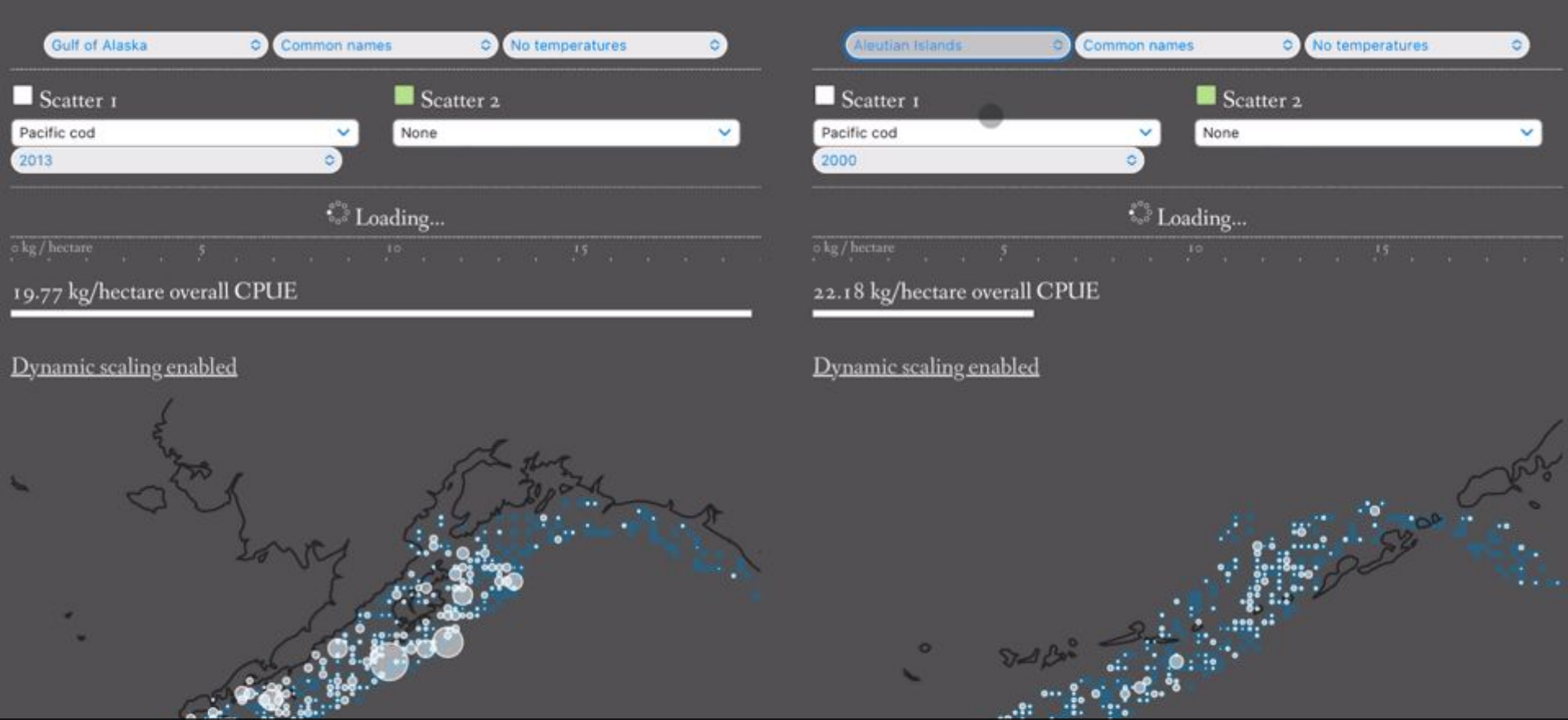
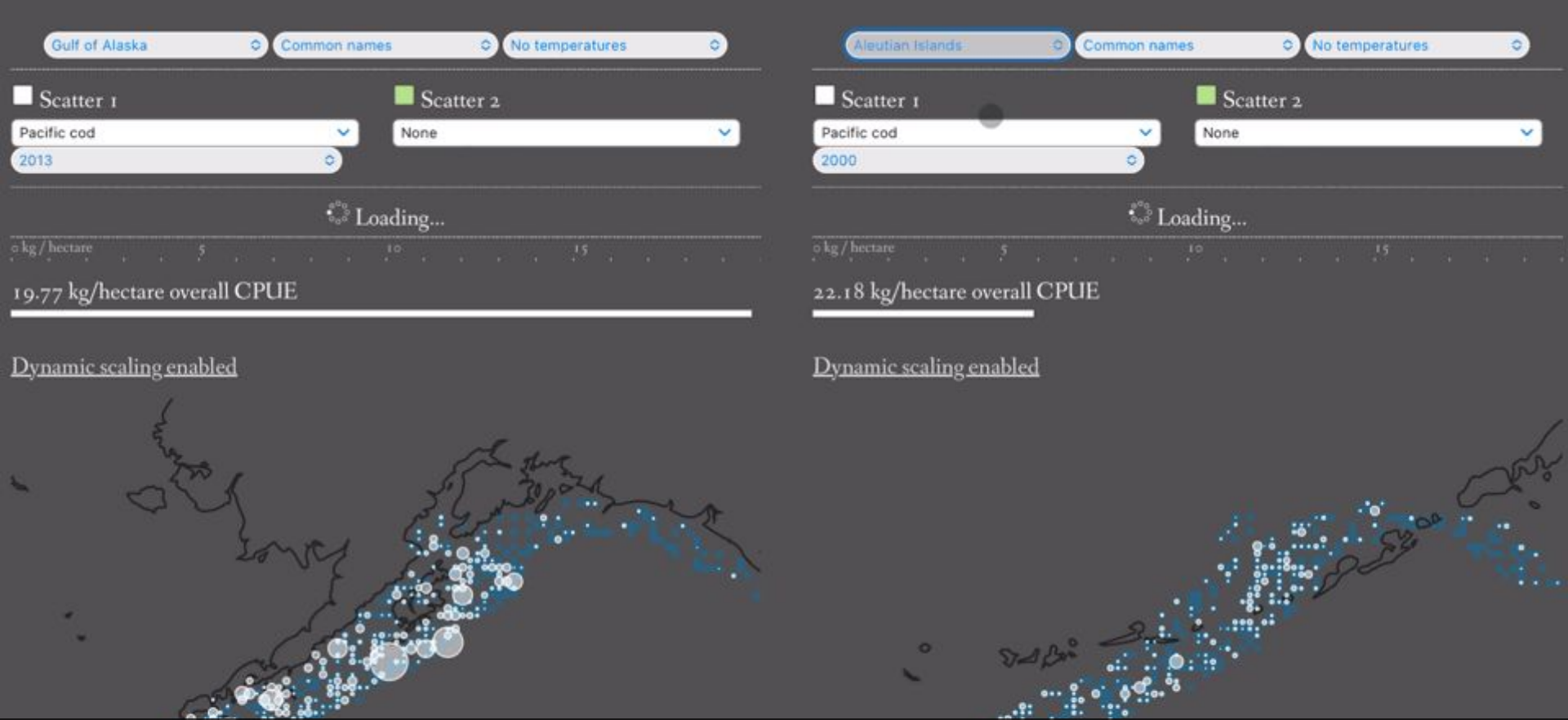


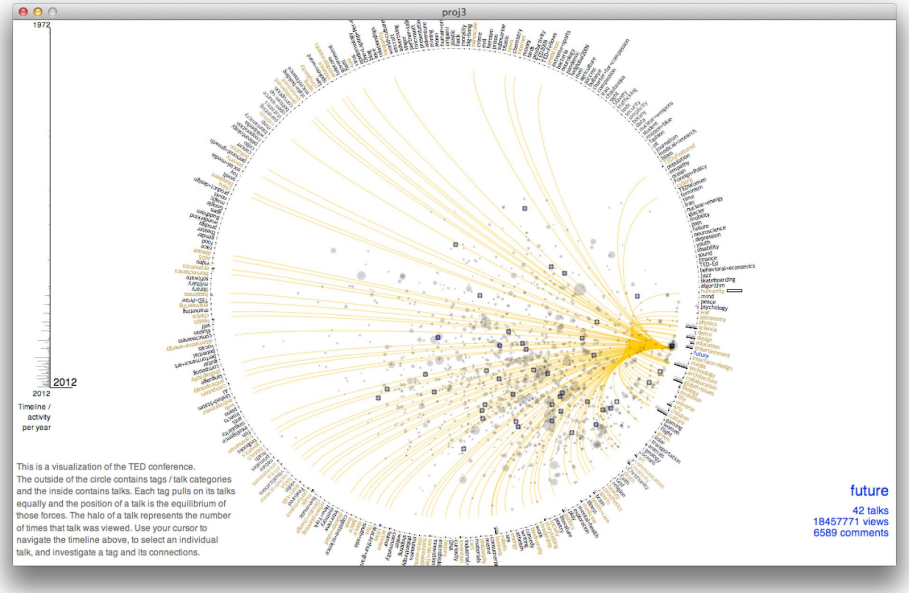

# Welcome!

Please find a seat. We will start at about 3:05 - 3:10




# Lecture 1

A Samuel Pottinger
Jan 22, 2025
Stat 198: Interactive Data Science and Visualization

