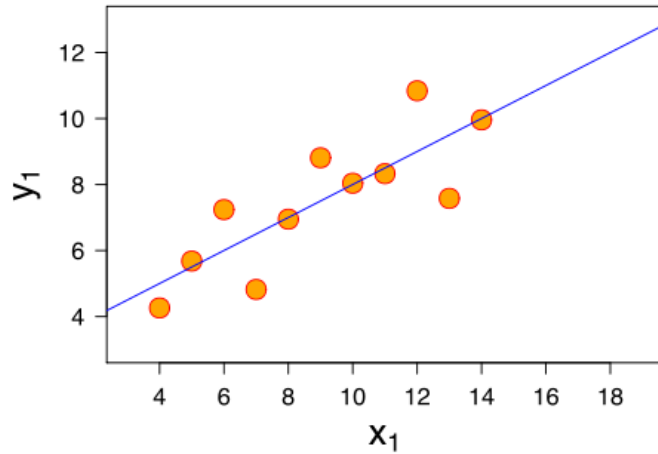
O-ring failure in the Challenger

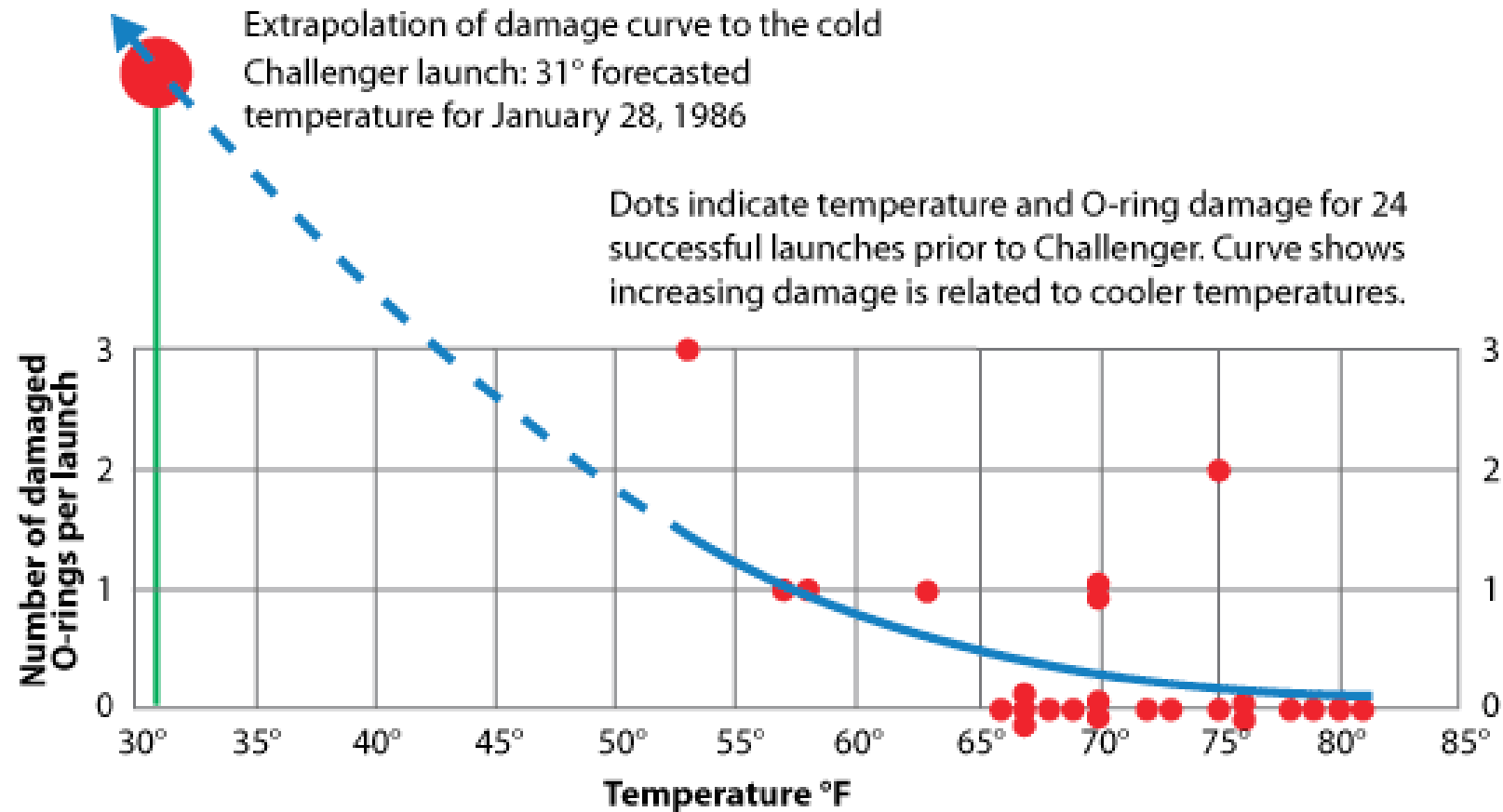History of O-Ring Damage in Field Joints (Cont)

