

# 01

## Information Visualization

Daniel Gonçalves, Sandra Gama

# Intro Task Abstraction



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01

# SYLLABUS

# What We'll Study

## The Visualization Crafting Process

What, Why, How?

### Data

Variable Types

Derived measures

### Perceptual Issues

Marks

Visual encoding

Color

# What We'll Study

## Idioms

- Simple graphs
- Hierarchies
- Tabular data
- Temporal-based
- Geo-based
- Multivariate

## Overall Organization & Interactivity

## Lying and Obfuscating

## Dealing with complexity

## Evaluation

# Still time to leave if...

- ... you are expecting to get through the course without showing some nice programming skills (no “canned visualizations” here!)
- ... you expect strict requirements (“sausage factory”) to follow blindly
- ... cookie-cutter evaluation
- ... you’re just thinking of hashing out some barely functioning code without learning *what* you should be visualizing and *how*

# Welcome aboard if...

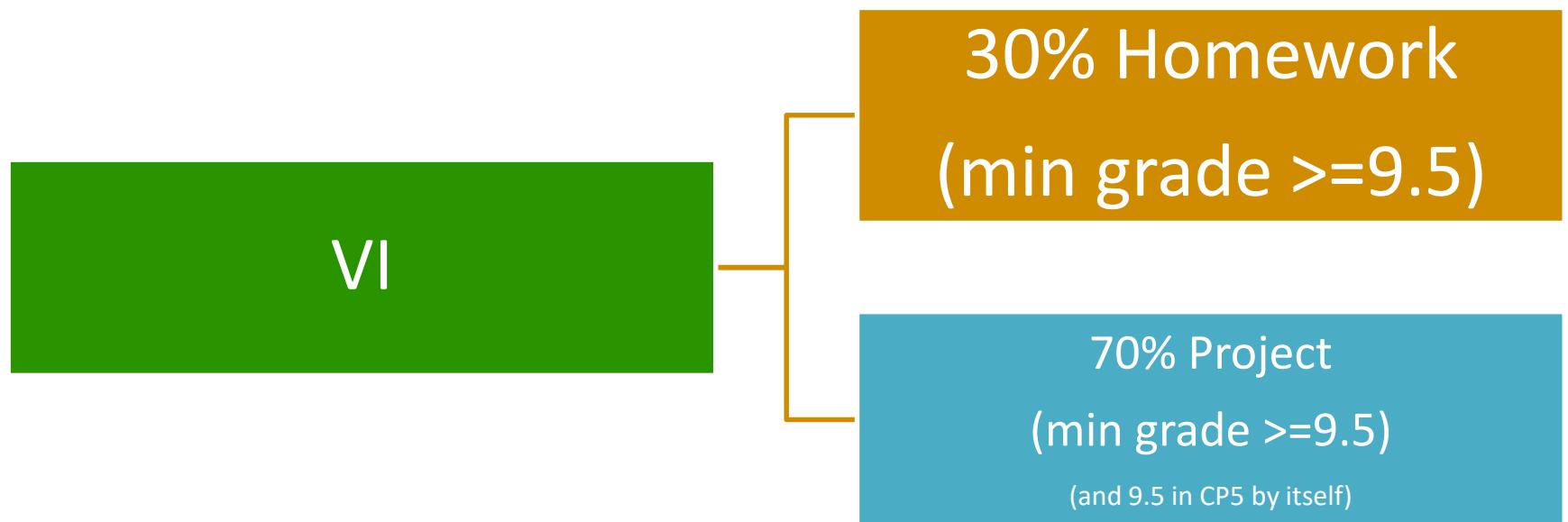
You want to understand what the best visualization for a certain dataset and task is

You do not want to be fooled by “evil” visualizations

You want to get technical skills to create *custom, targeted, effective* visualizations

You want to exercise your creativity

# How we will evaluate?



# Homework

**Four, throughout the semester**

**1-2 page long, small challenges to demonstrate theoretical knowledge.**

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**i.e. JUSTIFY YOUR CHOICES...**

# Homework

**Four, throughout the semester**

**1-2 page long, small challenges to demonstrate  
theoretical knowledge.**

**i.e. JUSTIFY YOUR CHOICES...**

**NOT COMMON SENSE**

# Homework

**First HW already available!!**

**(deadline: sep 26, submit on Moodle!)**

# Homework – Grading

**Work graded on 0-1 scale**

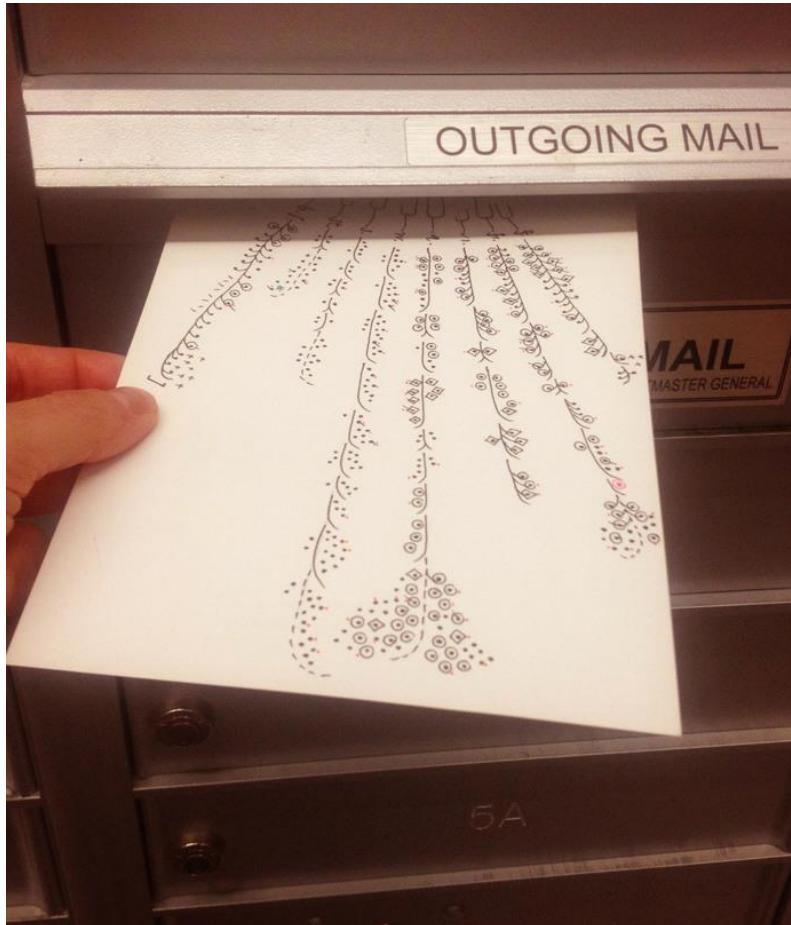
**Why? All different, all the same...**

**Minimum Grade 9.5 (after normalization)**

# “Dear Data”

<http://www.dear-data.com>

Year-long, analog data drawing project by  
Giorgia Lupi and Stefanie Posavec



# “Dear Data”

**For one week, collect and measure a particular type of data about your life**

**Represent it visually on a postcard drawing on a postcard!**

**Rated based on complexity, creativity, originality and appeal**

# “Dear Data” Examples

.....	o:	o:....	o...	'	o.....x.....	o...o.....
-x.....	...oo..	..o..	..o..o....o	...o..oo..	△o..	o...o...
....o..	o.....	.....o	..o..o	..o....	o...o..o	...o...o..o
o... ..	o...oo	..o..	..△..o	..△....	oo'....	o.....
...o..△	o...oo	.....	..o	ooooo..	o..o..	...o...o...
.. Γ.....	o@X...△..	..o..X..o..	o.. Γ '...o..	...	.....o.....	...o..
....	Γ Γ....	...o..	...	.....	...o....o..o	.....
....o..	o....	o o..o..	..o..o..o..	o..o..o...	...o..o..o..	...o..
o..	.....	o..X....	o..o..o..	o..o..o..	.....	..o....
..o..	..o..o..	o..	....	..o..o..o..	..	o...o..o..
..oo'oo'...	ooo'oo'...	...o	o..o..o..	..o..o..o..	o'..o.....	.....
.. X..o..	...o..	..o...o	o.....	...	.	o...o..o..
....	...o..o..	...	...o..o..	11111..	o..	o...o.....
...o..	...o..	o...o..	..	..	o..	X..X
....	...	...o	..	..o..	o..	o...o.....
.....	..	%..	..	o	.	...o..
.....	..	.....	..	..	..o	...o..

# “Dear Data” Examples

○.....  
\* X \*\*\*\*\*  
....#  
○|...  
..#△  
||Γ\*\*\*\*\*  
....  
....○  
○  
..○  
○○○○...  
..X#\*  
....  
...○  
....  
....

## DEAR DATA WEEK 01: WHAT'S THE TIME?

### HOW TO READ IT:



- each symbol represents every moment I gazed at the clock, grouped by hours of the day:  
Different symbols and attributes represent WHY and HOW I checked the time.

## SYMBOLS

- o on purpose: wanted to know what the time was.
  - just glanced: on a phone, mac or else
  - Because I thought of this project.
  - x I thought "Don't look!"  
But I did.
  - ! Because I was bored
  - ! Because I was hungry
  - Δ Heard somebody saying the time aloud. 0012

## ATTRIBUTES

- f\*ck! I'm late!
  - oh, ok. I'm fine.
  - analog support  
(i.e. wristwatch)
  - alarm clock rang.
  - glanced at the clock  
while testing or  
emailing with  
Stefanie. ☺

SEND TO:

STEFANIE POSAVEC

~~BRUNSWICK~~ ~~BRUNSWICK~~

LONDON

[ UK ]

## ENGLAND

# “Dear Data” Examples



# "Dear Data" Examples

“DEAR DATA  
WEEK 24: DOORS' PATTERNS

HOW TO READ IT:

Every little rectangle represents a door I opened and/or passed through, in chronological order, to enter a space. (P.S. closet doors and furniture doors are not included)

MAIN LOCATION:

- my Building
- work (NEW-INC)
- SHOP/STORE
- CAFÉ/PUB RESTAURANT
- CLIENT PLACE

TRANSPORTATION

TIME OF DOOR:

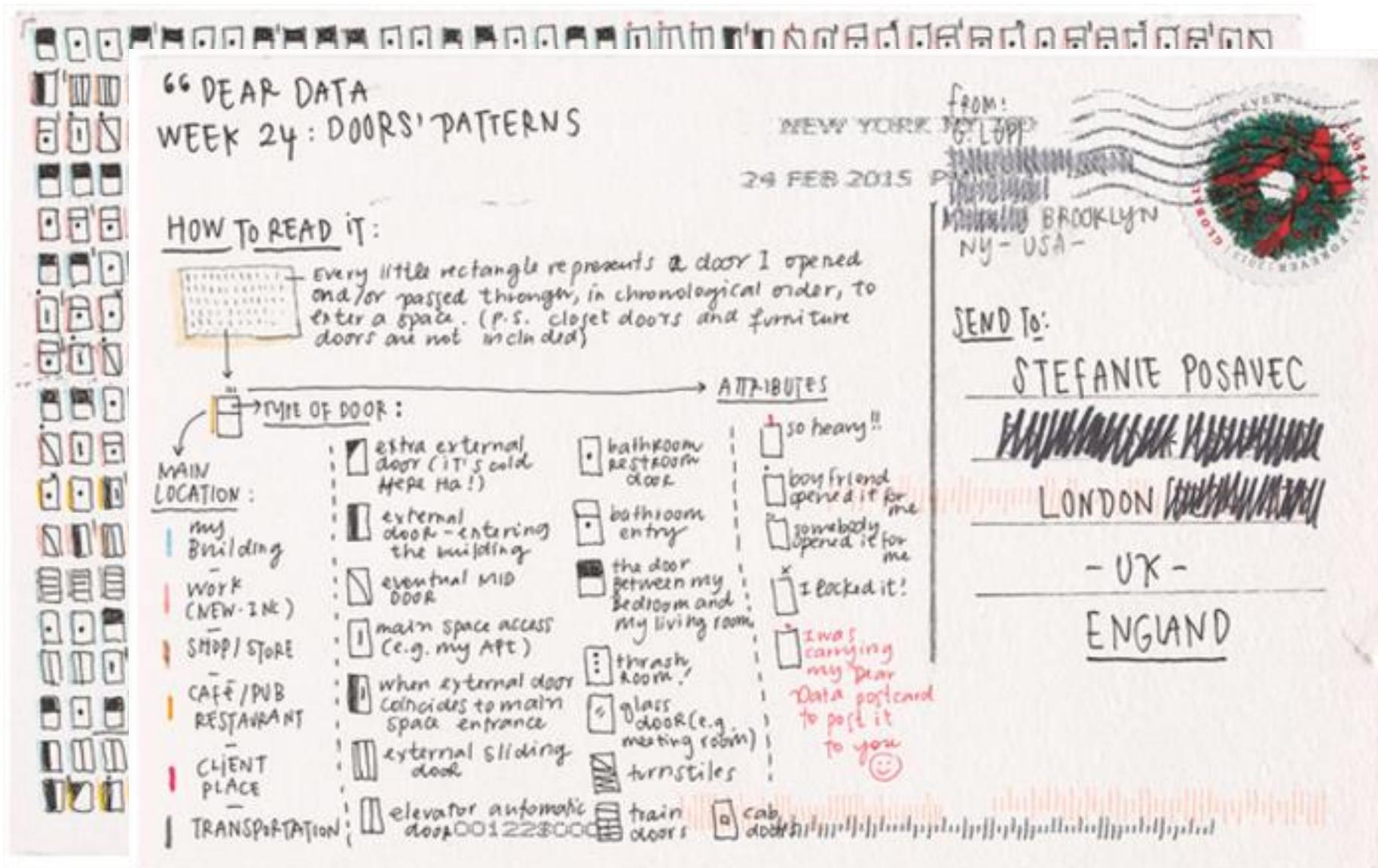
- extra external door (IT's cold here ha!)
- external door - entering the building
- eventual MID DOOR
- main space access (e.g. my Apt)
- when external door coincides to main space entrance
- external sliding door
- elevator automatic door 001228000

ATTRIBUTES

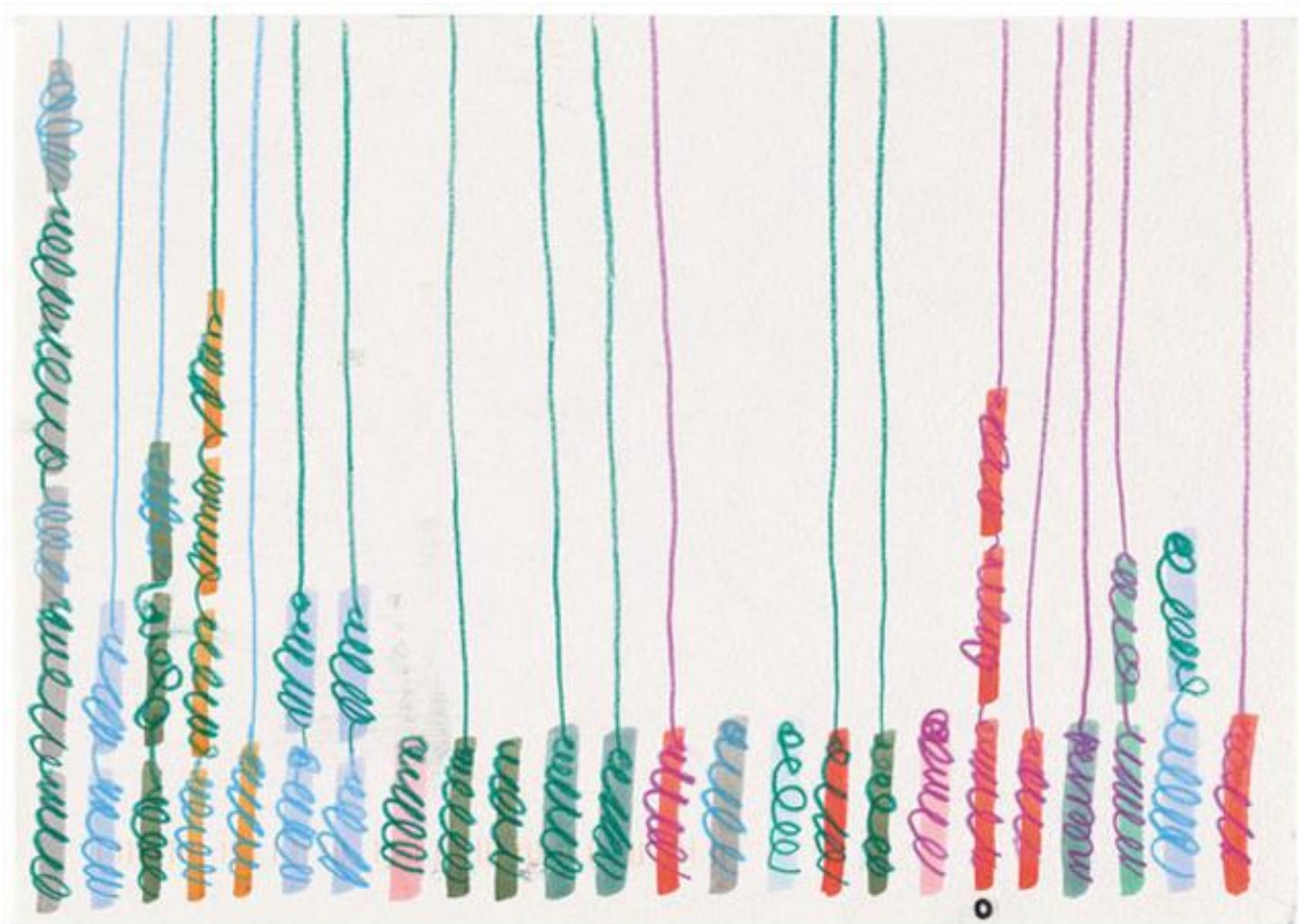
- bathroom RESTROOM door
- bathroom entry
- the door between my bedroom and my living room
- trash room!
- glass door (e.g. meeting room)
- turnstiles
- so heavy!!
- boyfriend opened it for me
- somebody opened it for me
- I locked it!
- I was carrying my dear Data postcard to post it to you 😊

FROM: G. LOPP  
TO: STEFANIE POSAVEC  
24 FEB 2015  
NEW YORK CITY  
USA  
MINI BROOKLYN  
NY - USA

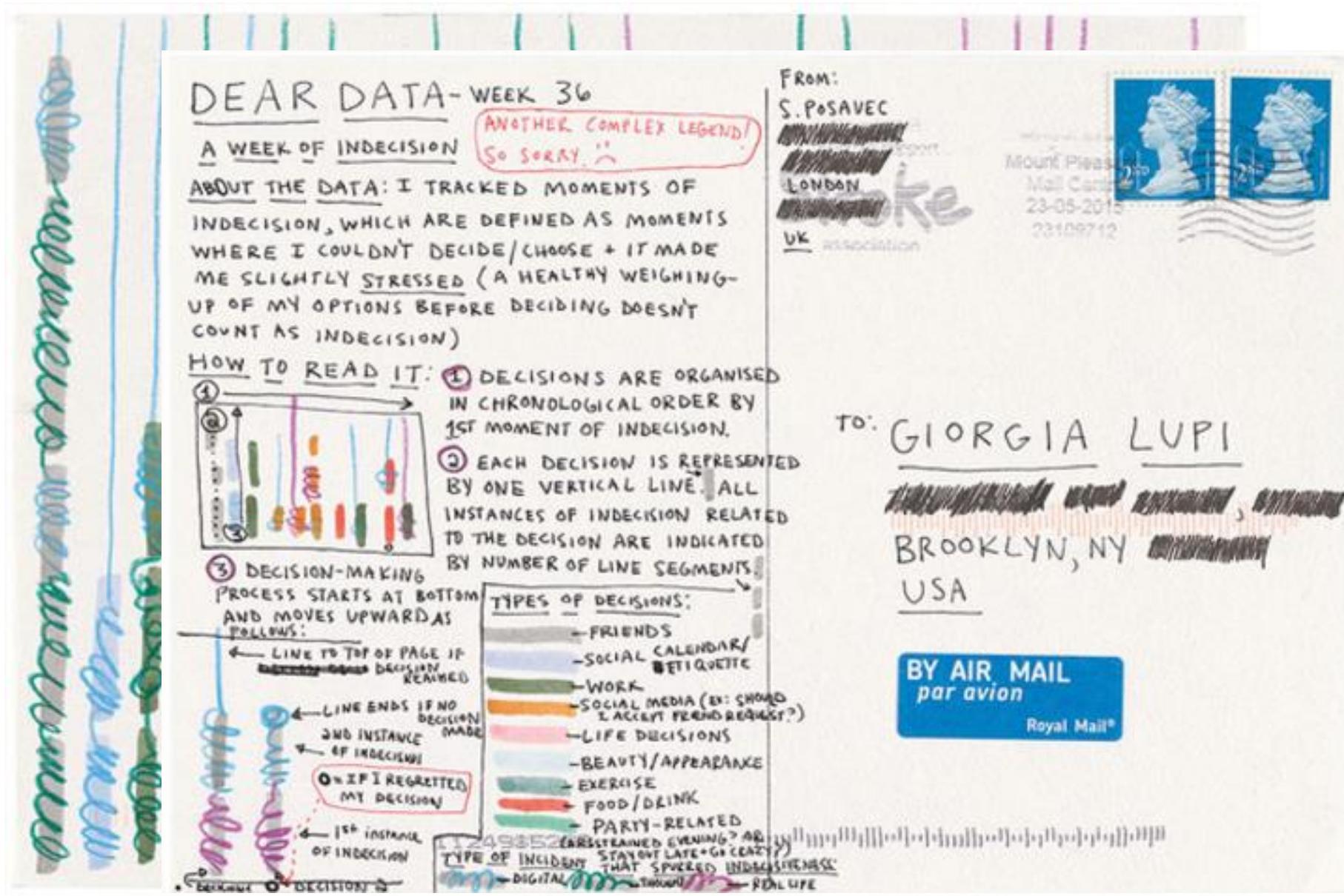
SEND TO:  
STEFANIE POSAVEC  
LONDON  
- UK -  
ENGLAND