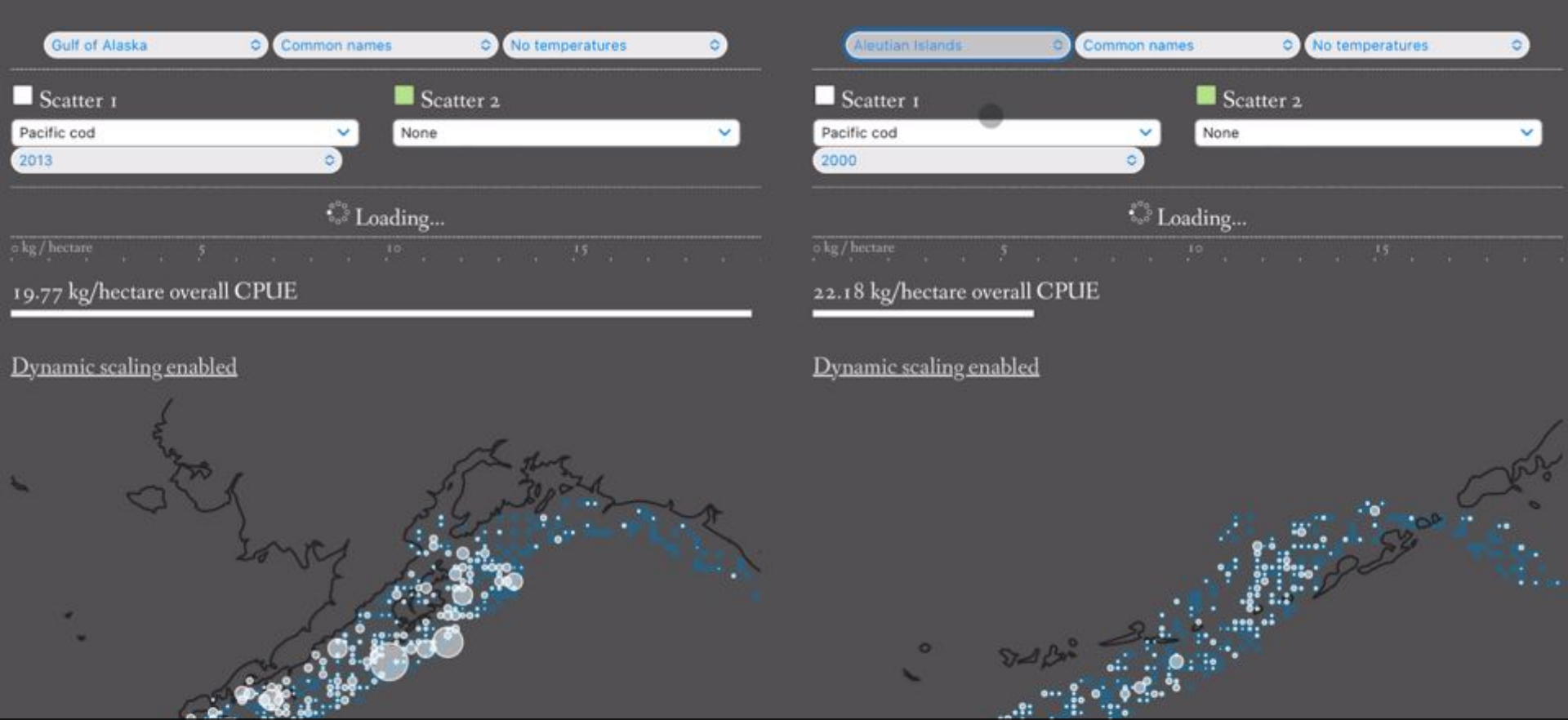



# Today

About the course

Overview of concepts

Some logistics




# About the Course

**Hello!** I'm a data scientist, software engineer, and information designer.

---

**Sam Pottinger**
A more human-centered AI/ML
https://gleap.org

```
UC Berkeley | Data + Environment
      EVERY | Data + Synthetic Biology
       IDEO | Data + Design
     Plenty | Data + Indoor Agriculture
      Apple | Data + Engineering
     Google | Data + Visualization
    LabJack | Data + Hardware

 Processing | Data + Love in Java
Sketchingpy | Data + Love in Python
```

I’d love to learn more about you and for you to meet some of your fellow students.

Our first homework assignment will test drive the Zulip to do introductions. Keep an eye on #learner-graded and #learner-audit for more information.

**What you will be able to do after the course.**

- Build data visualizations and other interactive experiences to **share your findings** with others.
- Tell **impactful stories** that engage your readers emotionally through data.
- Invite your audience in as **co-creators** to build new meaning alongside you in your work and collaborate with AI / ML to design solutions and make decisions.
- **Craft tools to explore data-heavy questions** and uncover insights.
- Incorporate **ethics and accessibility** into your data visualization work.

# What we will cover together

| Section | Concepts | Tech |
| --- | --- | --- |
| Hello | Overview of data visualization. | (Creative) Python |
| Primitives | Perception / cognitive science for viz. | Sketchingpy, Matplotlib |
| Combination | Data viz within human-centered design. | Geospatial and graph data |
| Conversation | Game design. | Alternative user inputs |
| Context | Accessibility and ethics. | Adaptive technologies |
| Skills | Iterative process. | JavaScript, D3, P5.js |

# What we will do together

Weekly Exercises

Weekly Reading

Interactive Experience

Final Project + Present

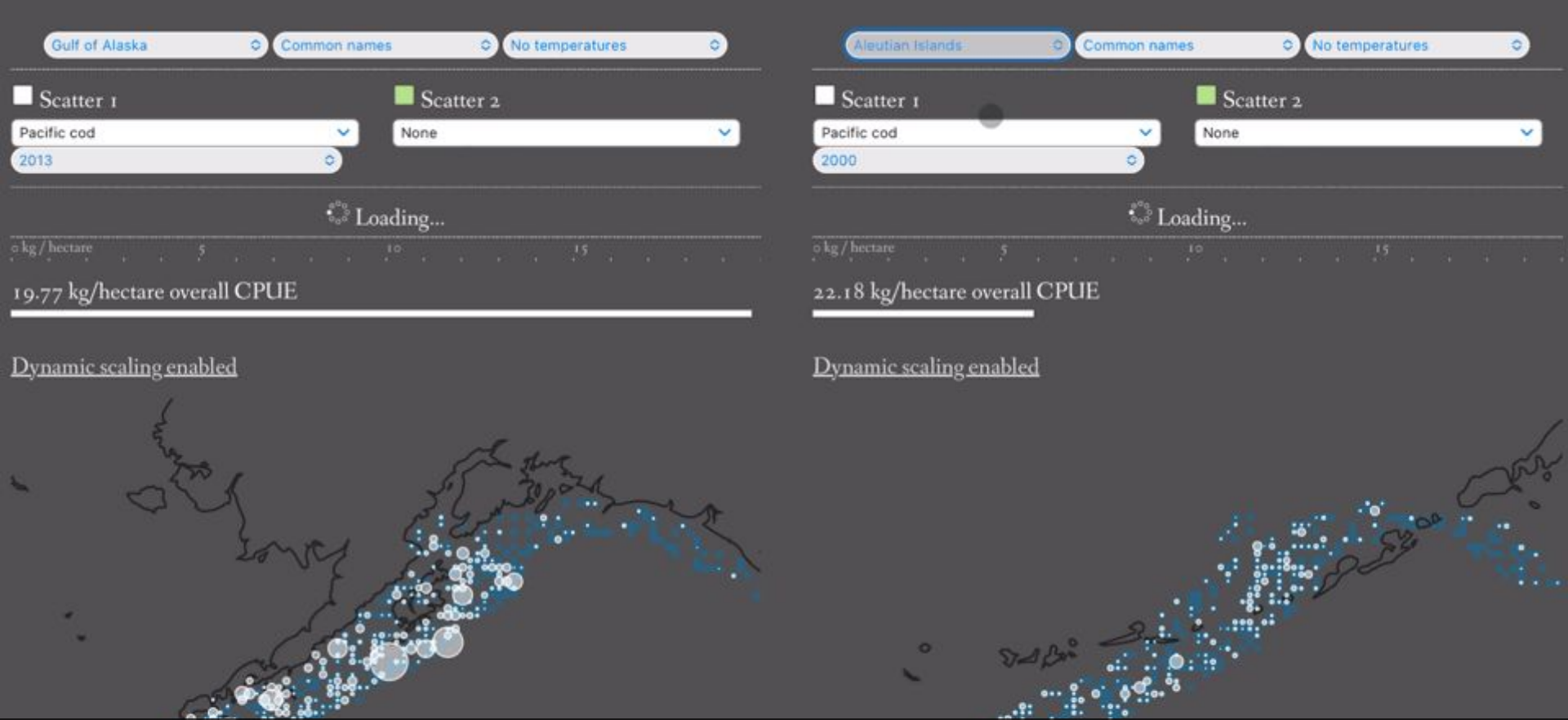
# What we will do together

| | |
|---|---|
| Weekly Exercises | Weekly Reading |
| Interactive Experience | Final Project + Present |