O-ring failure in the Challenger

O-ring failure in the Challenger

Extrapolation of damage curve to the cold
Challenger launch: 31° forecasted
temperature for January 28, 1986

Dots indicate temperature and O-ring damage for 24
successful launches prior to Challenger. Curve shows
increasing damage is related to cooler temperatures.

Visualize for analysis

Visualize first

Visualize for analysis

Visualize first

Visualize as a reflex

Visualize for analysis

Visualize first

Visualize as a reflex

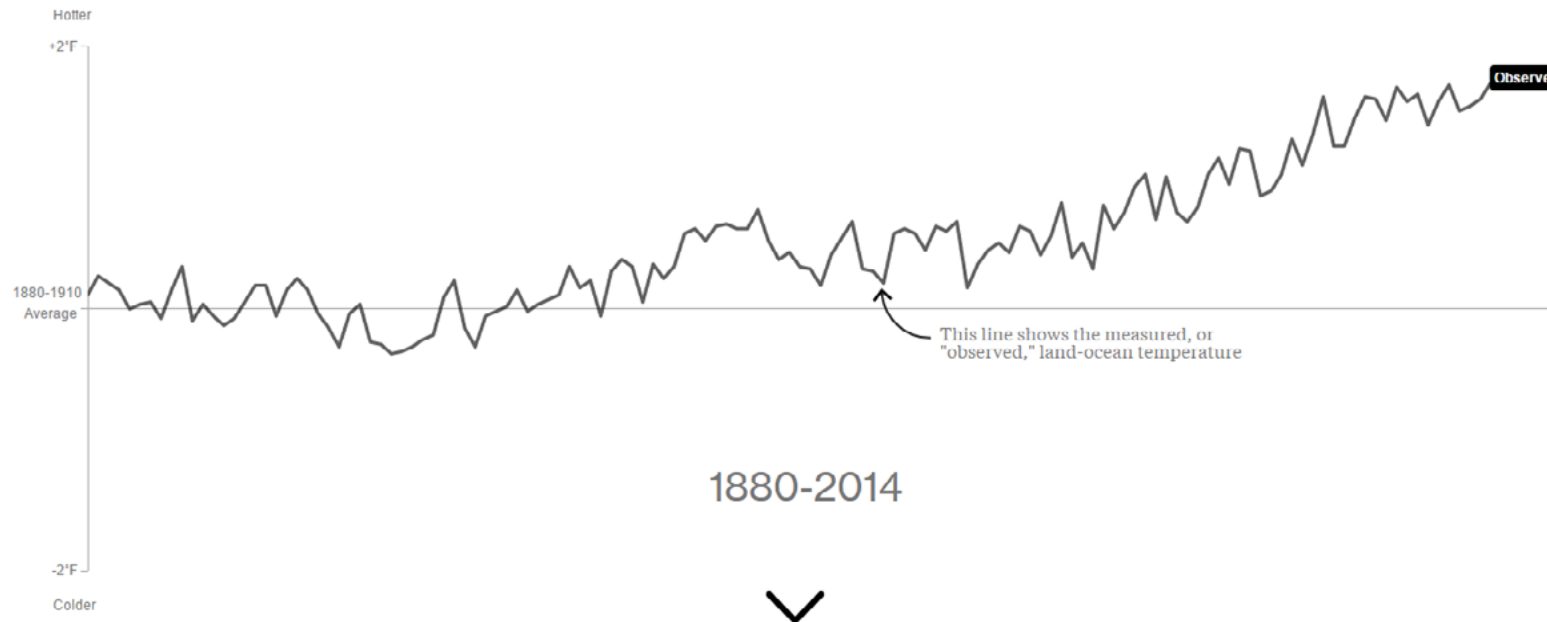Visualize using effective encodings

Visualize for communication

Visualize for communication
[https://www.bloomberg.com/graphics/2015-whats-warming-the-world/]

Visualize for communication

Draw your line on the chart below

Percent of children who attended college

Free tip: Your line
should go through
this point.

Parents' income percentile

Poorest

Richest
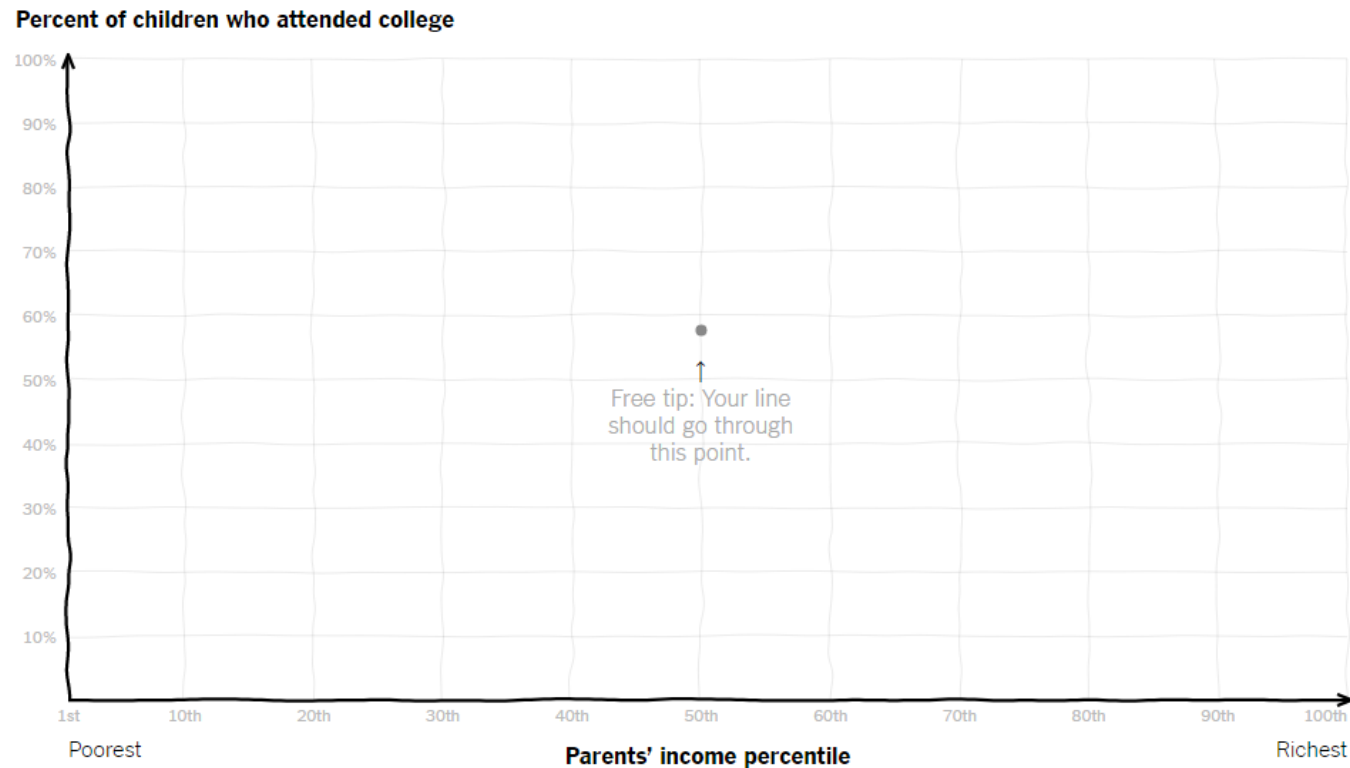
Why/when interactive visualization?