# “Dear Data” Examples



# “Dear Data” Examples



# “Dear Data” Logistics

**Deadline: 3 October**

**Don’t Forget: deliver postcard in class (on the 4th, in Alameda’s case)!**

**We won’t accept “non-postcards”.**

**Showcase: we’ll select a few to be presented in class, week of Oct 17**

# “Dear Data” Grading

## Four criteria

Idea (originality)

Effort

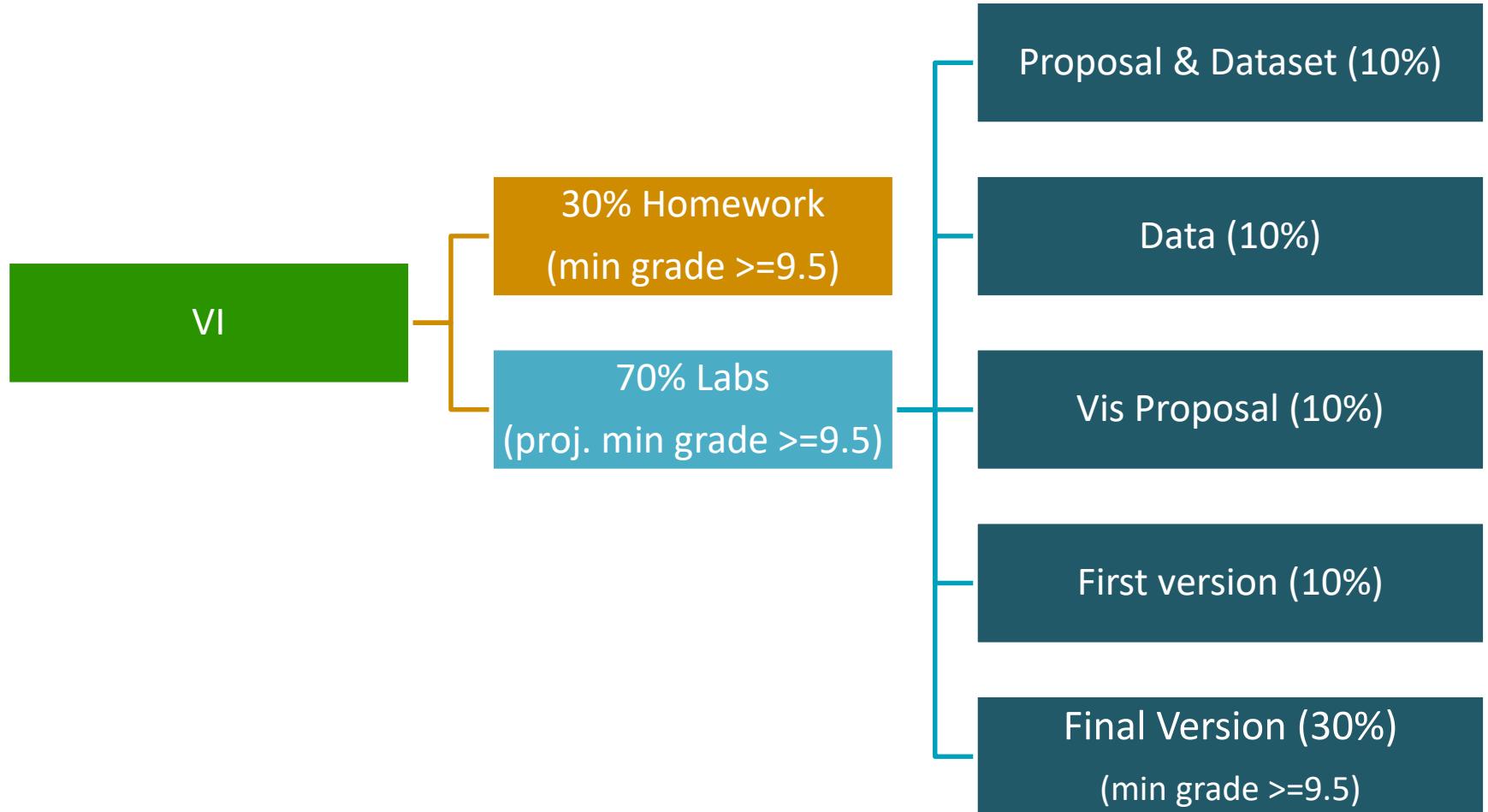
Creativity

Works?

Those will get you up to 0.9

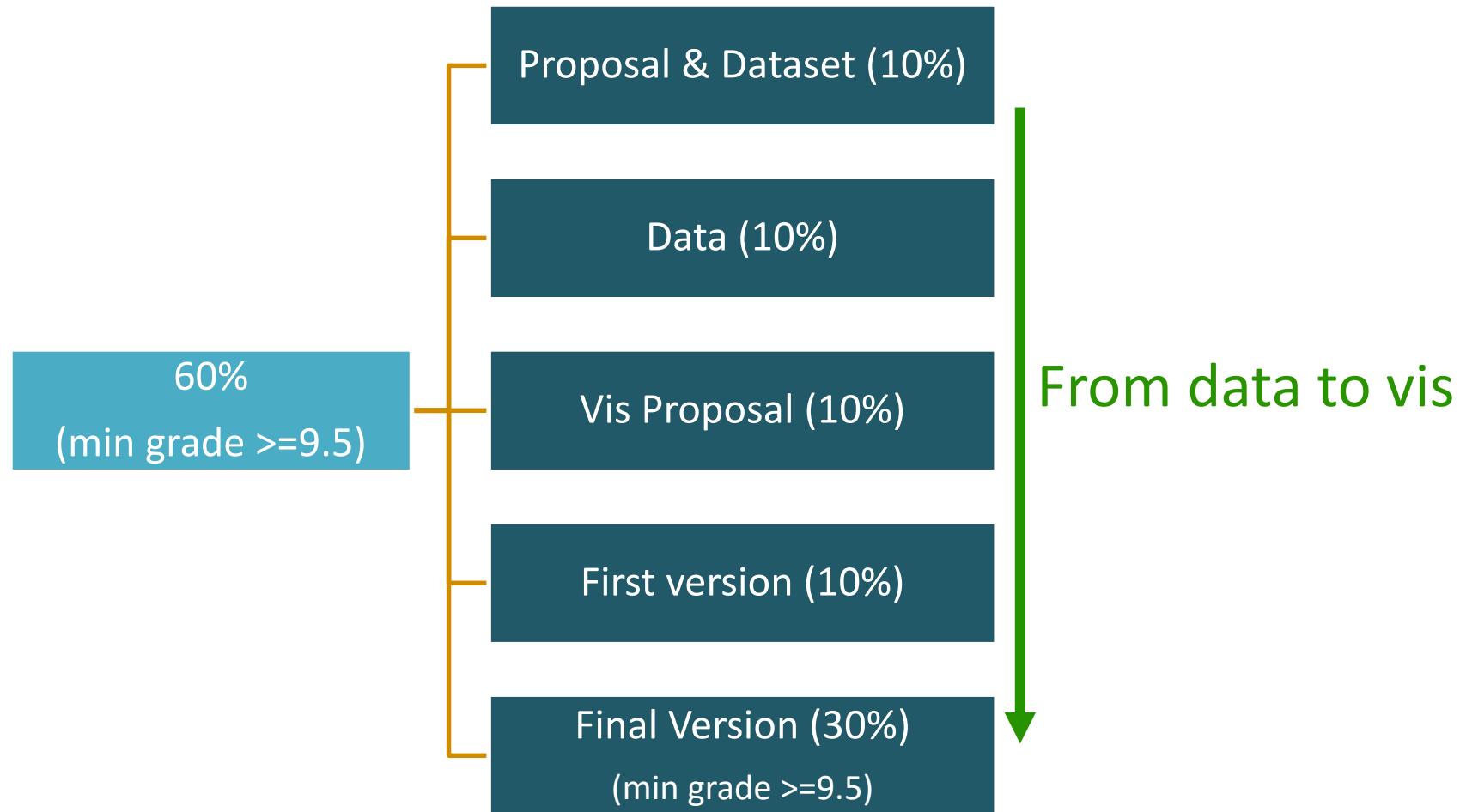
Presenters in class will get the additional 0.1