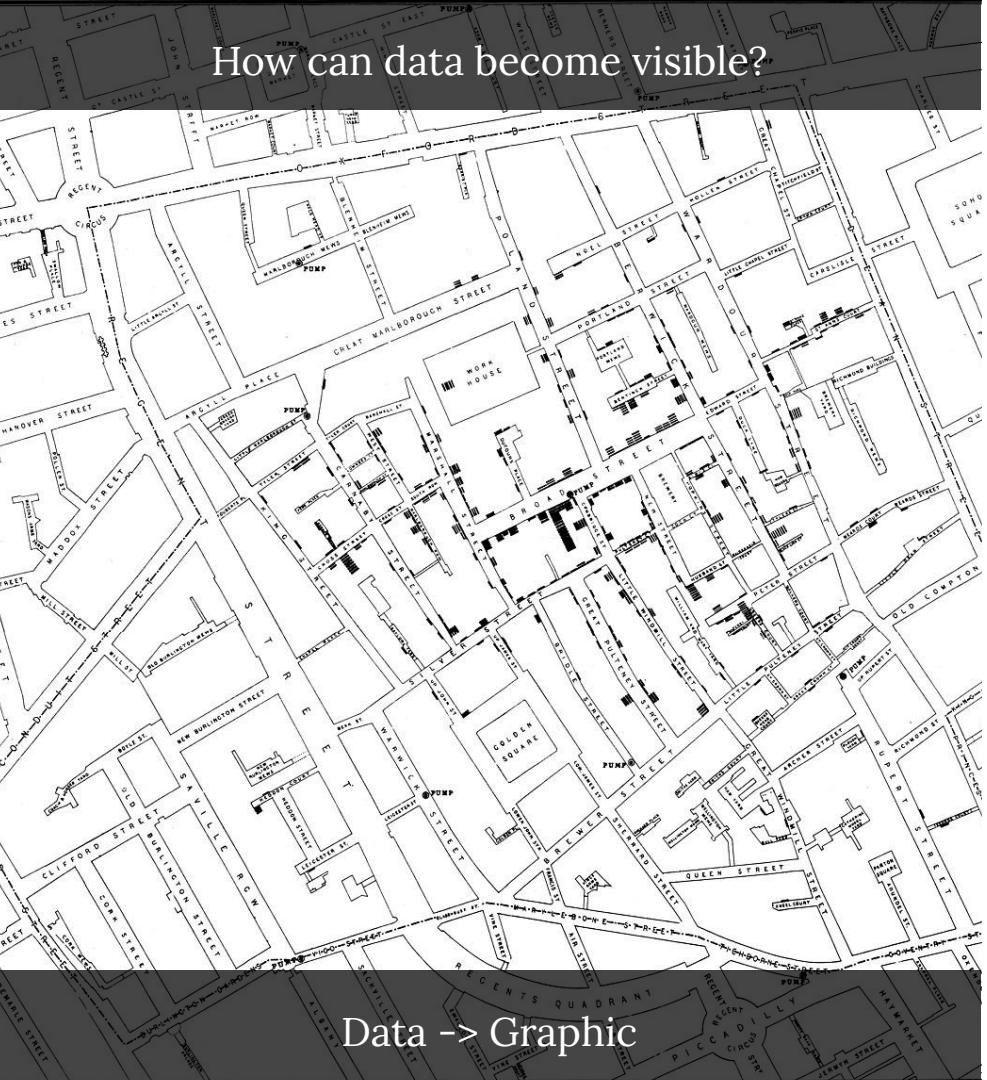
**Check out the course manual for more information.**

## Some things we won't do

- A deep investigation of data manipulation / cleaning.
- Full treatment of evaluative methods.
- Server-side engineering.
- Tableau, PowerBI, ...




# 4 Perspectives




# Data Visualization in 4 Acts

| As representation

As task

As message

As dialogue

Why and how different groups do data visualization.
How you can think about it in your work.

| Year | Number of Wolves | Number of Moose |
|---|---|---|
| 1980 | 50 | 664 |
| 1982 | 14 | 700 |
| 1984 | 24 | 811 |
| 1986 | 20 | 1025 |
| 1988 | 12 | 1653 |
| 1990 | 15 | 1216 |
| 1992 | 12 | 1600 |
| 1994 | 15 | 1800 |
| 1996 | 22 | 1200 |
| 1998 | 14 | 700 |
| 2000 | 29 | 850 |
| 2002 | 17 | 1000 |
| 2004 | 29 | 750 |
| 2006 | 30 | 385 |
| 2008 | 23 | 650 |
| 2010 | 19 | 510 |
| 2012 | 9 | 750 |
| 2014 | 9 | 1050 |
| 2016 | 2 | 1300 |
| 2018 | 2 | 1500 |

**Premise:** The human visual system is good at spotting patterns.

What is the relationship between wolves and moose in Isle Royale?

What year saw the most moose?

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|---|---|---|
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| 1984 | 24 | 811 |
| 1986 | 20 | 1025 |
| 1988 | 12 | 1653 |
| 1990 | 15 | 1216 |
| 1992 | 12 | 1600 |
| 1994 | 15 | 1800 |
| 1996 | 22 | 1200 |
| 1998 | 14 | 700 |
| 2000 | 29 | 850 |
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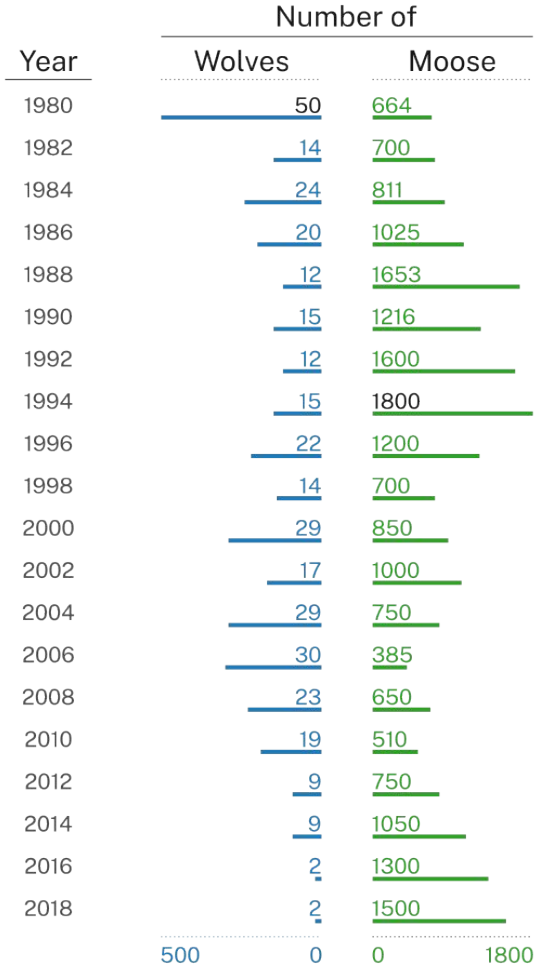


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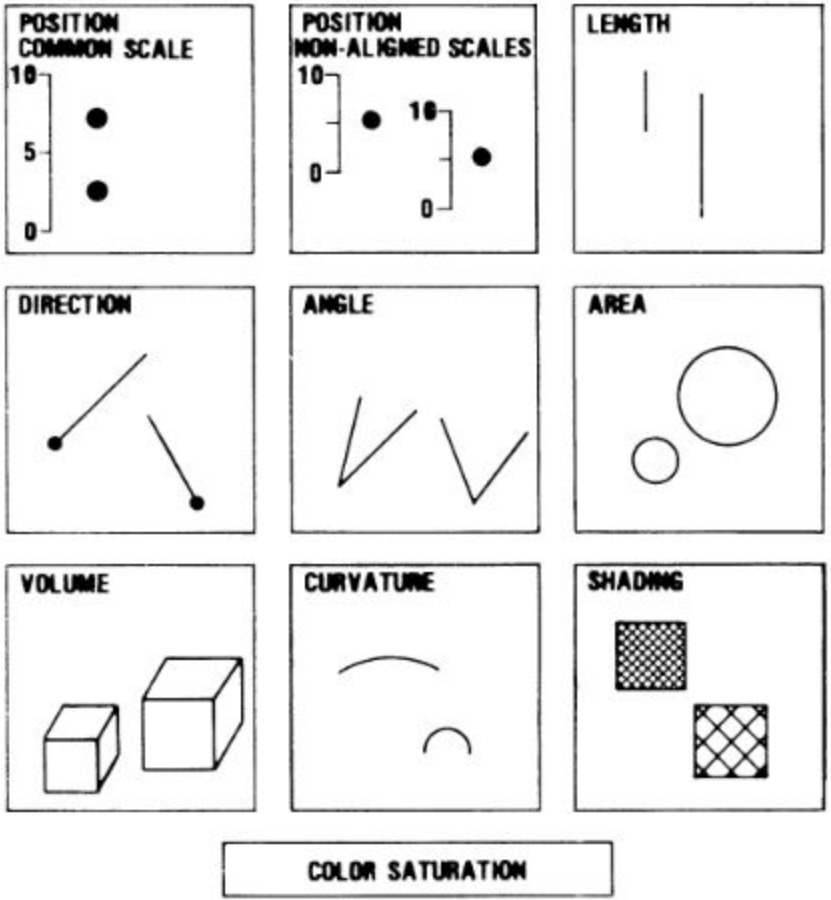



*Figure 1. Elementary perceptual tasks.*

**Example:** This first way of thinking about data visualization focuses on encoding.

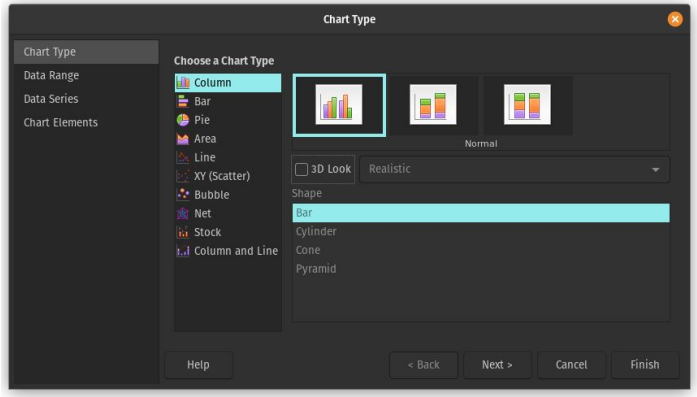
How do we “map” attributes of data to visual attributes?

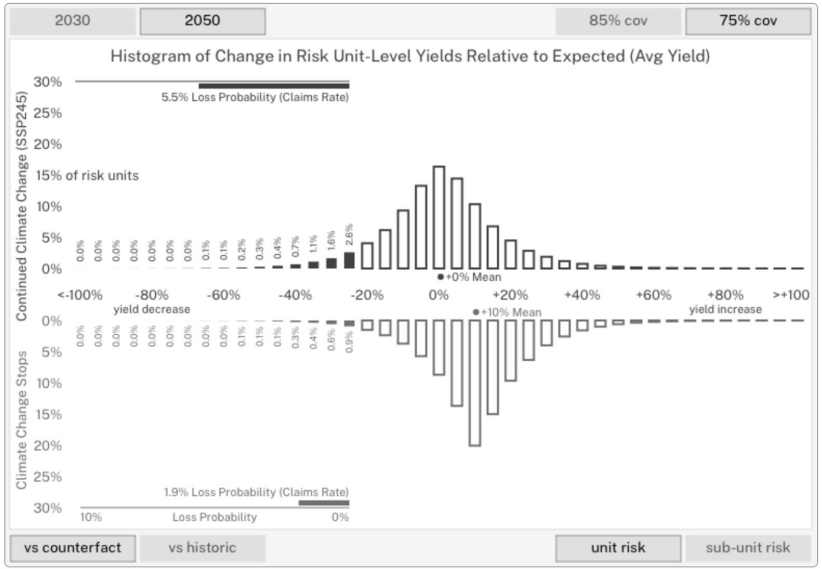
What visual encodings are better than others?

