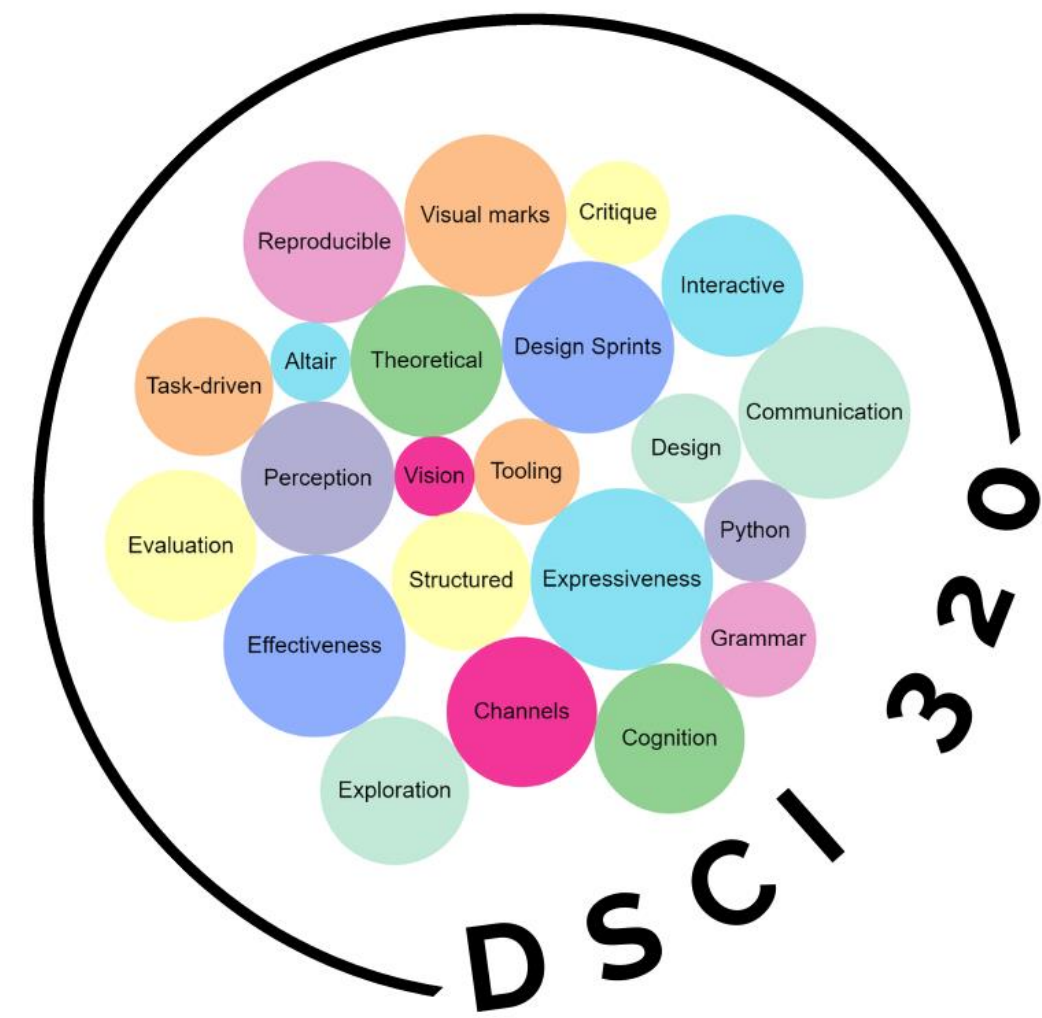


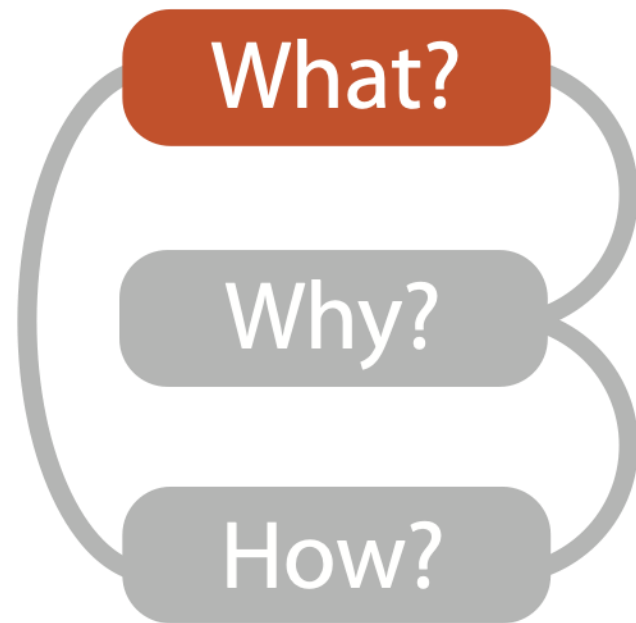
Visualization for Data Science

Altair Workday



Learning Outcomes

- Perform various data wrangling tasks to format datasets
- Use graphical marks to create common vizzes
- Create visualizations for sequential temporal tasks (e.g., line, area, and stacked area charts)
- Create visualizations for cyclic temporal tasks (e.g., heatmaps)



What?