Rhetoric: it can be more convincing

Boosting: it can be more effective

Geographic Tube Map (click a station for travel time map)
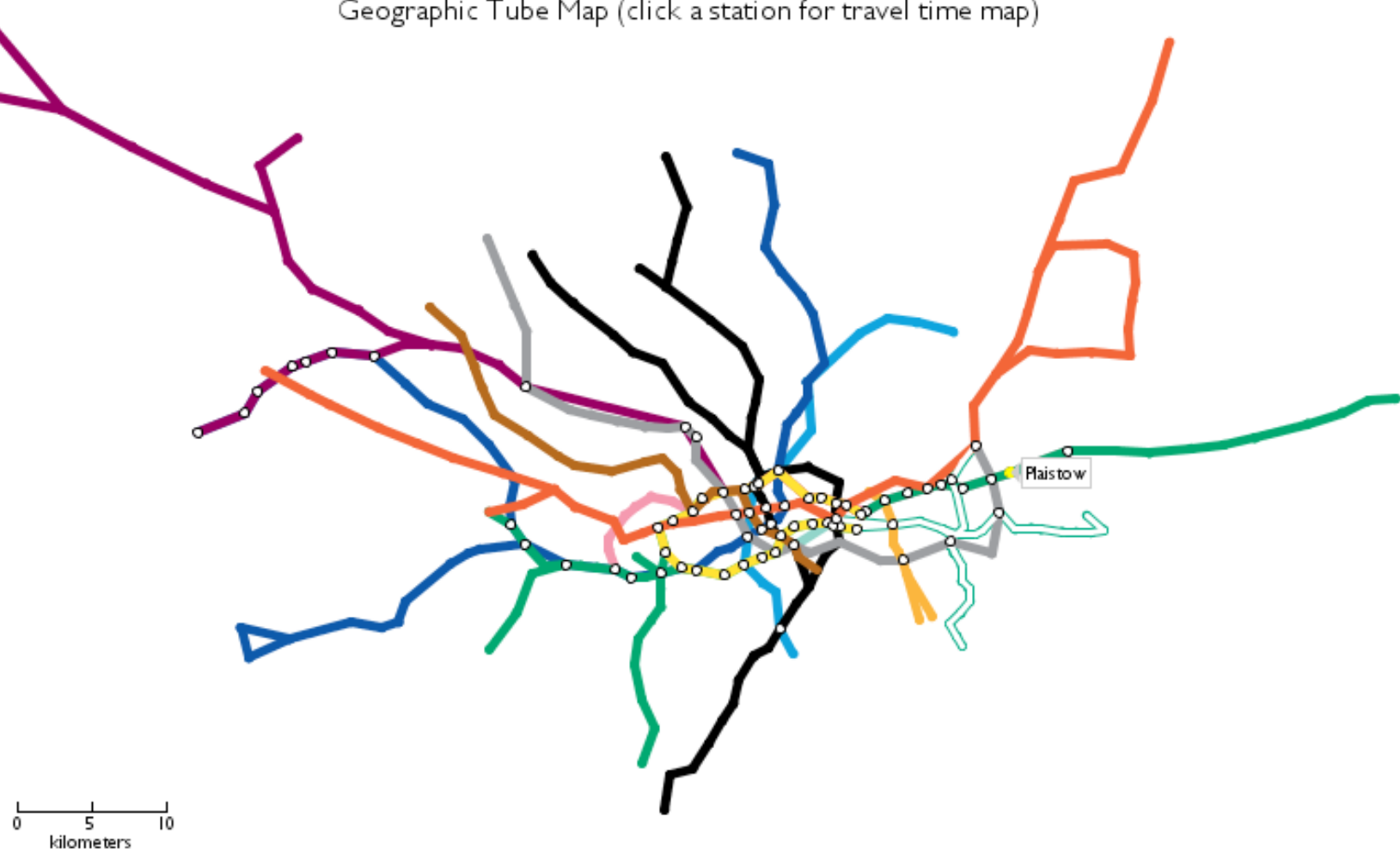
Plaistow