How do we make visualizations accessible?

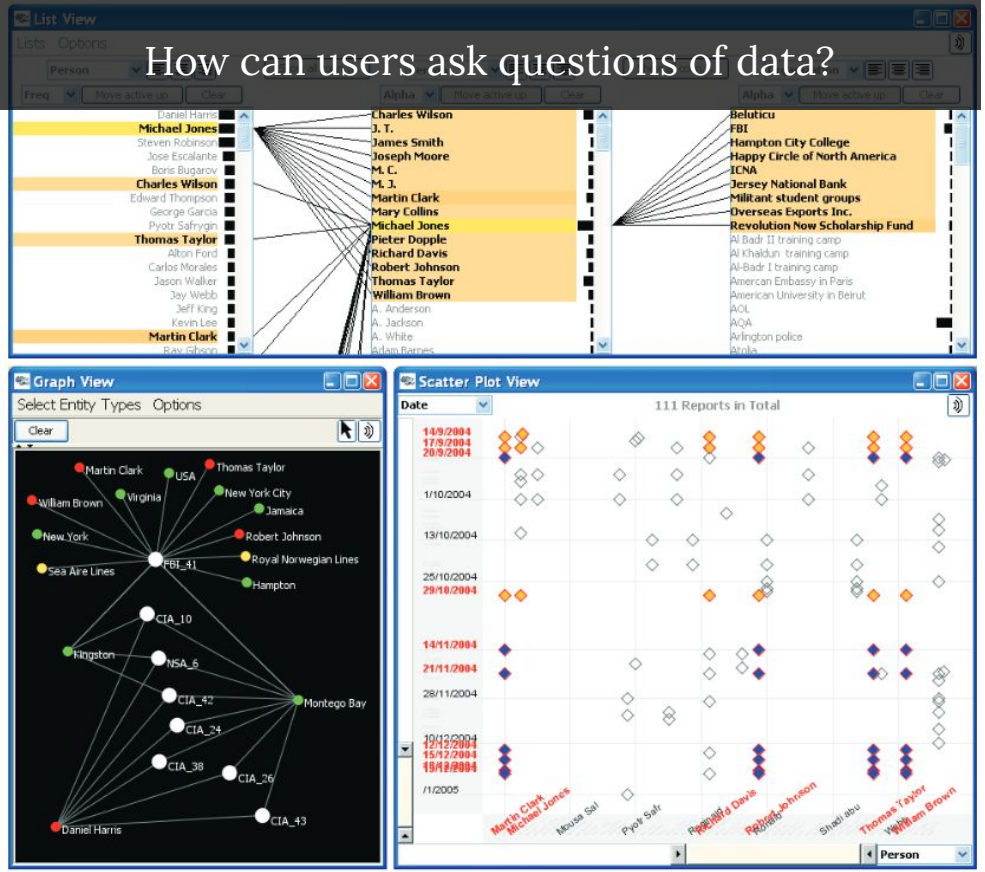
**Offers:** Flexibility beyond the chart wizard but principles to guide us.

Gives us the basic building blocks for how humans process visual information but lets us use that understanding in many different ways.



**Where this will come back:** Learn more about human visual system to understand when to use different chart types or encoding devices.




# Data Visualization in 4 Acts

As representation

As task

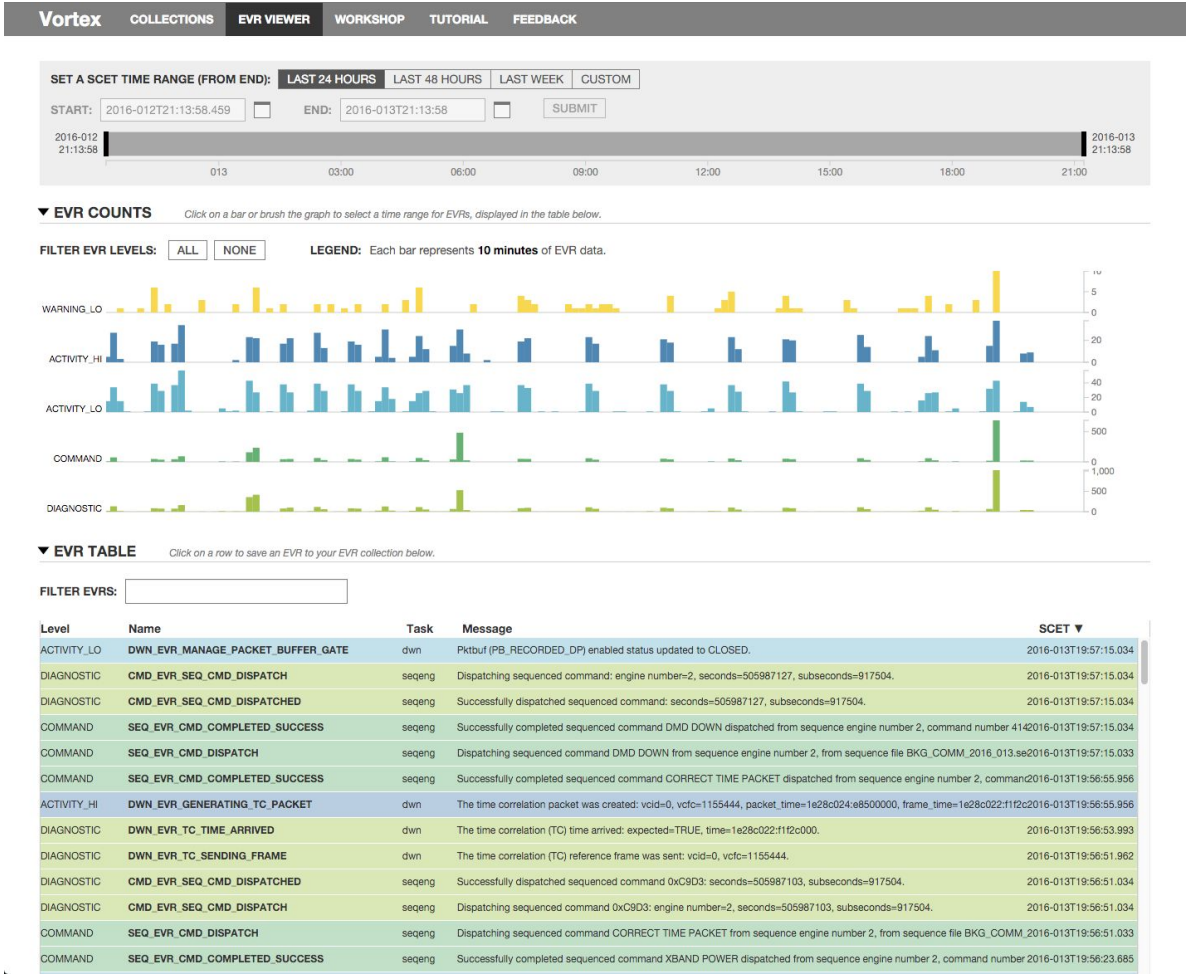
As message

As dialogue

Why and how different groups do data visualization.
How you can think about it in your work.

**Premise:** Visualizations are part of a broader user journey.

A structured way to think about the user in the context of data visualization.



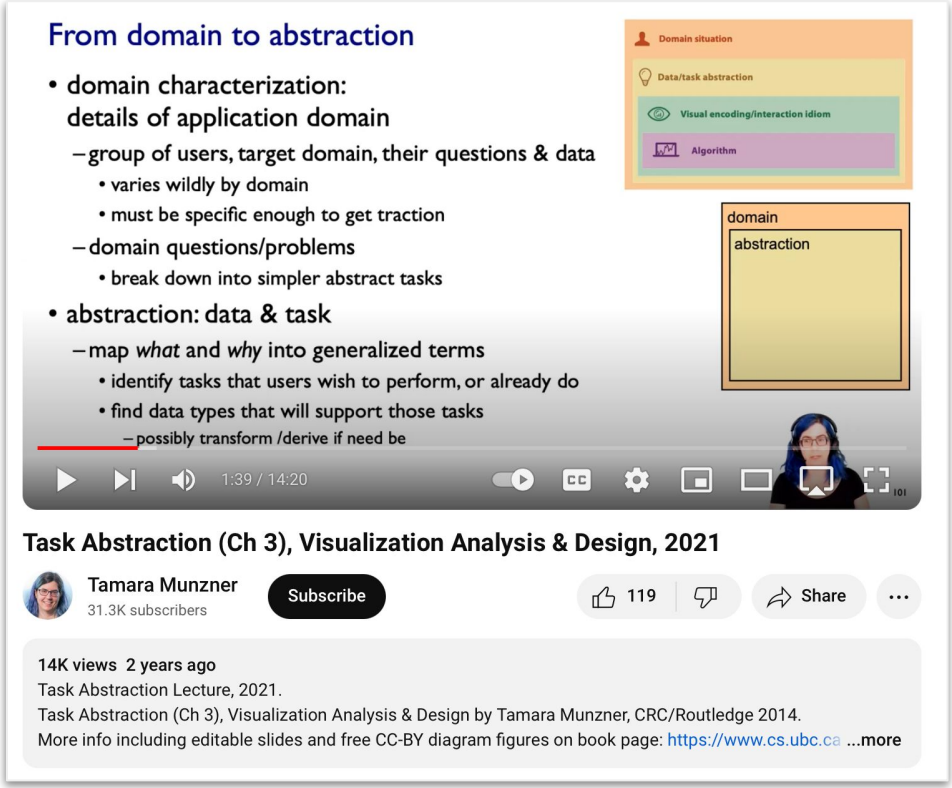

**Example:** Rachel Binx at NASA.

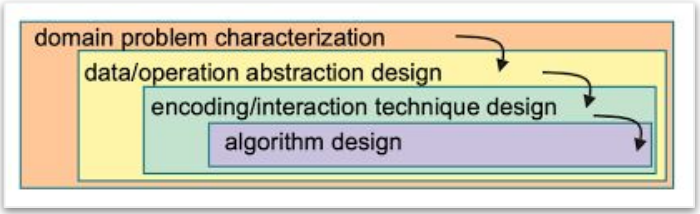
Looking at “event records” sent from spacecraft to NASA.