# How we will evaluate?

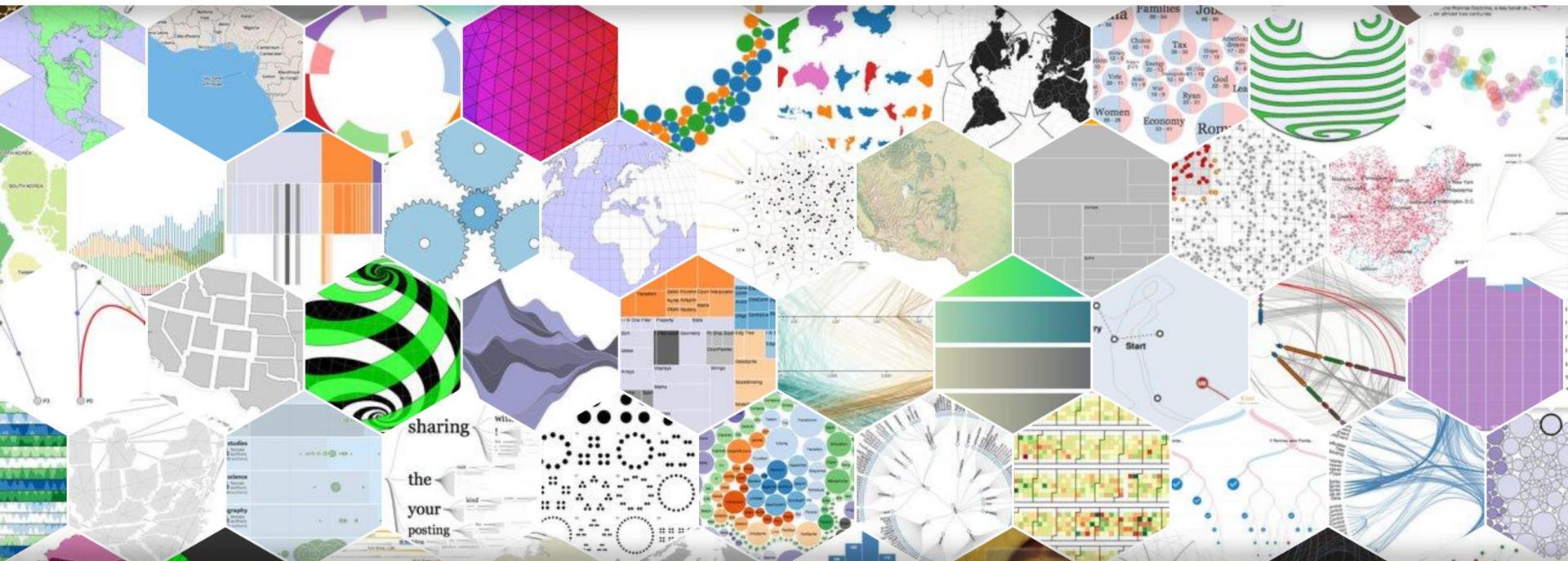


# Project

You will be crafting a visualization



# D3 Data-Driven Documents



Like visualization and creative coding? Try interactive JavaScript notebooks in [Observable!](#)

**D3.js** is a JavaScript library for manipulating documents based on data. **D3** helps you bring data to life using HTML, SVG, and CSS. D3's emphasis on web standards gives you the full capabilities of modern browsers without tying yourself to a proprietary framework, combining powerful visualization components and a data-driven approach to DOM manipulation.

Download the latest version (7.6.1) [here](#).



We'll use this!

[See more examples](#)

[Chat with the community](#)

[Follow announcements](#)

[Report a bug](#)

[Ask for help](#)

**State of the art framework**

**We're engineers, not designers**

**Will use latest version**

There ***will*** be grade penalties for using others...

# “not designers...” BUT...

## Design matters

**It must “look good”**

- Color scheme

- Alignments

- Contrast

- Legibility

- ...

“not designers...” BUT...

**Be Creative!**

# Lectures

Not really...

# Flipped Classroom



# ~~Lectures~~ Videos & Readings

**Watch pre-recorded videos**

**Also recommended readings**

**Quizzes to assess what you've learned**

# ~~Lectures~~ Videos

Watch pre-recorded videos

Also recommended readings

Quizzes to assess what you've learned

To watch/read/do BEFORE class

# In class

**Questions**

**Practical cases**

**Demos**

**Discussion**

# Online Materials

## Support Portal (Moodle)

<http://pcm.rnl.technico.ulisboa.pt>

Same credentials as for the Fénix portal

# Use FENIX auth!

The image shows a login interface with the following elements:

- A "Username" input field with a small user icon and a question mark icon.
- A "Password" input field with a small user icon and a question mark icon.
- A "Remember username" checkbox.
- A large blue "Log in" button.
- A link to "Forgotten your username or password?"
- A message: "Cookies must be enabled in your browser" with a question mark icon.
- A section titled "Log in using your account on:" containing a button labeled "Fenix Authentication".

A red rectangular box highlights the "Fenix Authentication" button, indicating it is the recommended login method.

# Your Name...

You \*\*\***MUST**\*\*\* enroll using only your first and last names

“Daniel Jorge Viegas Gonçalves” → “Daniel Gonçalves”

**General**

Username\* ist13898

Choose an CAS server (SSO) authentication method

Suspended account

The password must have at least 8 characters, at least 1 digit(s), at least 1 non-alphanumeric character(s)

New password   Unmask

Force password change

First name\* Daniel

Surname\* Gonçalves

Email address daniel.goncalves@inesc-id.pt

Email display Allow only other course members to see my email address ▾

Email format Pretty HTML format ▾

Email digest type No digest (single email per forum post) ▾

# Add a Photo!



# ALL moodle

**Apart from lab group enrollments  
EVERYTHING ELSE will be done on  
moodle**

02

# WHAT IS (AND WHY?) INFOVIS?

# Visualization



# Why it is important??



# Fake News...



# So, infovis is everywhere...



# Canned solutions...

<https://thingsboard.io/smart-energy>



# So Cute!



# Get Over Cute!



InfoVis...

CUSTOM

# CONCRETE QUESTIONS

# ACTIONABLE ANSWERS

# Kahoot!

Game PIN

Enter

# QUESTIONS?

A cartoon illustration of a bald man with a large, bulbous nose. He is wearing a green turban and a purple feather in his hair. He has a mustache and is holding a white rectangular sign with both hands. The sign contains the text "THERE WILL NOW BE A BRIEF INTERMISSION".

**THERE WILL  
NOW BE A  
BRIEF  
INTERMISSION**



u/sweatshopper



**THERE WILL  
NOW BE A  
BRIEF  
INTERMISSION**

# Get Ready...

**http://etc.ch/ivnY**



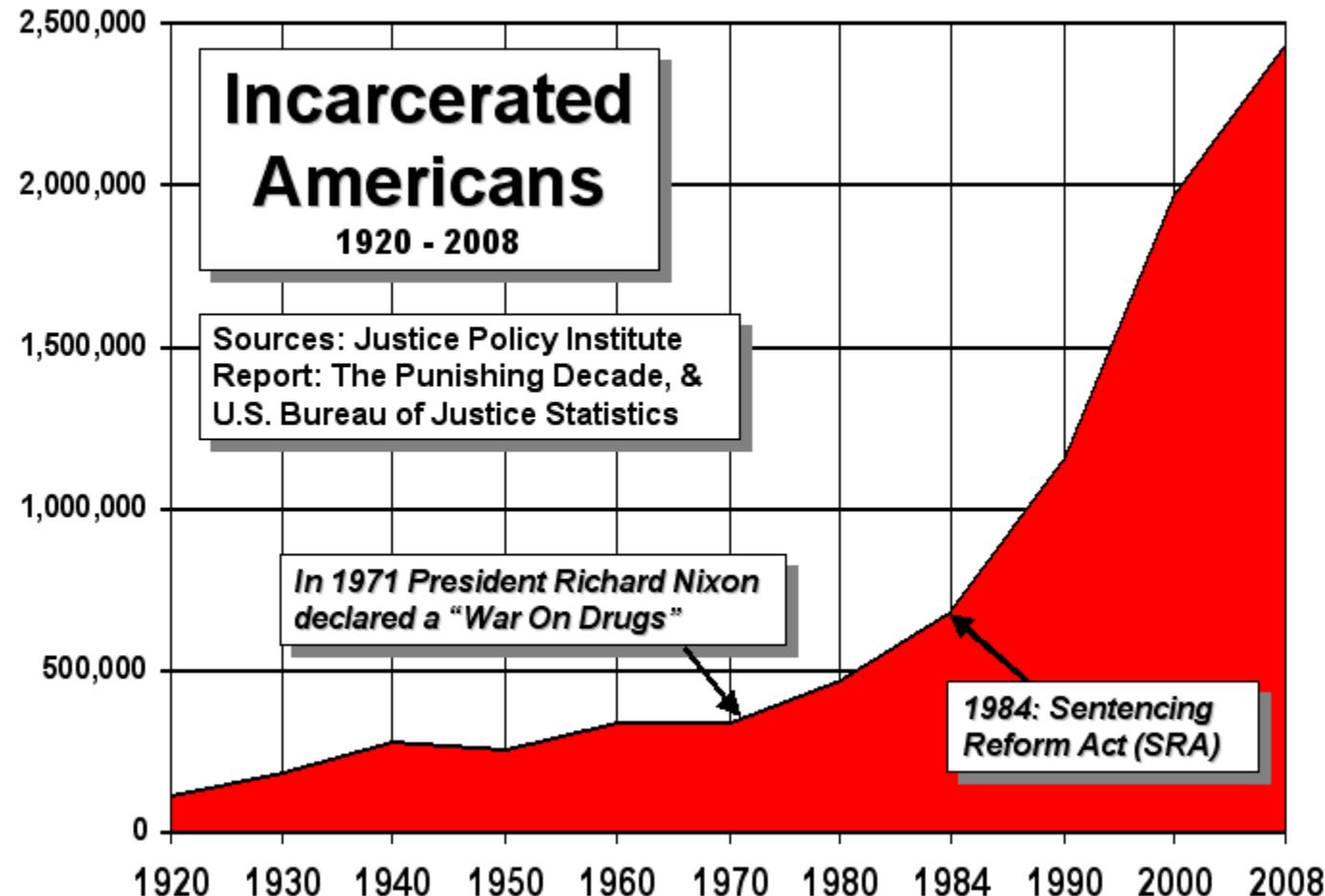
Direct  
Poll



# GOOD or EVIL?



# Exhibit A

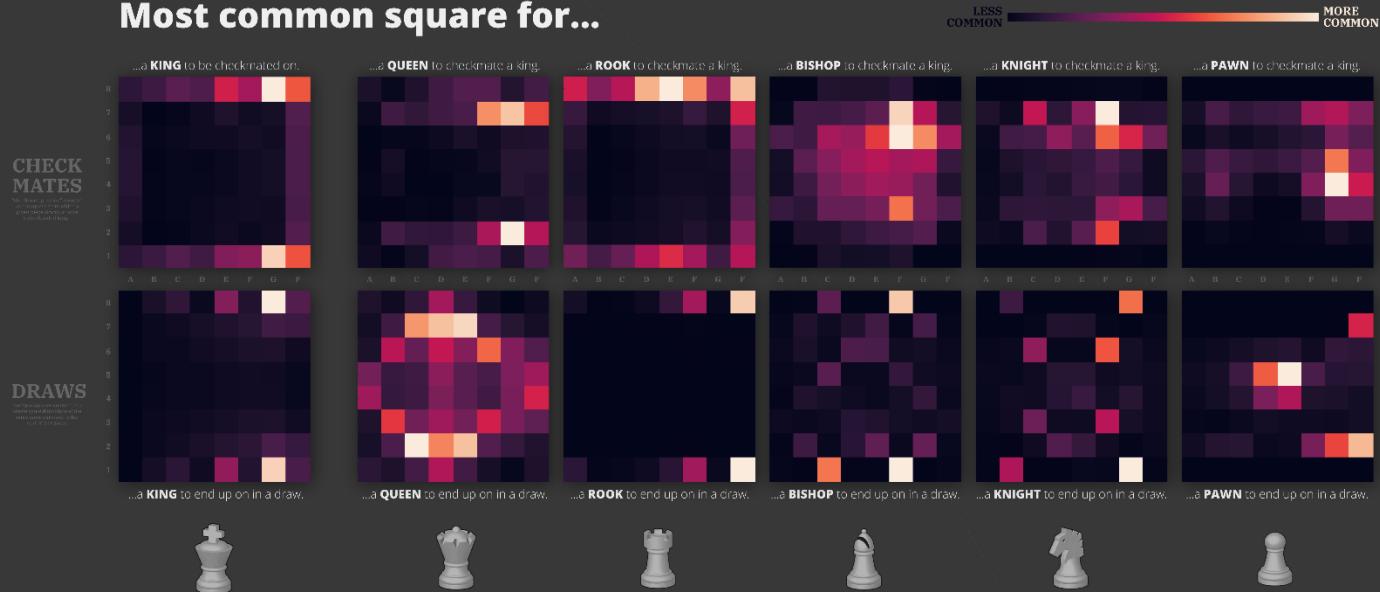


# Exhibit B

[https://www.reddit.com/r/dataisbeautiful/comments/9en8yn/most\\_common\\_checkmate\\_positions\\_in\\_400\\_million/](https://www.reddit.com/r/dataisbeautiful/comments/9en8yn/most_common_checkmate_positions_in_400_million/)