0   5   10
kilometers

London Tube, Geographic layout, http://www.tom-carden.co.uk/p5/tube_map_travel_times/applet/

Time to Travel from Plaistow

Plaistow

0   5   10
minutes

London Tube, Geographic layout, http://www.tom-carden.co.uk/p5/tube_map_travel_times/applet/

What will we learn?

Perception: Encoding effectiveness [Mackinlay]
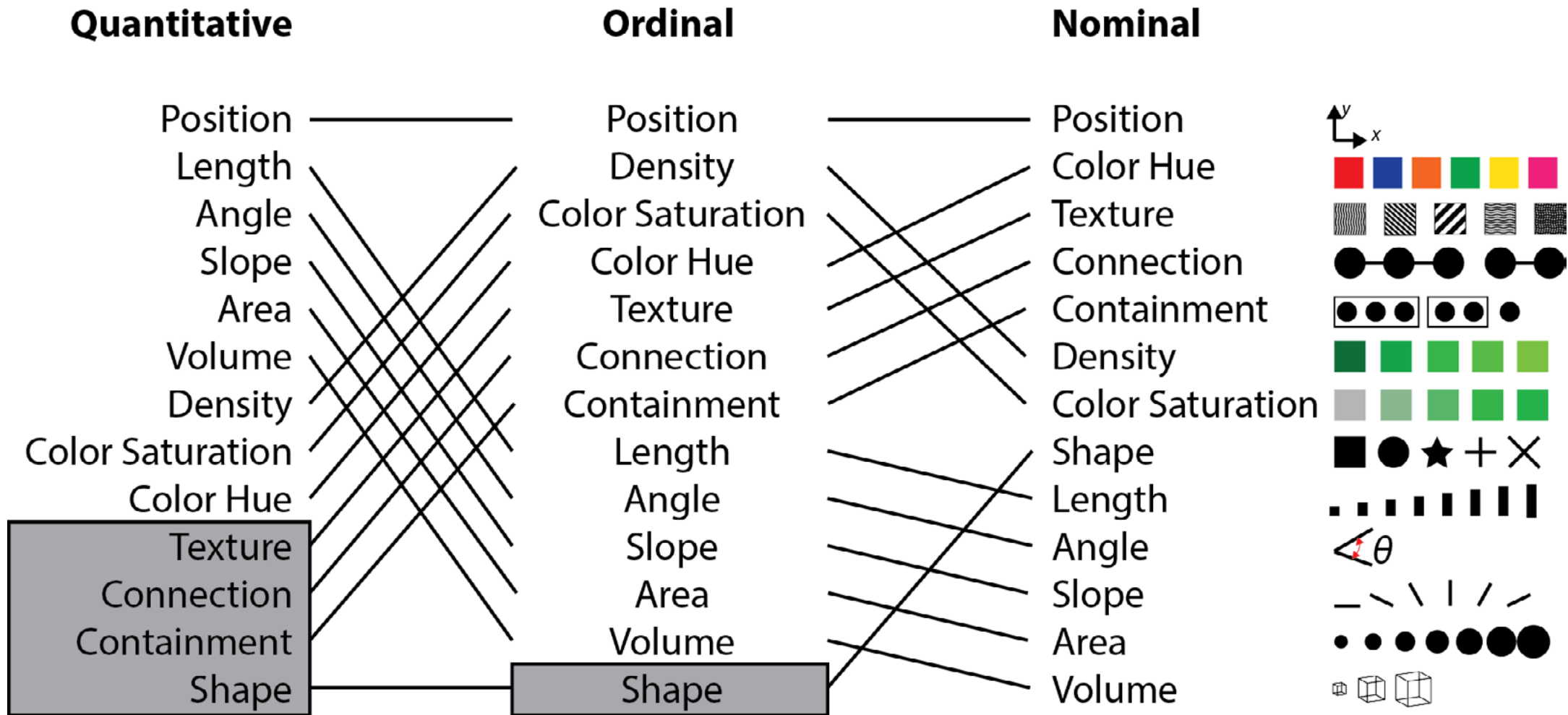