Interviewed a bunch of users to figure out how they worked with these data previously (log files).

Binx talks about how people had never seen their data before visually and the periodicity of events was revelatory for example.

Boils down into “tasks” the user executes and build user experiences to support those tasks.




**Offers:** Structured evidence-based understanding of the user to support them in their tasks.

Oritents around domains, tasks, questions, and data.

Fits within a broader modern user experience design dialogue.

**Where this comes back:** Discussion of how to use more traditional design concepts including those employed in other forms of product and UX design as part of data visualization and interactive data experiences.

# Data Visualization in 4 Acts

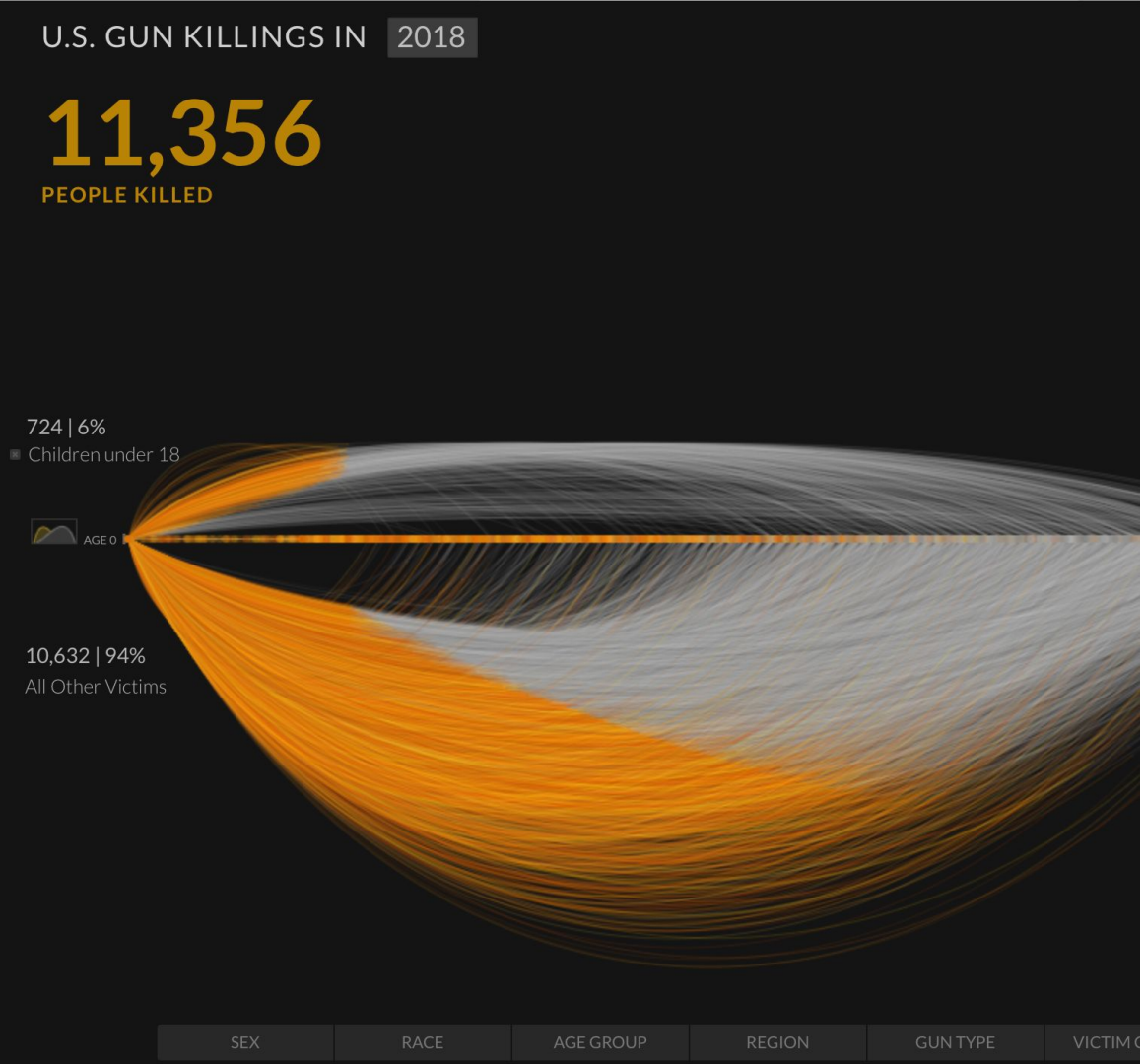
As representation

As task

| As message

As dialogue

Why and how different groups do data visualization.
How you can think about it in your work.




**Premise:** Forms given to data enable authors to convey a message to a reader.

How does the reader feel when going through a visualization?

Where is efficiency helpful but where does it conflict with the message of the piece?

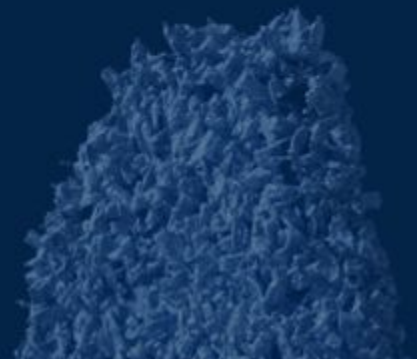
How might we defy reader expectations or have them confront prior held beliefs?

guns.periscopic.com

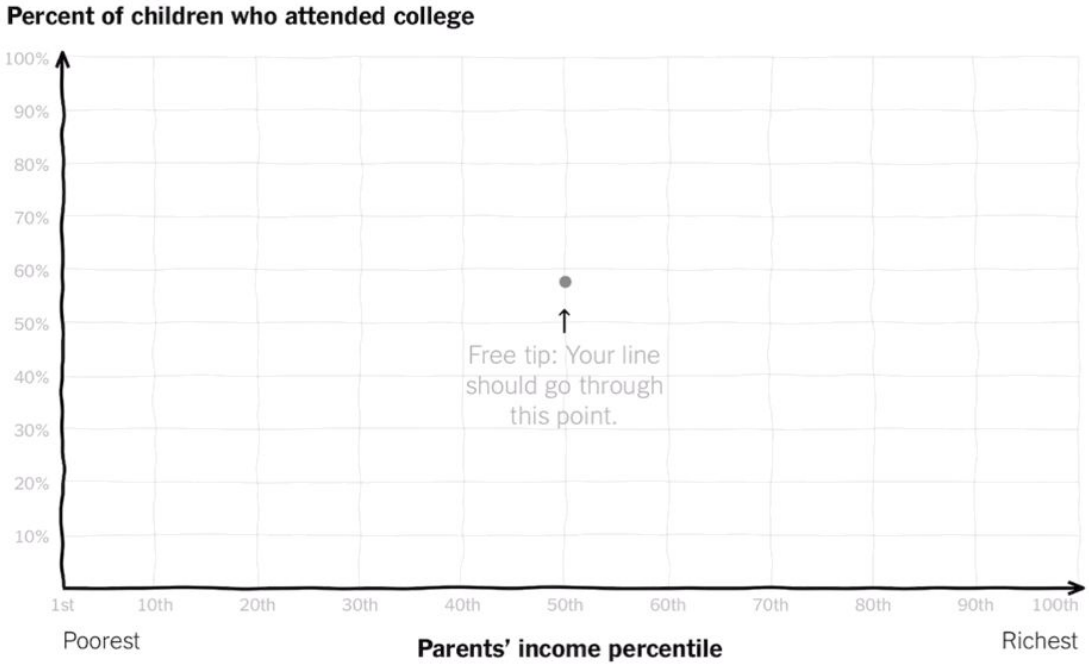
# A Treaty To End Plastic Pollution. Forever.