What's the most common **checkmate position** in  
**400 million games of chess?**

**Most common square for...**



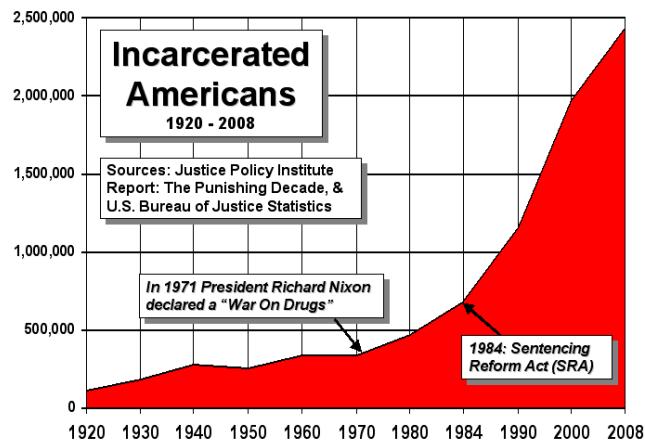
**Breakdown...**



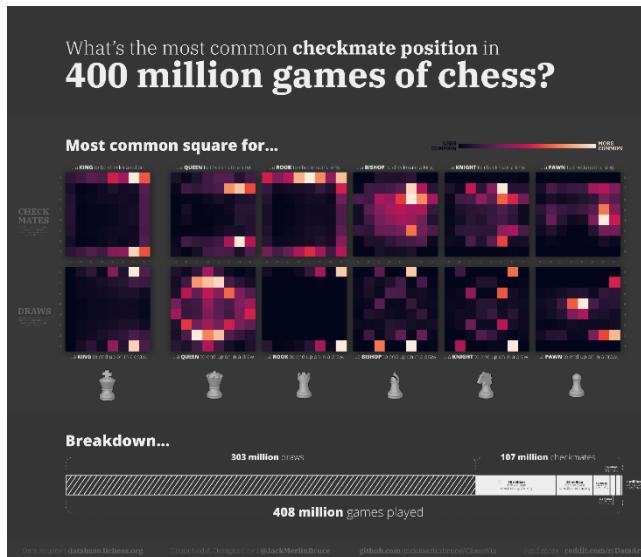
# All Together Now!

<http://www.proffreader.com/2014/07/comparison-of-letter-positions-in-eight.html>

A



B



03

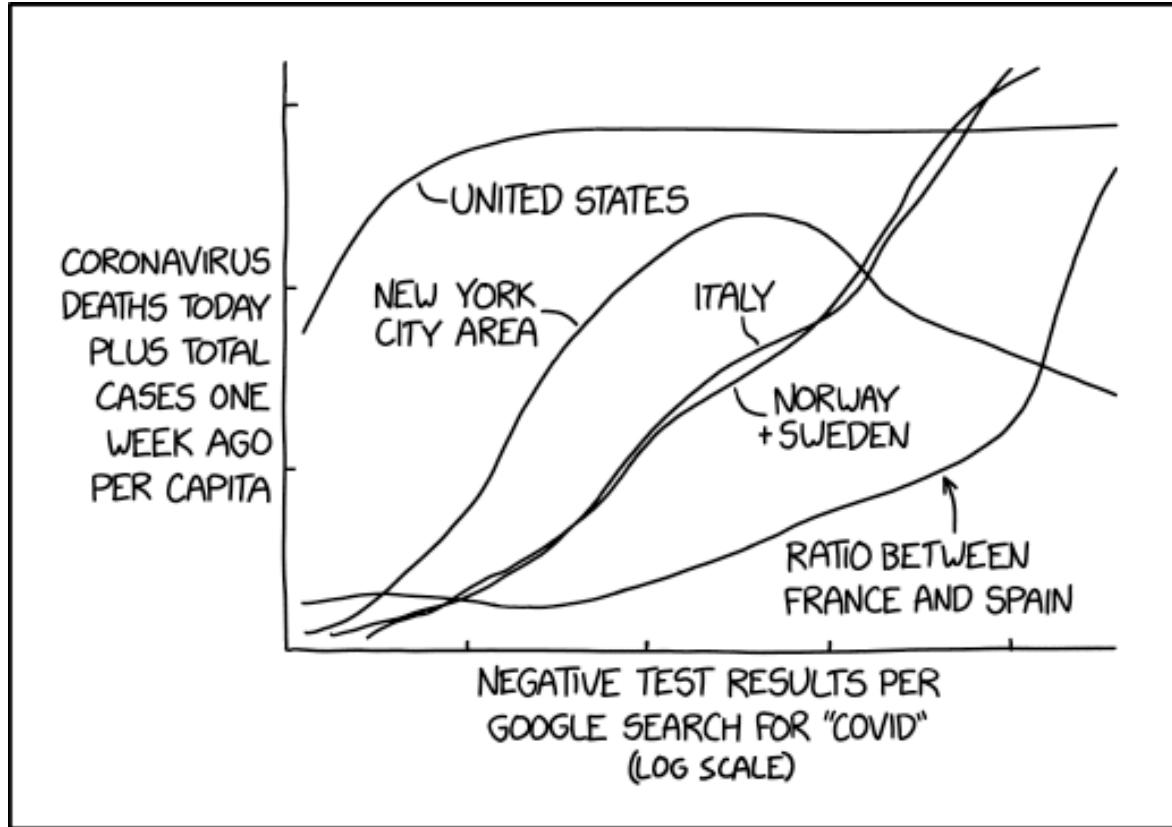
# TASK ABSTRACTION

# What? Why? How?



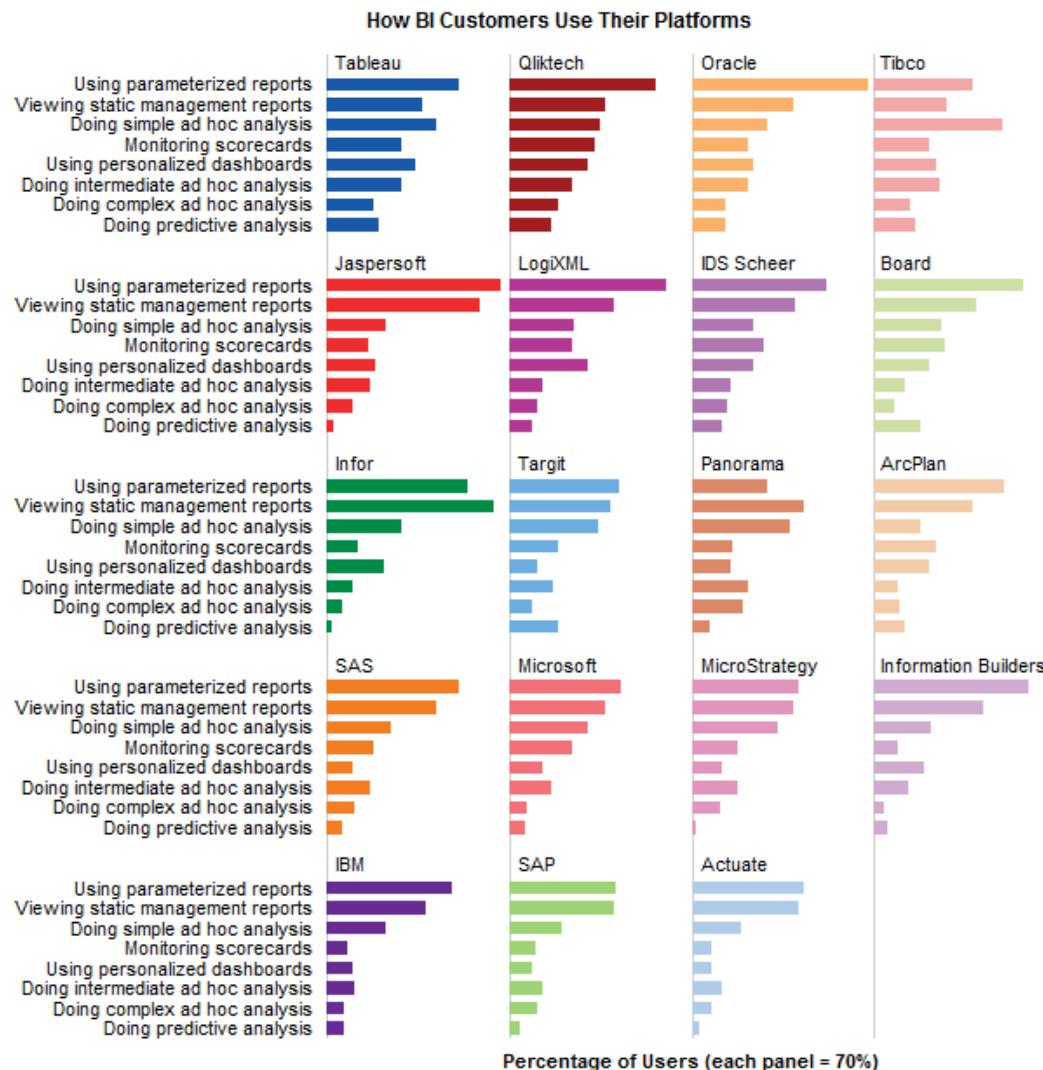
# Is this a good Viz?