Perception: Choosing (using) color wisely
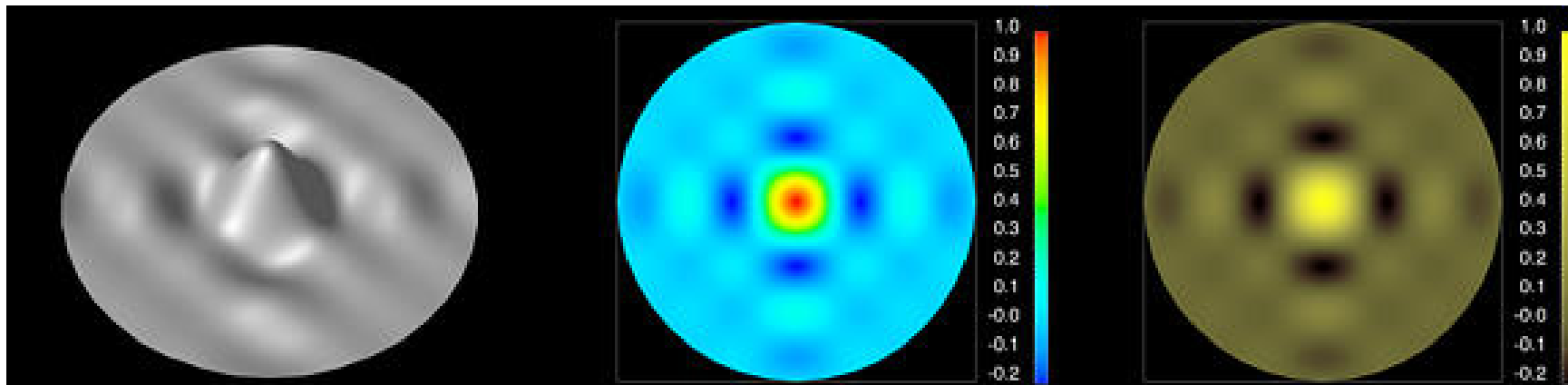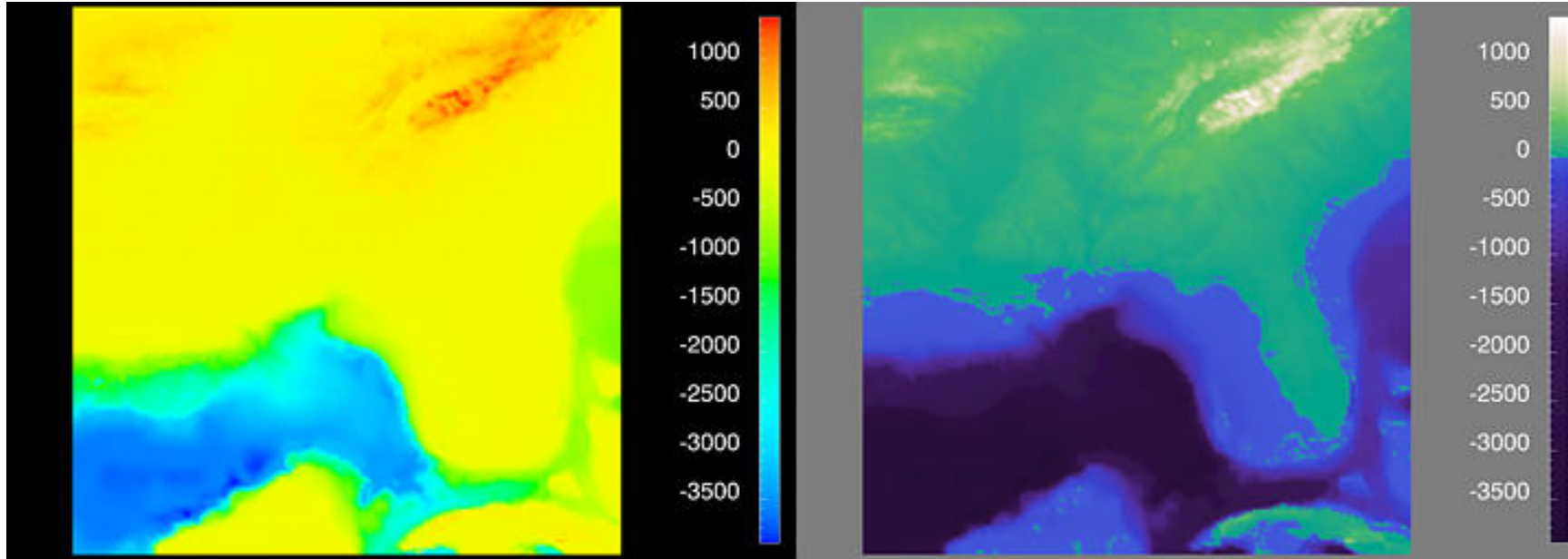
[Bernice E Rogowitz and Lloyd A Treinish. 1993. Why Should Engineers and Scientists Be Worried About Color? IBM Thomas J. Watson Research Center. Retrieved May 11, 2013 from http://www.research.ibm.com/people/l/lloydt/color/color.HTM]