World leaders must take steps to drastically limit the impact of plastics on the environment and human health

CHOOSE OUR FUTURE



## Draw your line on the chart below




I'm done

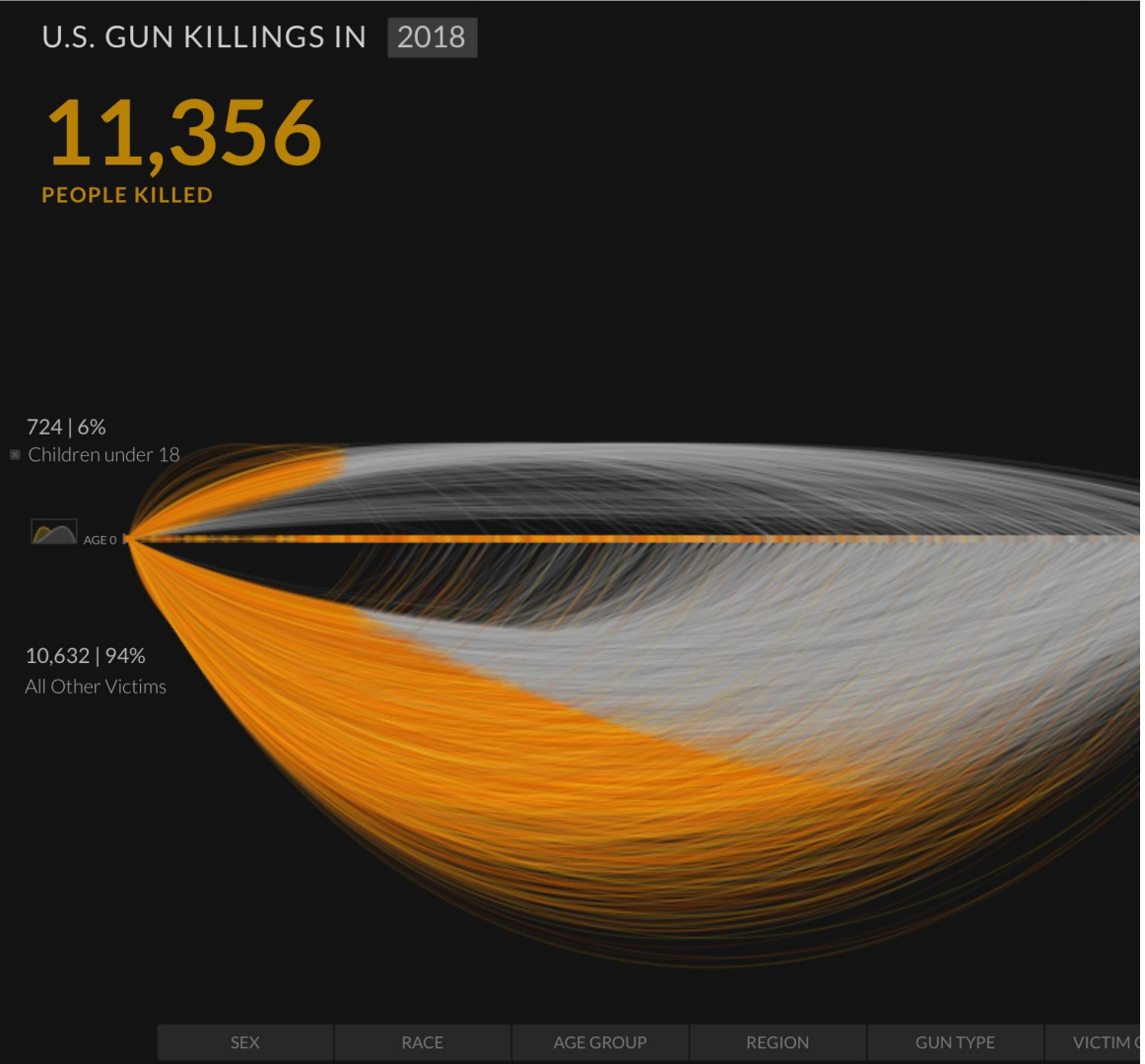
Start over

**Offers:** A way to convey messages with logos and pathos.

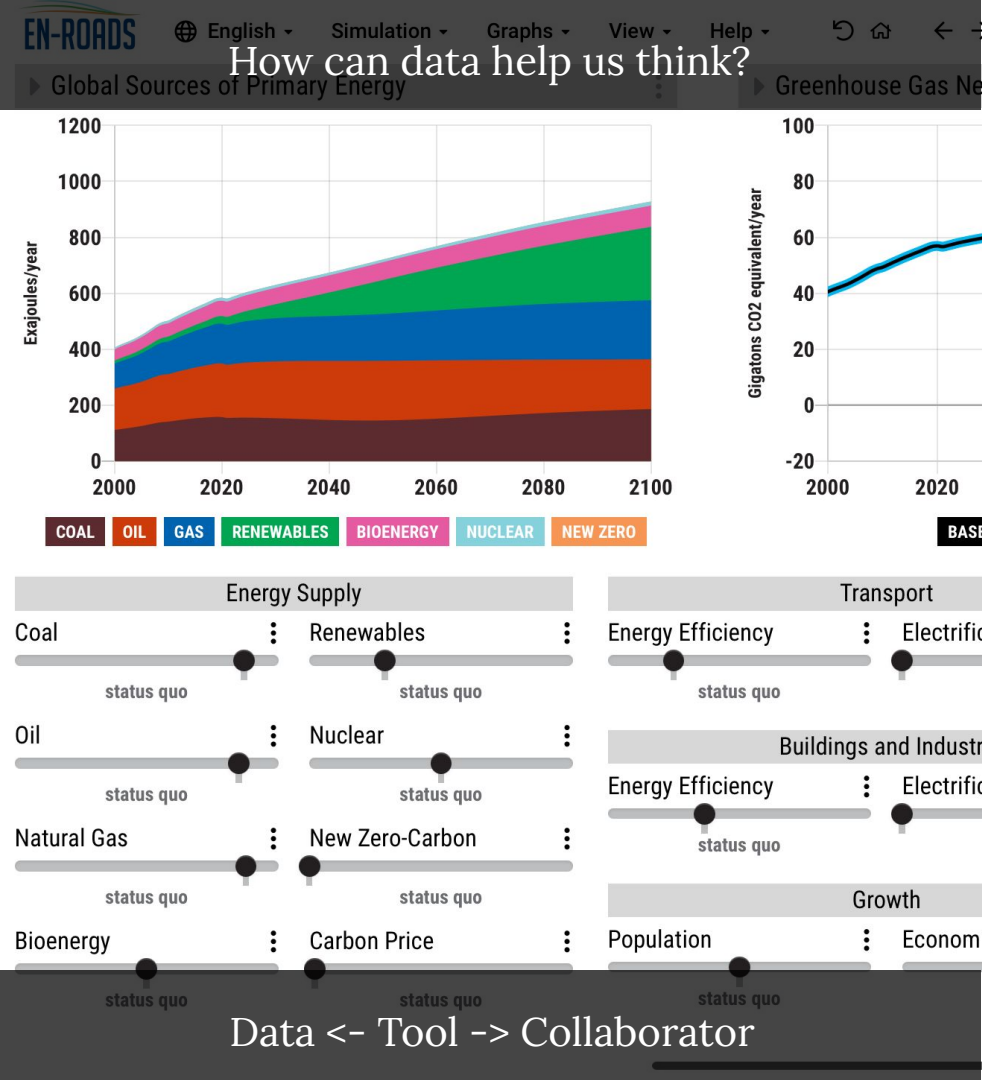
How to invoke emotional response.

How to challenge reader assumptions.

How to understand the process by which messages and meaning are interpreted.