<https://xkcd.com/2294/>

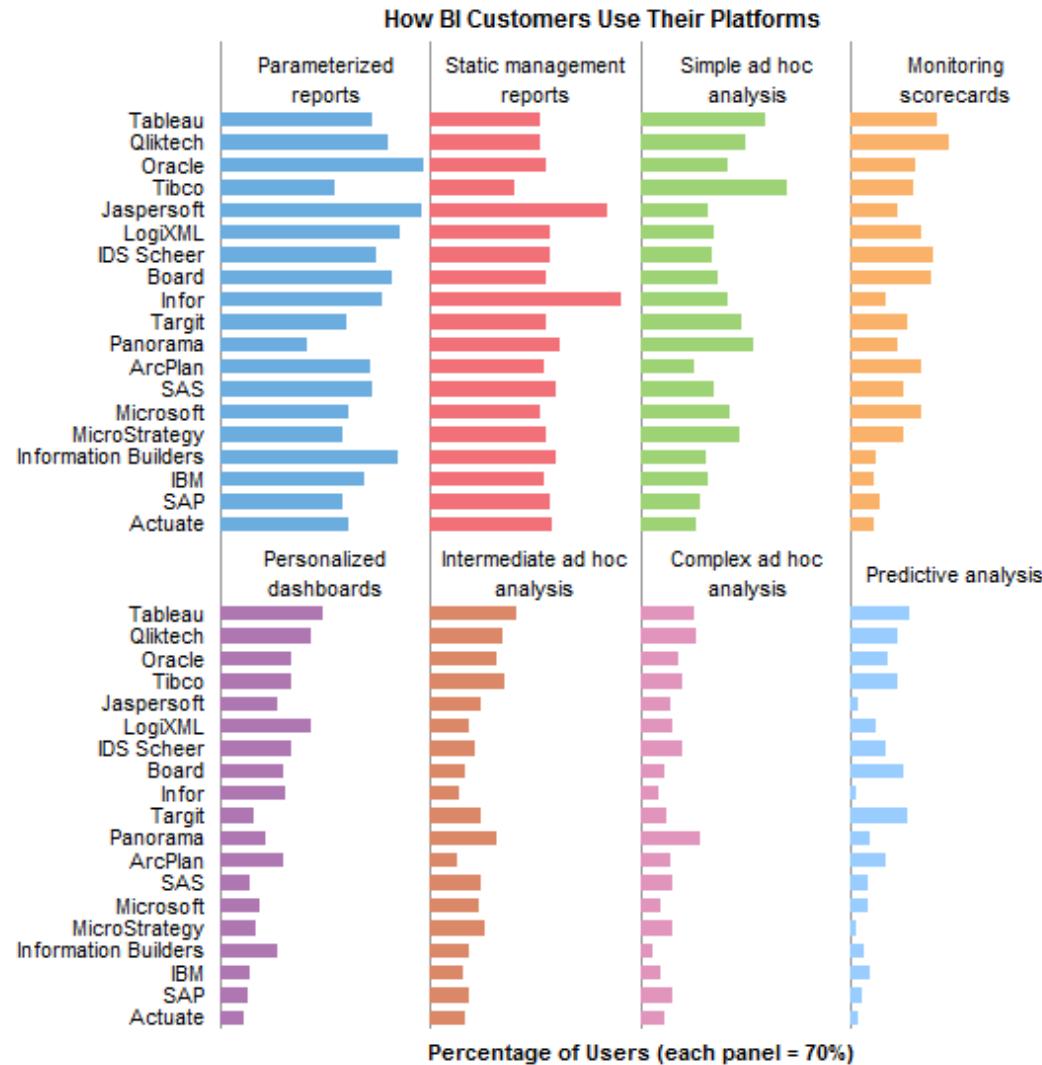


I'M A HUGE FAN OF WEIRD GRAPHS, BUT EVEN I ADMIT SOME  
OF THESE CORONAVIRUS CHARTS ARE LESS THAN HELPFUL.

# Is this a good Viz?

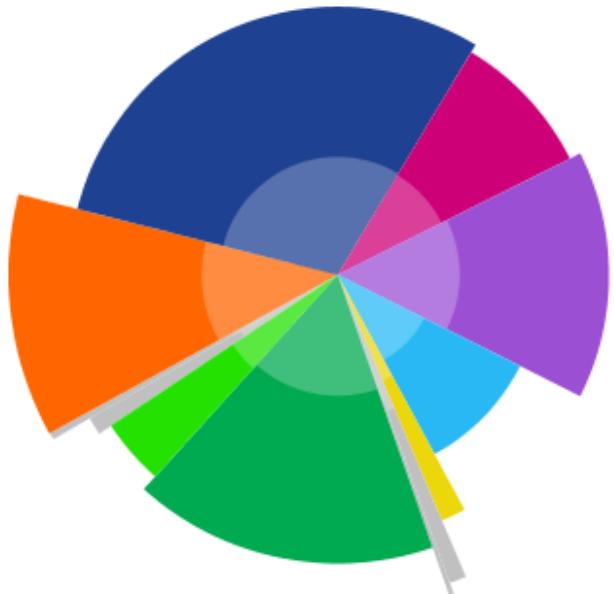


# Is this a good Viz?

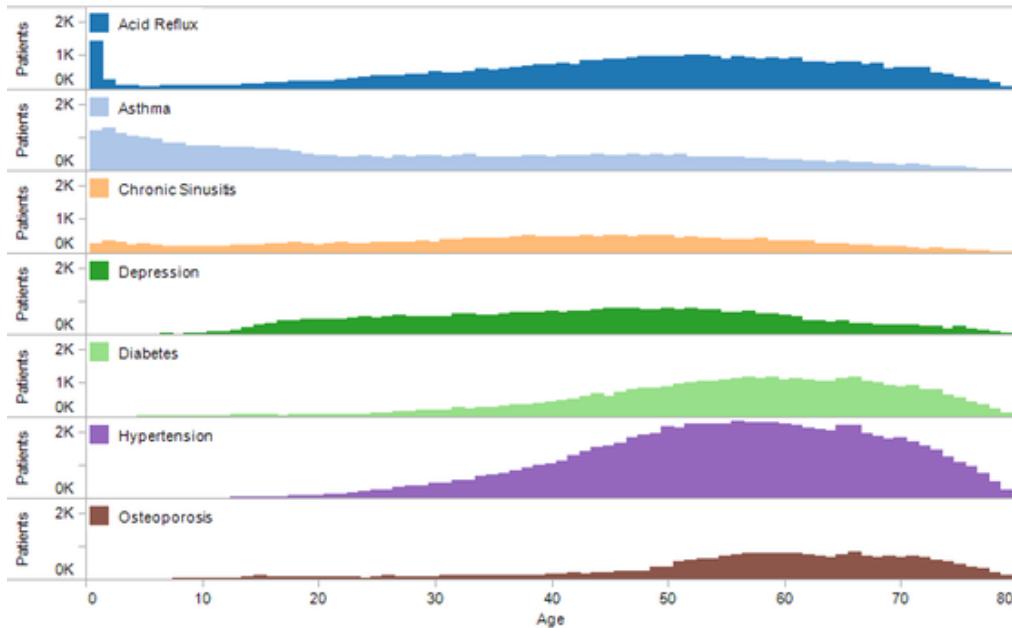


# Is this a good Viz?

<https://eagereyes.org/criticism/cost-of-a-sick-chart>  
<https://eagereyes.org/criticism/curing-a-sick-chart>