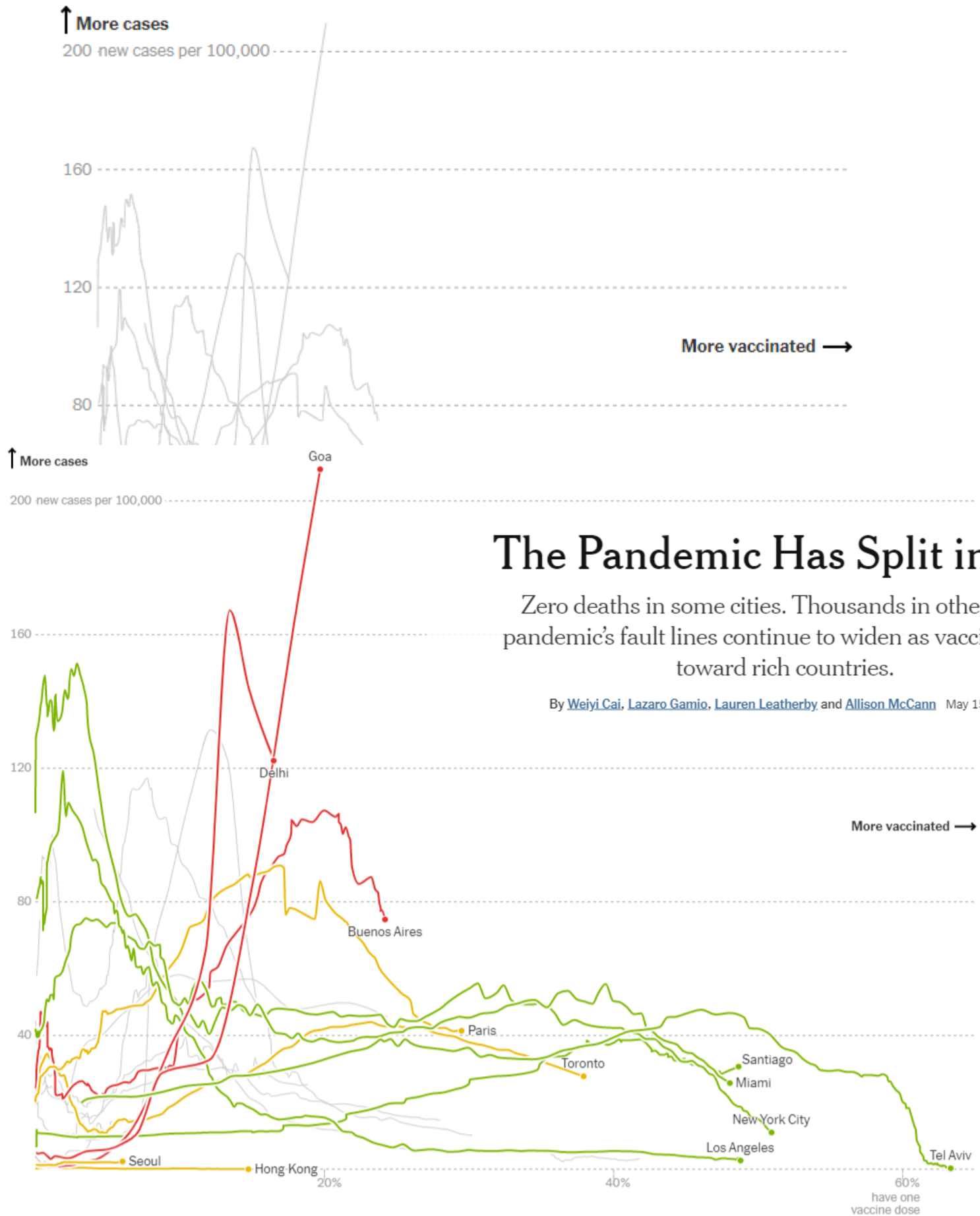
Datasets

- ➔ Data Types
 - ➔ Items
 - ➔ Attributes
 - ➔ Links
 - ➔ Positions
 - ➔ Grids
- ➔ Data and Dataset Types

Tables	Networks & Trees	Fields	Geometry	Clusters, Sets, Lists
Items	Items (nodes)	Grids	Items	Items
Attributes	Links	Positions	Positions	
	Attributes	Attributes		
- ➔ Dataset Types
 - ➔ Tables
 - ➔ *Multidimensional Table*
 - ➔ Networks
 - ➔ Trees
 - ➔ Fields (Continuous)
 - ➔ Geometry (Spatial)