**Where this will come back:** Techniques we can borrow from art and design to guide and evoke an emotional response.




# Data Visualization in 4 Acts

As representation

As task

As message

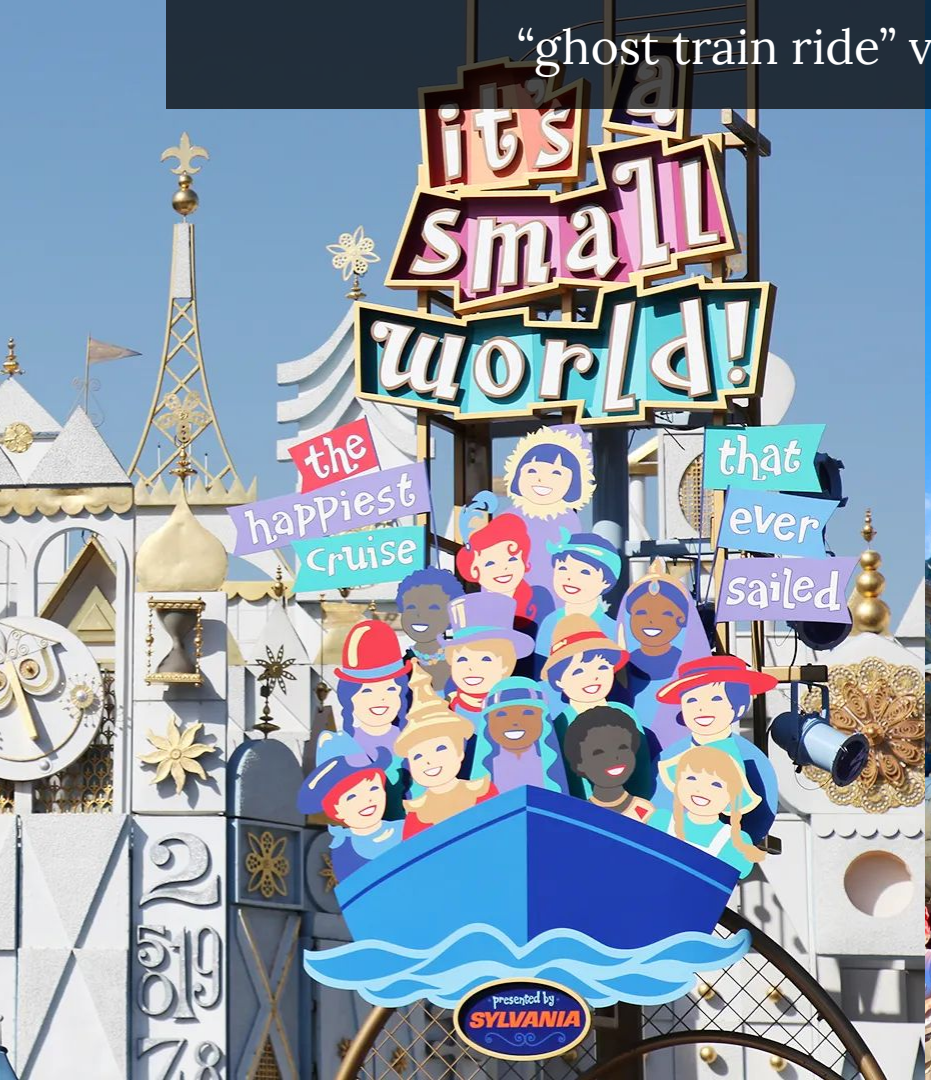
As dialogue

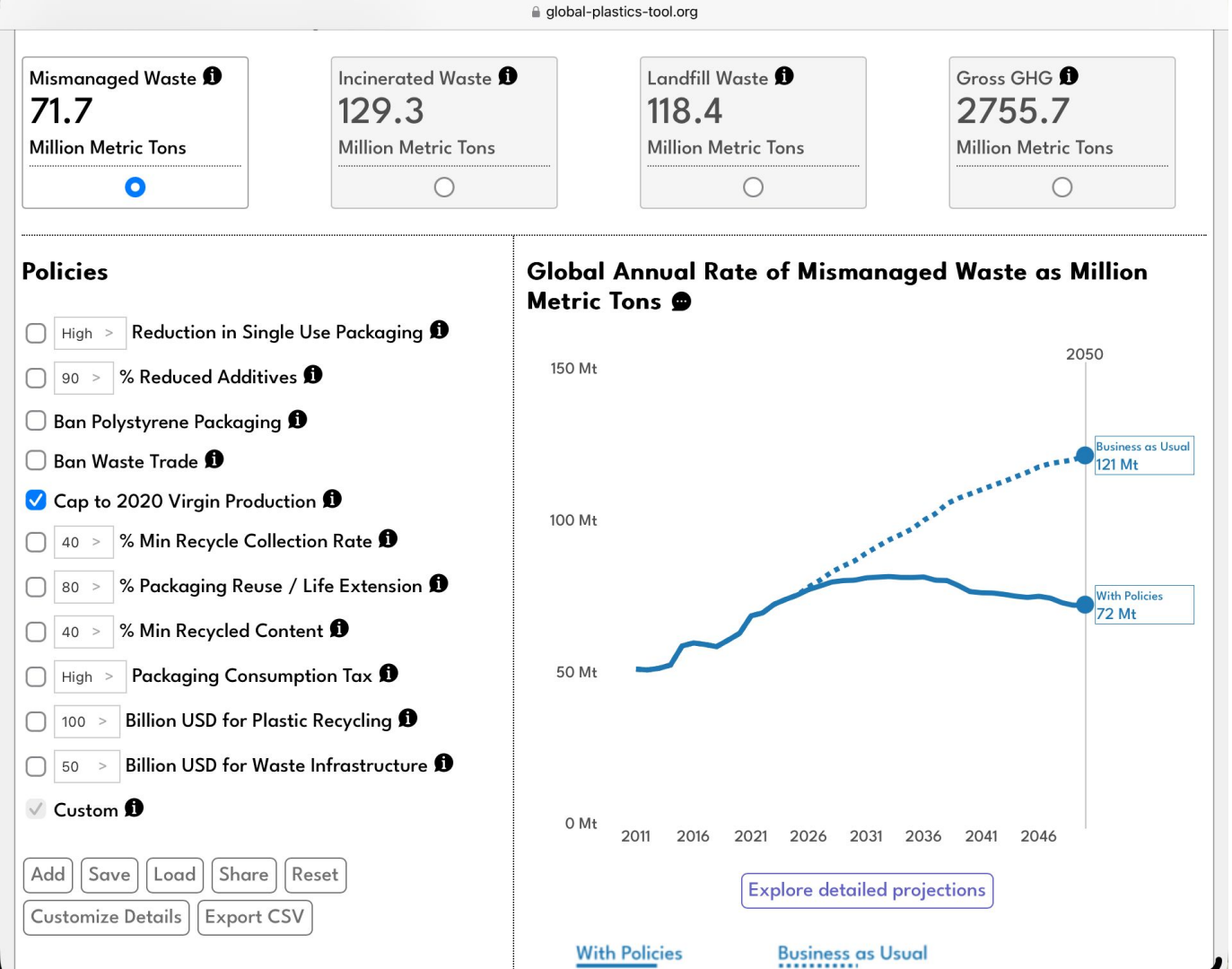
Why and how different groups do data visualization.
How you can think about it in your work.

**Premise:** Data as humane dynamic media.

The designer creates media for thought, elevating the reader to an author of tools and co-creator of meaning.

“ghost train ride” vs “open world”



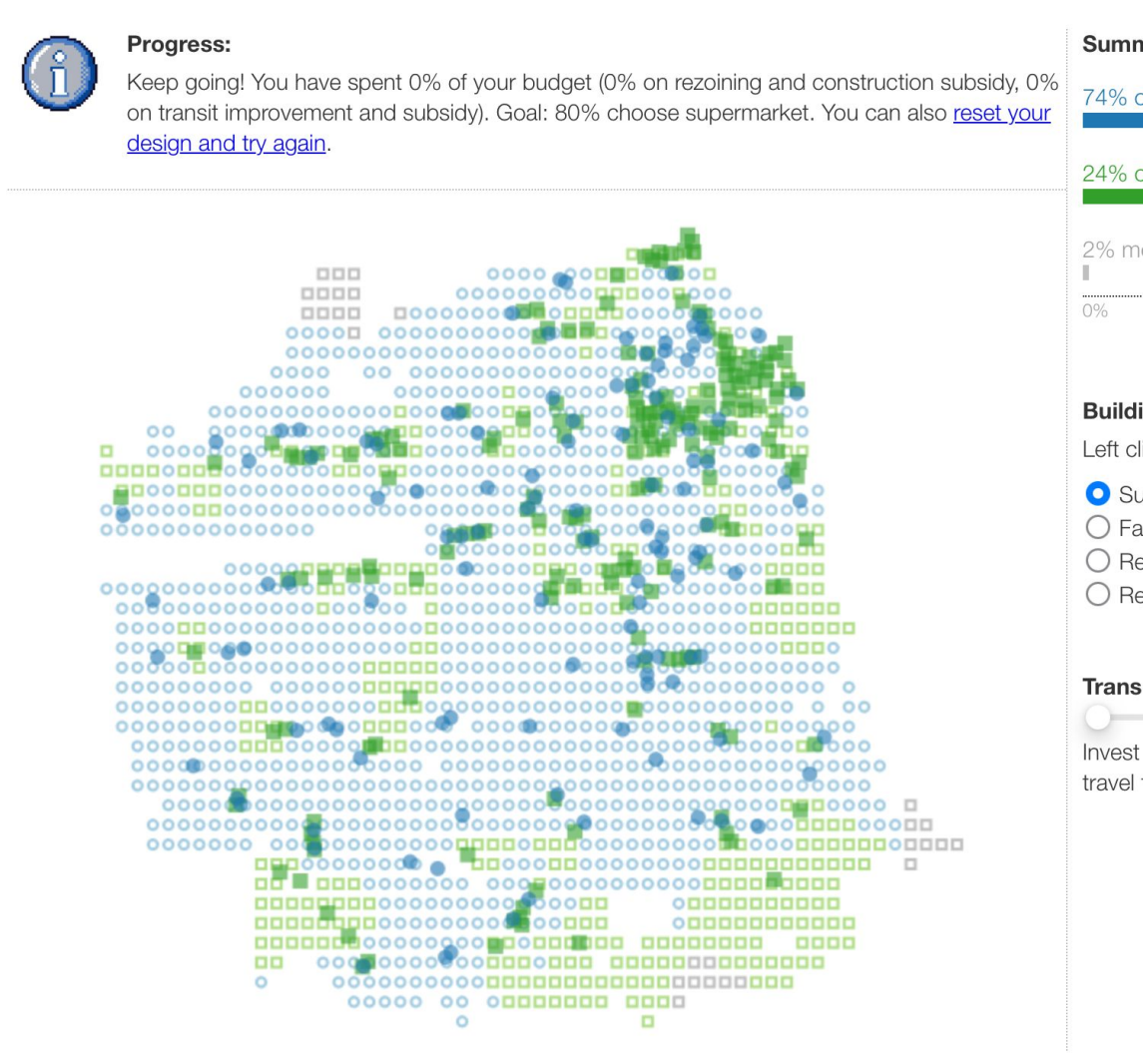



**Example:** Finding a solution to the plastics crisis.

A layered experience in which the user can simulate different policies.

An invitation to build outside the original designer's intention.