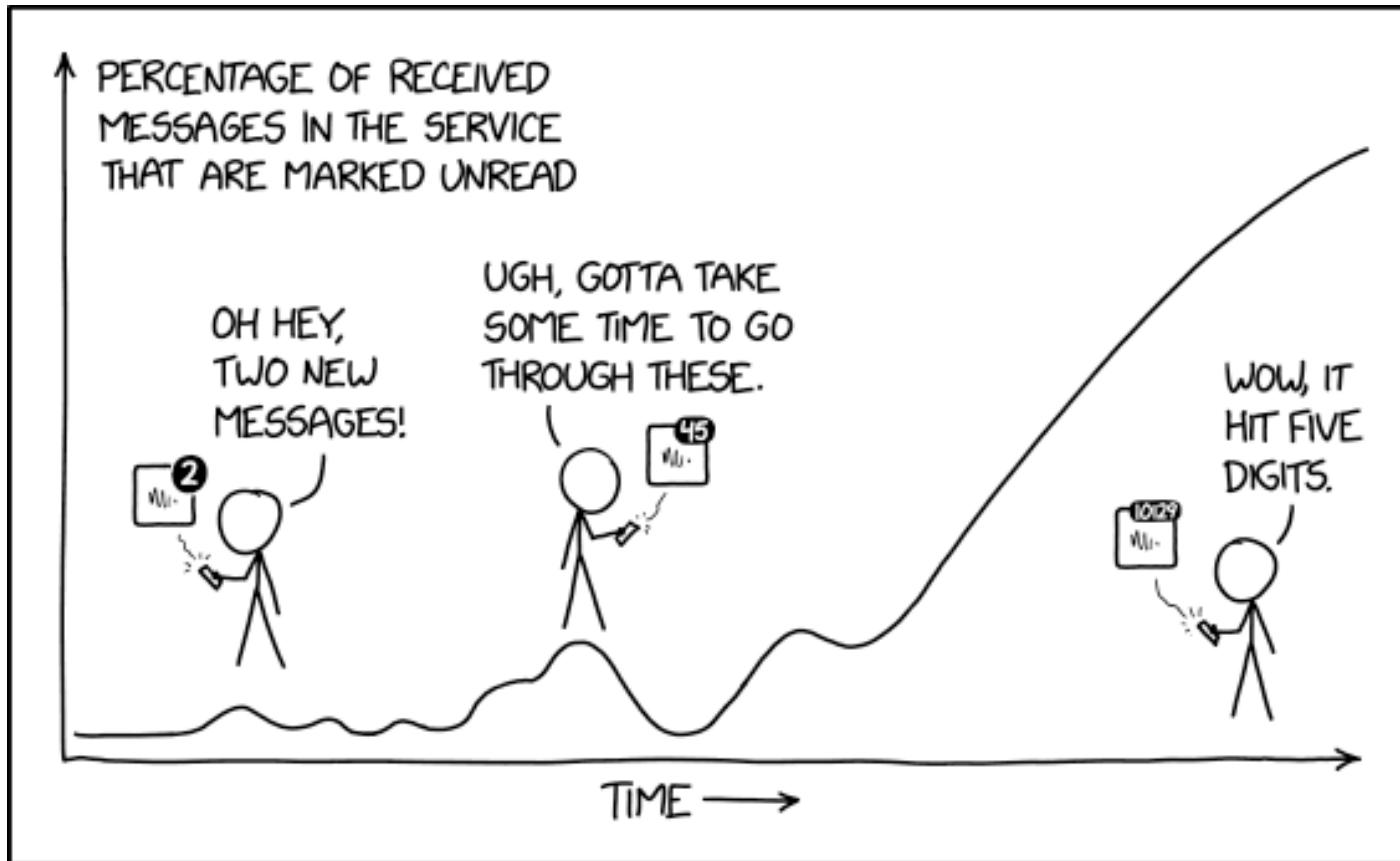


Age 45  
◀ ▶



# Is this a good Viz?

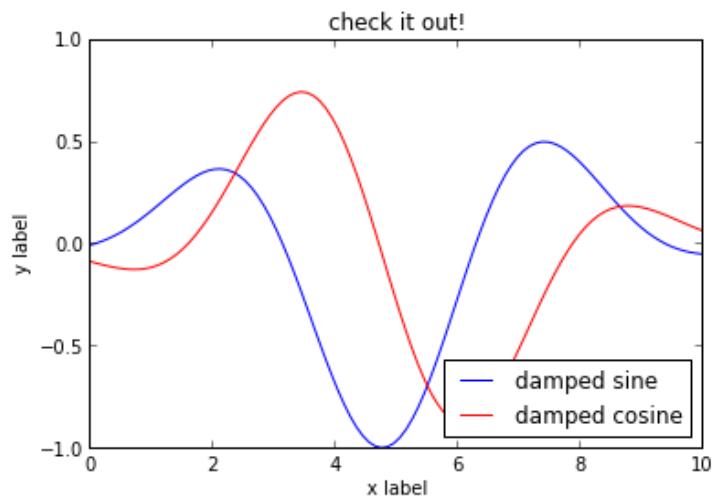
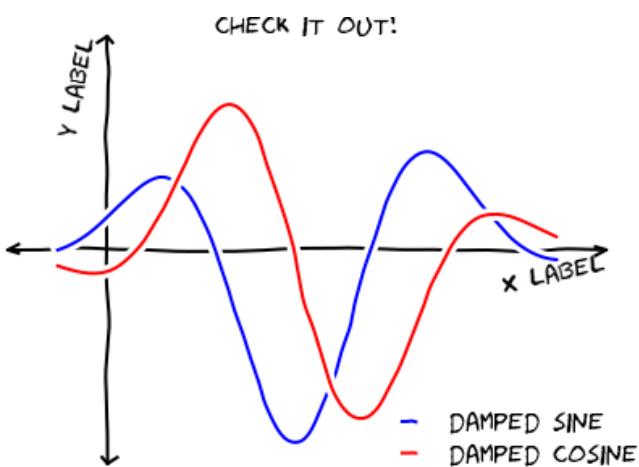
<https://xkcd.com/2389/>