The skills we will develop

1. Identify tasks for a visualization

2. Identify visual comparisons that enable those tasks

3. Identify visual encodings/idioms that best support those comparisons

4. Implement those visual encodings [Altair mostly]

Questions?

How will class be structured?

Course goals

Design: Learn the principles of information visualization, pipelines, interactions

Create your own visualizations

Critique: Learn how to critique and evaluate information visualization systems

Class format

Readings before class

Lectures assume you have done the readings
  Mandatory attendence, regular quizzes!

Studio section for fast design projects

Class format

This gives us:

More time for deep dives into techniques/systems and why they work

More time for design work/critiques

More time for labs

During lectures

Lectures punctuated by small group work (4-6 people)

I put up a problem/puzzle, you work through it,
we discuss

During labs

Programming (pairs, first few weeks)
   DO NOT copy each others' code

Project designs/critiques (individual or group)

Design jams (4-6 people)
   Group designs related to that week's topic

Lab reflections (after design jams)

Instead of a paragraph or two…

Prepare ~5 minute presentation (template provided)

One person (random) presents

Once you do it, you won't have to present again

Individual assignment

Communicative visualization of a small dataset I provide

Any tool you like

Submit once, get feedback, submit again

Group project (3-5 people)

More open ended

In-class feedback on proposal, sketches, prototypes, demo.