https://global-plastics-tool.org




**Offers:** Co-creation and user agency.

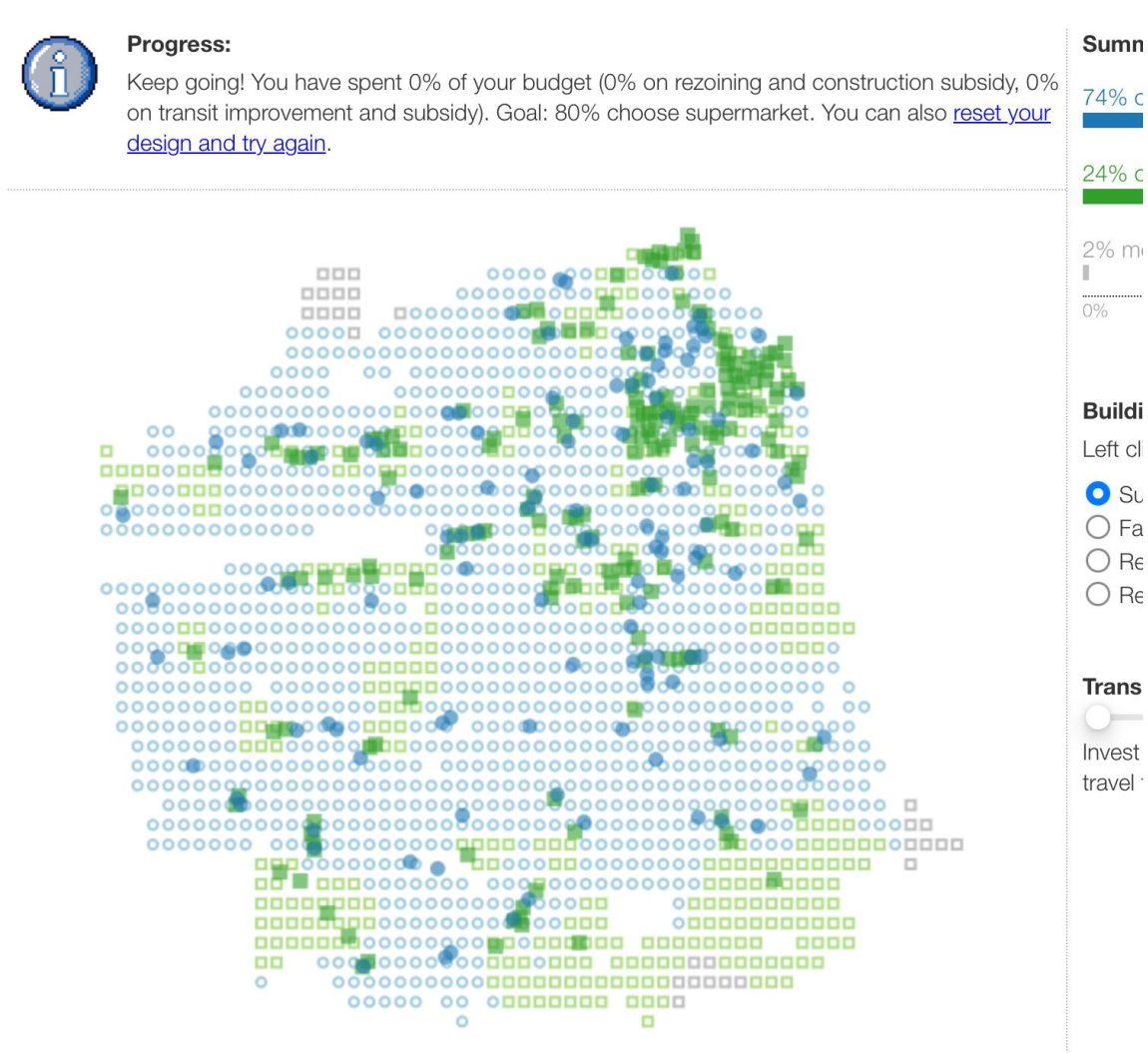
Often leaning on game design concepts.

How to teach with/without tutorializing.

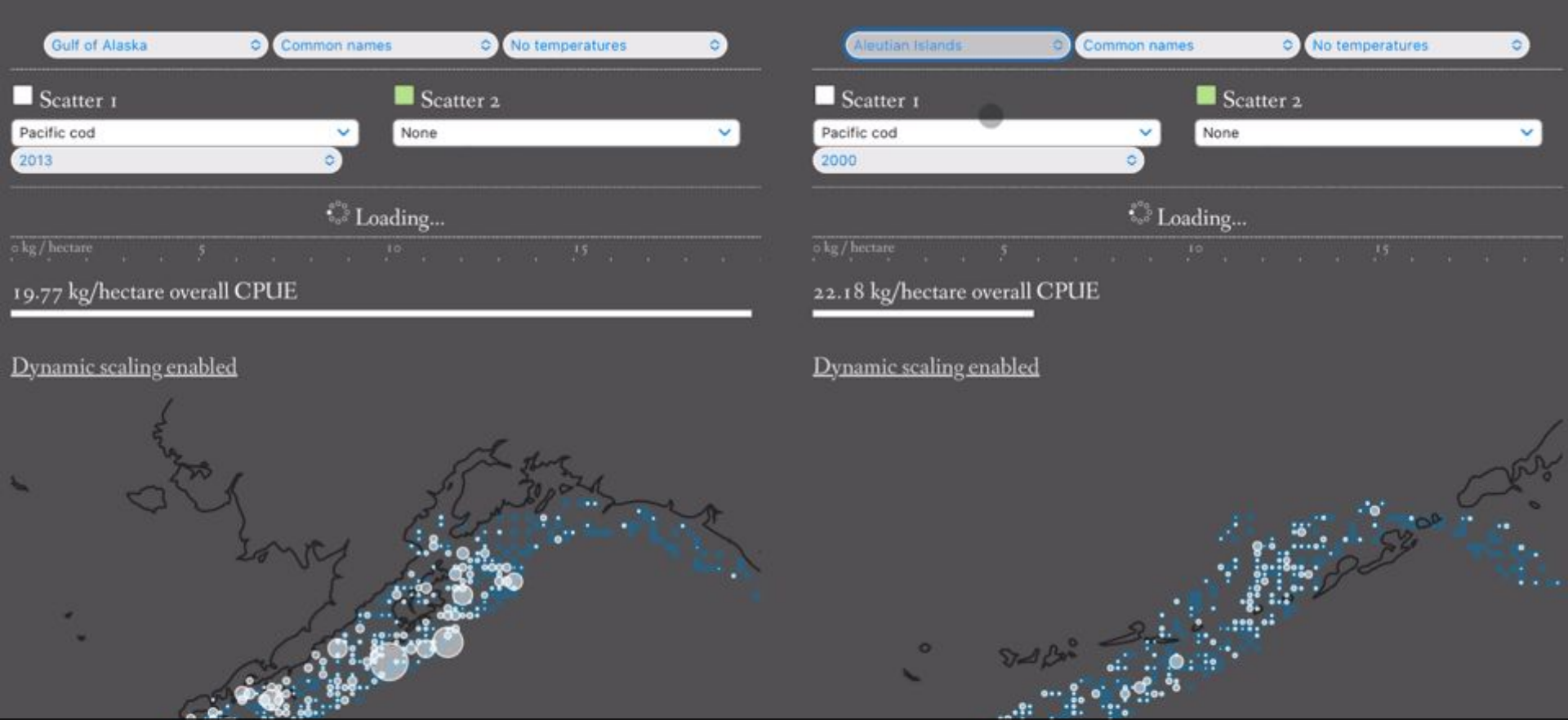
How to create spaces to interrogate assumptions.

How to build media to be repurposed.

How to design experiences where the user is co-author.




**Where this comes back:** How to employ interaction and game design to create digital spaces where users can explore data more freely and go beyond your own narrative.


Gulf of Alaska
Common names
No temperatures
Scatter 1
Pacific cod
2013
Scatter 2
None
Loading...
0 kg / hectare
5
10
15
19.77 kg/hectare overall CPUE
Dynamic scaling enabled
Aleutian Islands
Common names
No temperatures
Scatter 1
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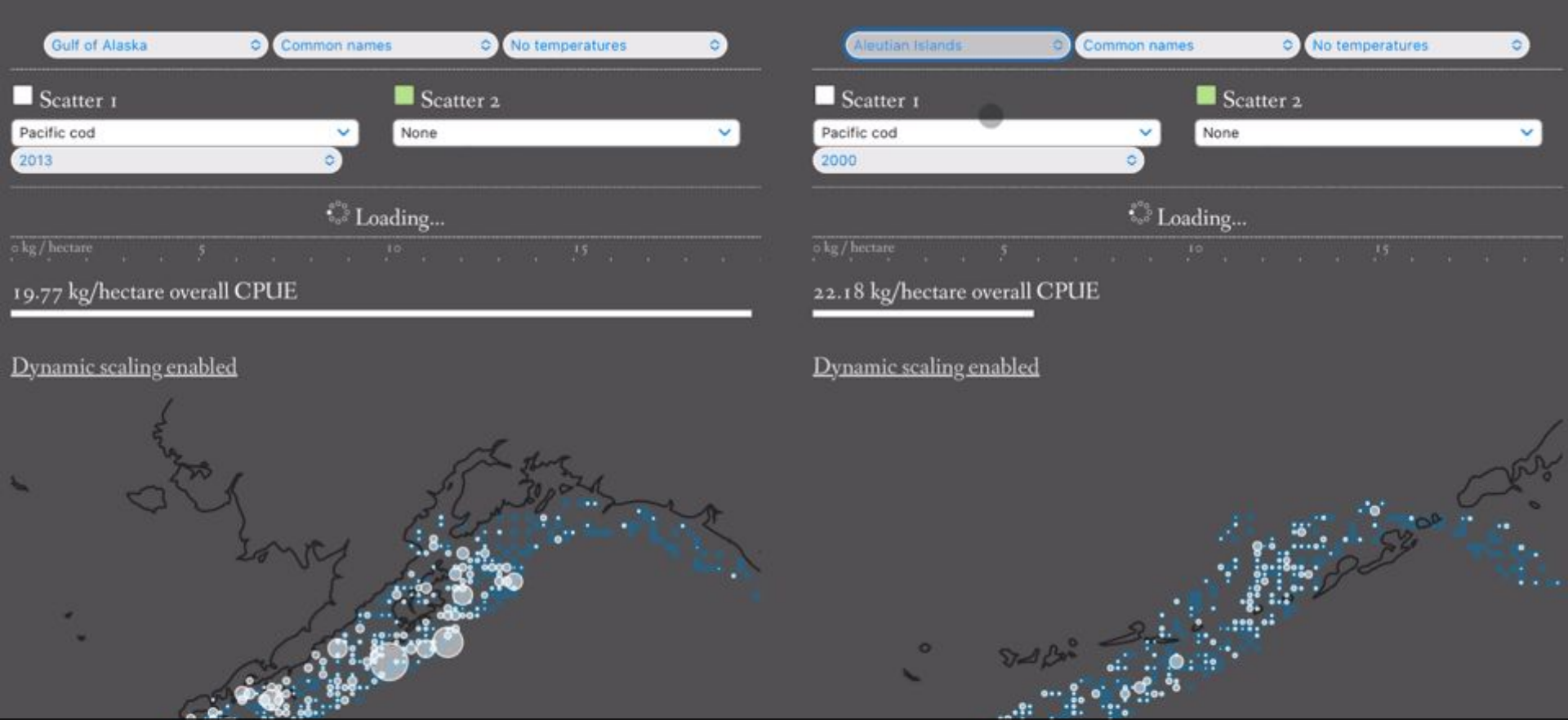
# Logistics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