ANOTHER WAY EVERY SYSTEM EVENTUALLY BECOMES EMAIL

# Accurate vs General

<https://jakevdp.github.io/blog/2012/10/07/xkcd-style-plots-in-matplotlib/>



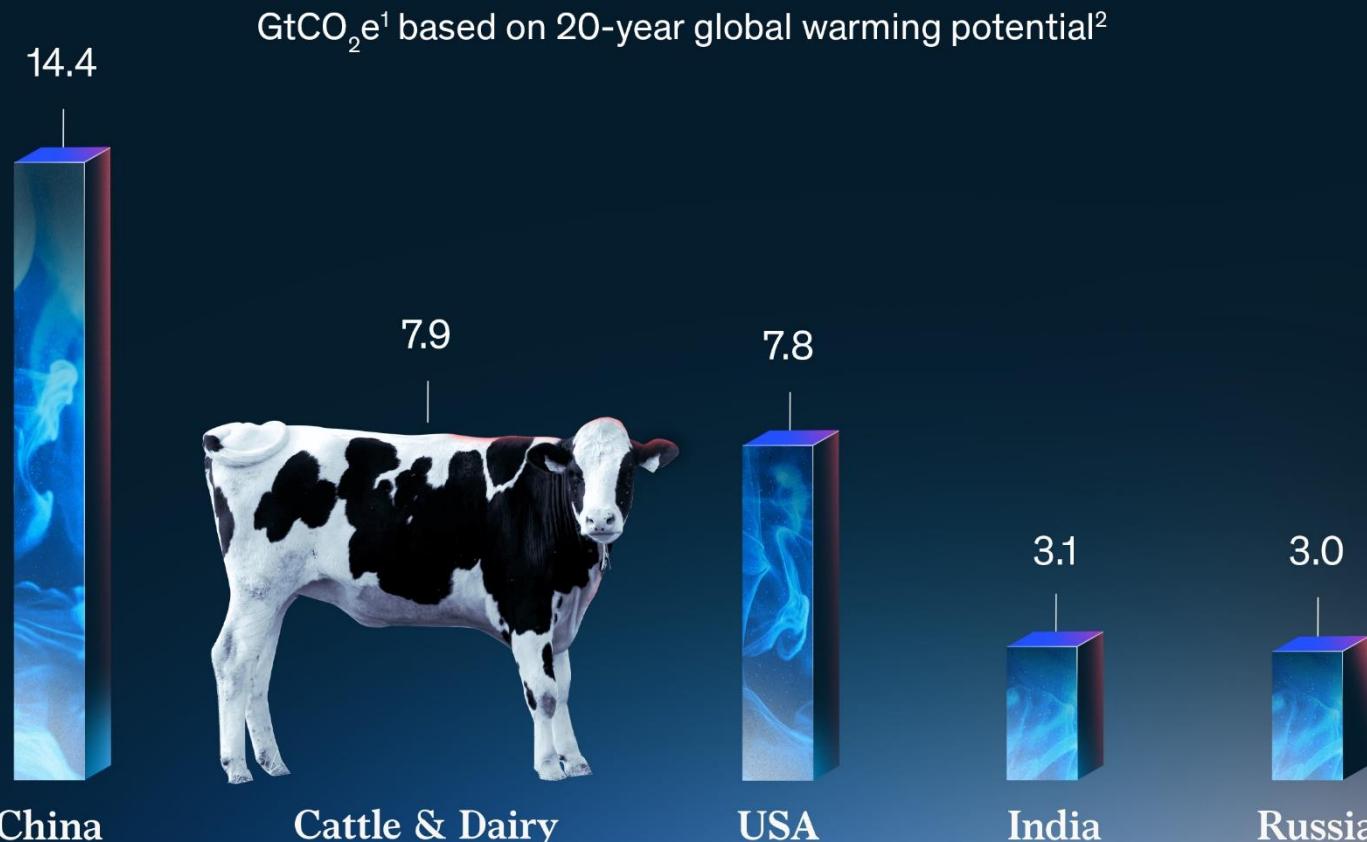
General Impressions



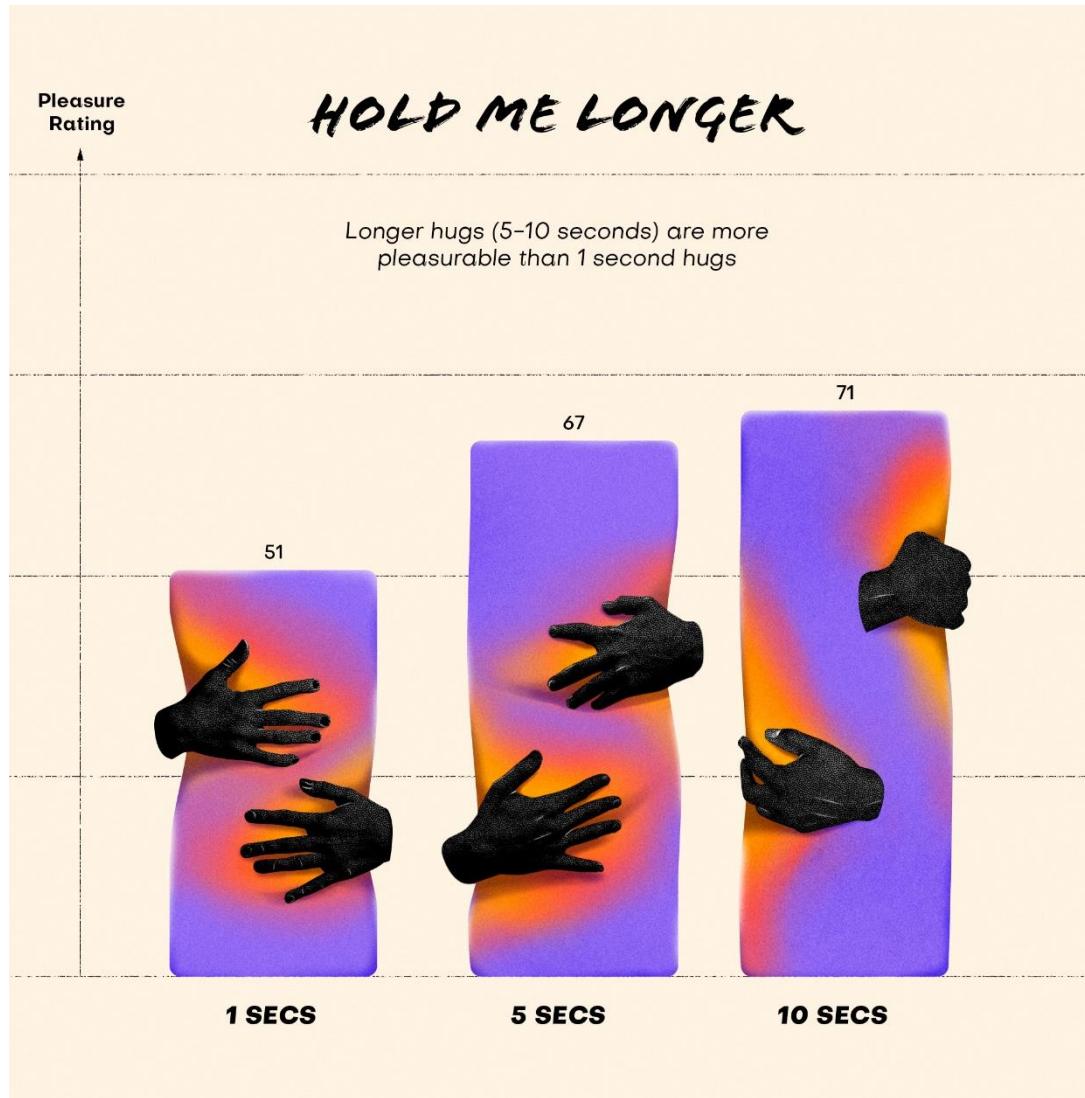
Accurate Analysis

# How about this one?

If cows were a country, they would be among the top greenhouse-gas emitters



# Another nice one

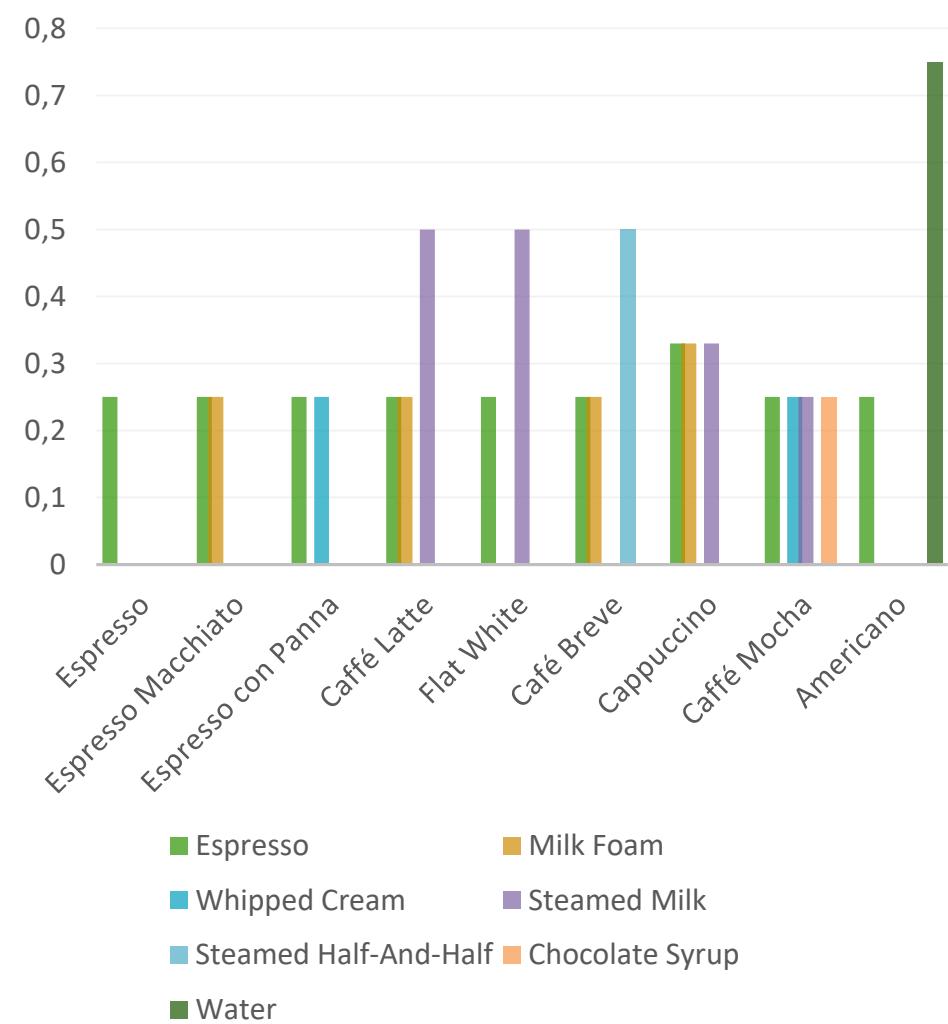


# Another one

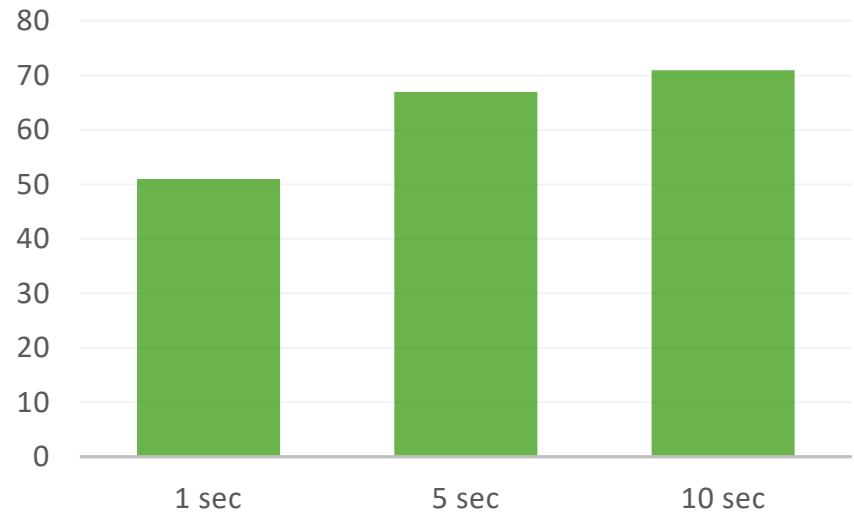
<https://ichimute.wordpress.com/blog/text-to-chartsgraphs-from-boring-to-interesting/>



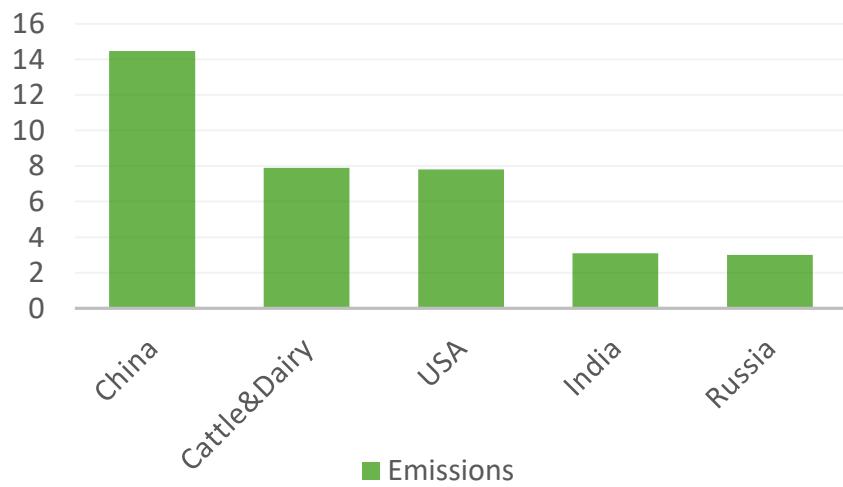
# And not...



## Hold Me Longer



## If Cows were a country...

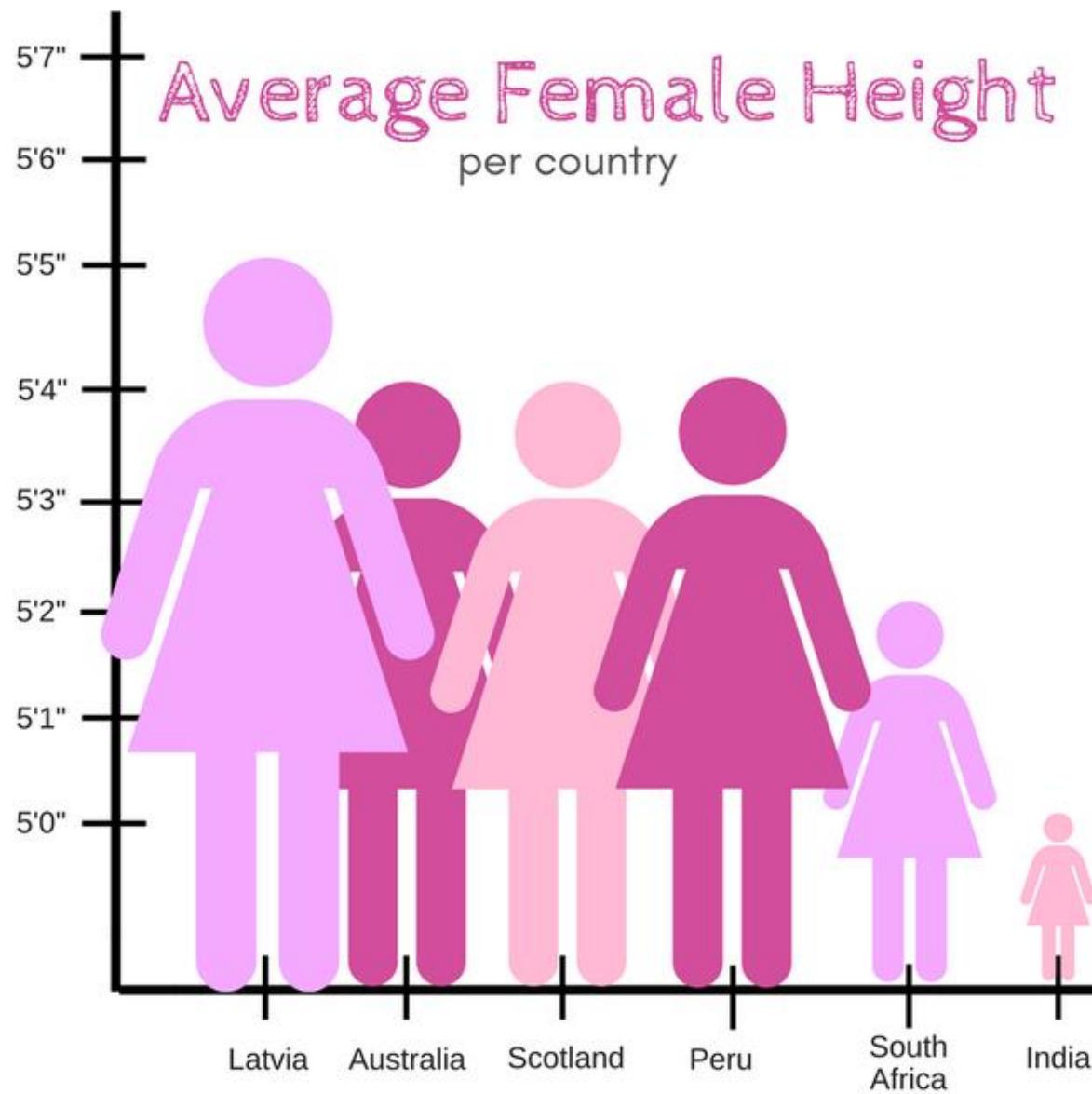


# “Death by Barchart”

“present ordinary data in extraordinary ways”

(Robert Kosara, <https://eagereyes.org/blog/2022/watch-my-outlier-talk-this-should-have-been-a-bar-chart>)

# This one is crap, however... be careful!



# Why Abstract tasks?



domain

***abstraction***

idiom

algorithm

Direct  
Poll

# QUESTIONS?