More soon…

Schedule and reading list

https://tinyurl.com/rxfgxc8

Class coordination: Slack

Join here: https://tinyurl.com/uhaxkwy

Email, past 4–5 weeks, sampled once per hour

139 unread

Mon
Nov 18

Mon
Nov 25

Mon
Dec 02

Mon
Dec 09

Mon
Dec 16

Date (midnight)
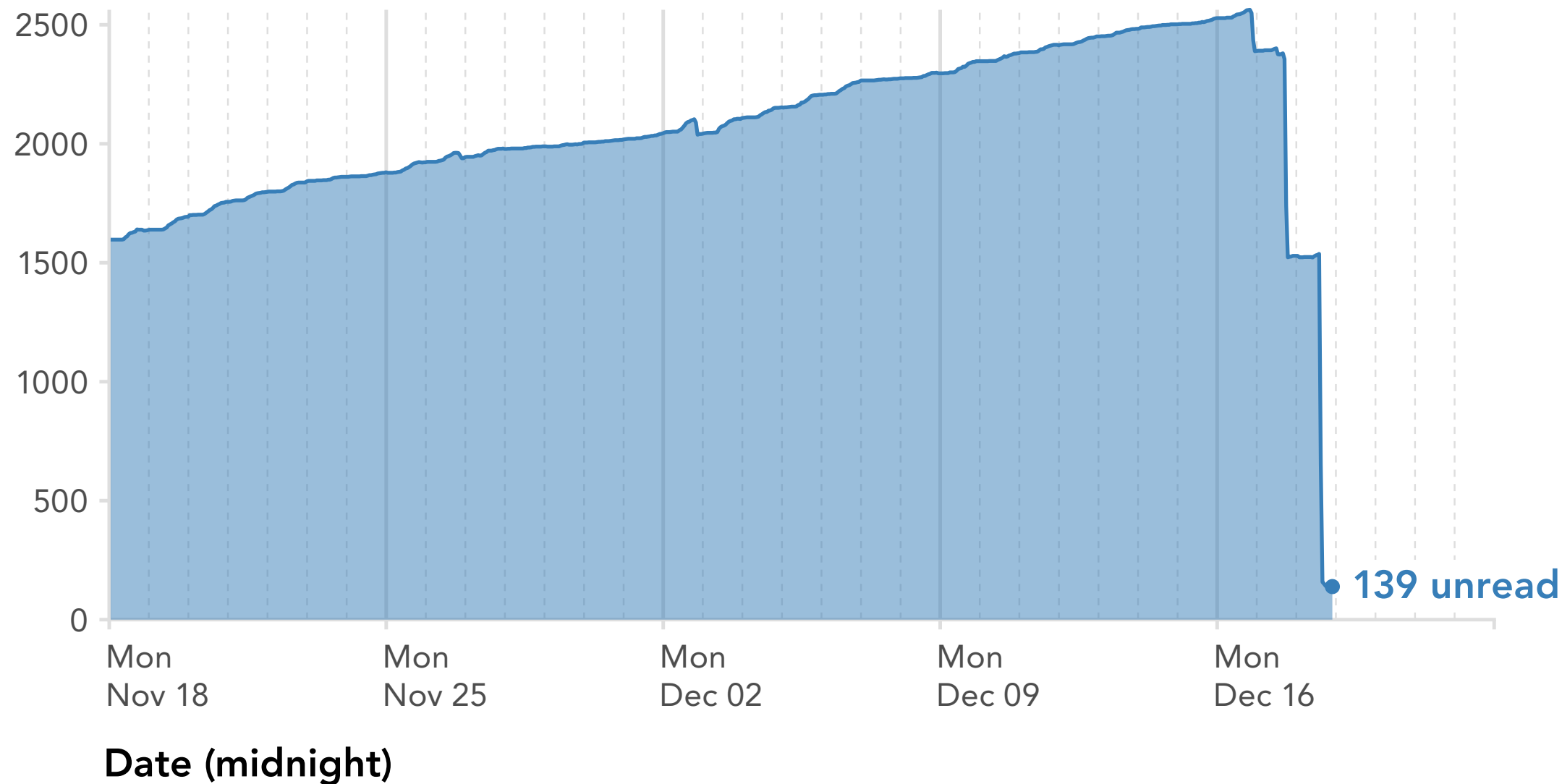
Office hours

Matt: Mon 2:30 – 4:00   (tentative)

Licia: Thurs 3:00 – 5:00 NQ 1270

or by appointment

Grading

20%   Quizzes
15%   Lab reflections, peer review
 5%   Class participation (attendance required)
15%   Labs
20%   Individual assigment
25%   Group project

Waitlist!

Huge this year, but there is always turnover

New department policy (automatic turnover)

Keep an eye on the #waitlist Slack channel

Before discussion section (Tues/Wed)

Install the latest version of Tableau:

https://www.tableau.com/academic/students

vis vis vis

group 1
group 2
group 3
group 4

group 5
group 6
group 7
group 8

group 9
group 10
group 11
group 12
group 13

group 14
group 15
group 16
group 17
group 18

Group 19
Group 20
Group 21
Group 22

back door

vis vis vis

group 1
group 2
group 3
group 4

group 1
group 2
group 3
group 4

group 5
group 6
group 7

group 5
group 6
group 7

group 8
group 9
group 10

group 8
group 9
group 10

back door

Syllabus

https://tinyurl.com/vg2hcs4

(linked from Canvas)

Questions?