Attributes

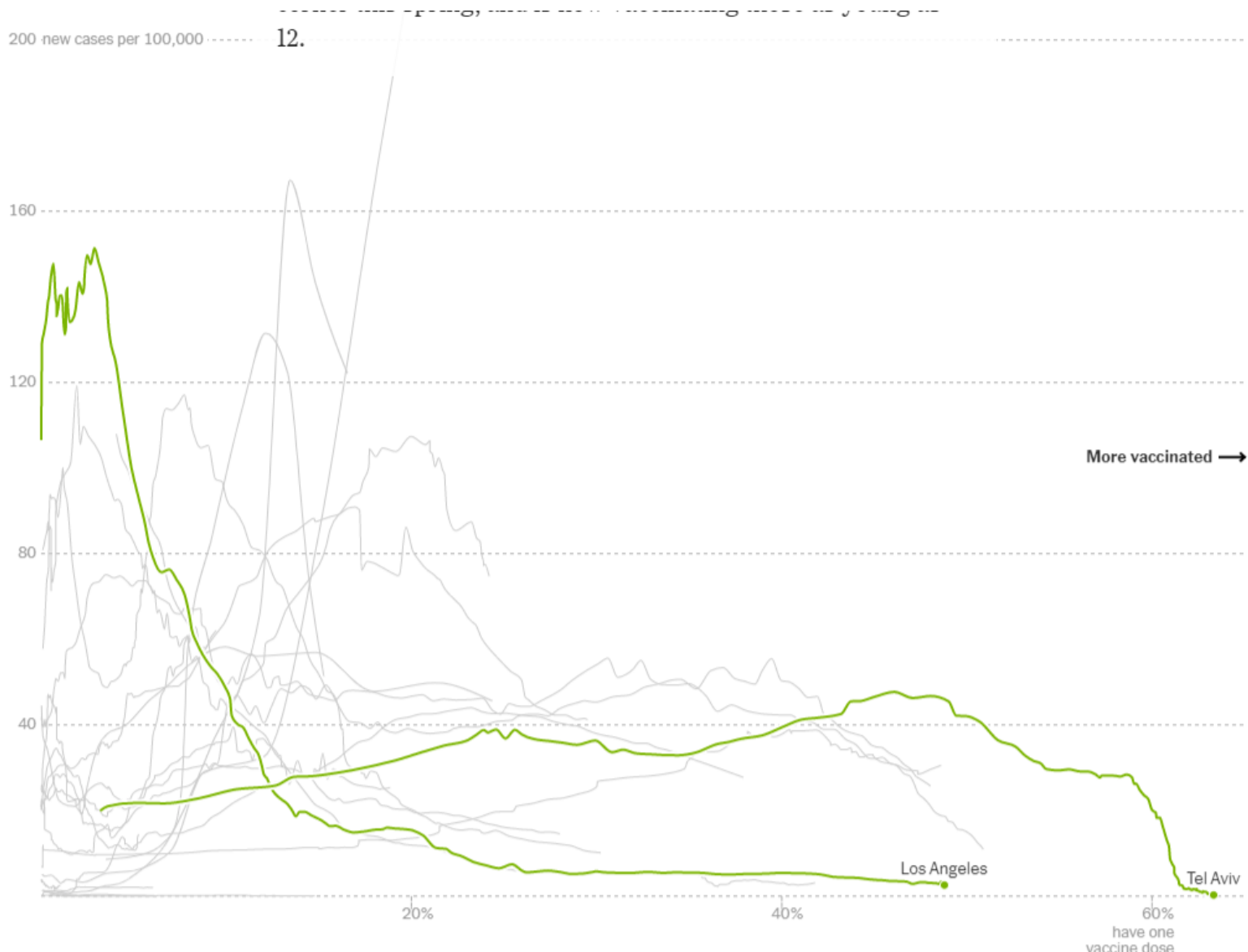
- ➔ Attribute Types
 - ➔ Categorical
 - ➔ Ordered
 - ➔ Ordinal
 - ➔ Quantitative
- ➔ Ordering Direction
 - ➔ Sequential
 - ➔ Diverging
 - ➔ Cyclic
- ➔ Dataset Availability
 - ➔ Static
 - ➔ Dynamic



The Pandemic Has Split in Two

Zero deaths in some cities. Thousands in others. The pandemic's fault lines continue to widen as vaccines flow toward rich countries.

By [Weiji Cai](#), [Lazaro Gamio](#), [Lauren Leatherby](#) and [Allison McCann](#) May 15, 2021



➔ Ordering Direction

➔ Sequential



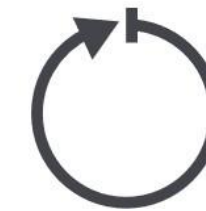
e.g.,
height ≥ 0
time: ms since Unix epoch

➔ Diverging



e.g.,
elevation: above and below
sea level
deltas: change in value since
previous timestep

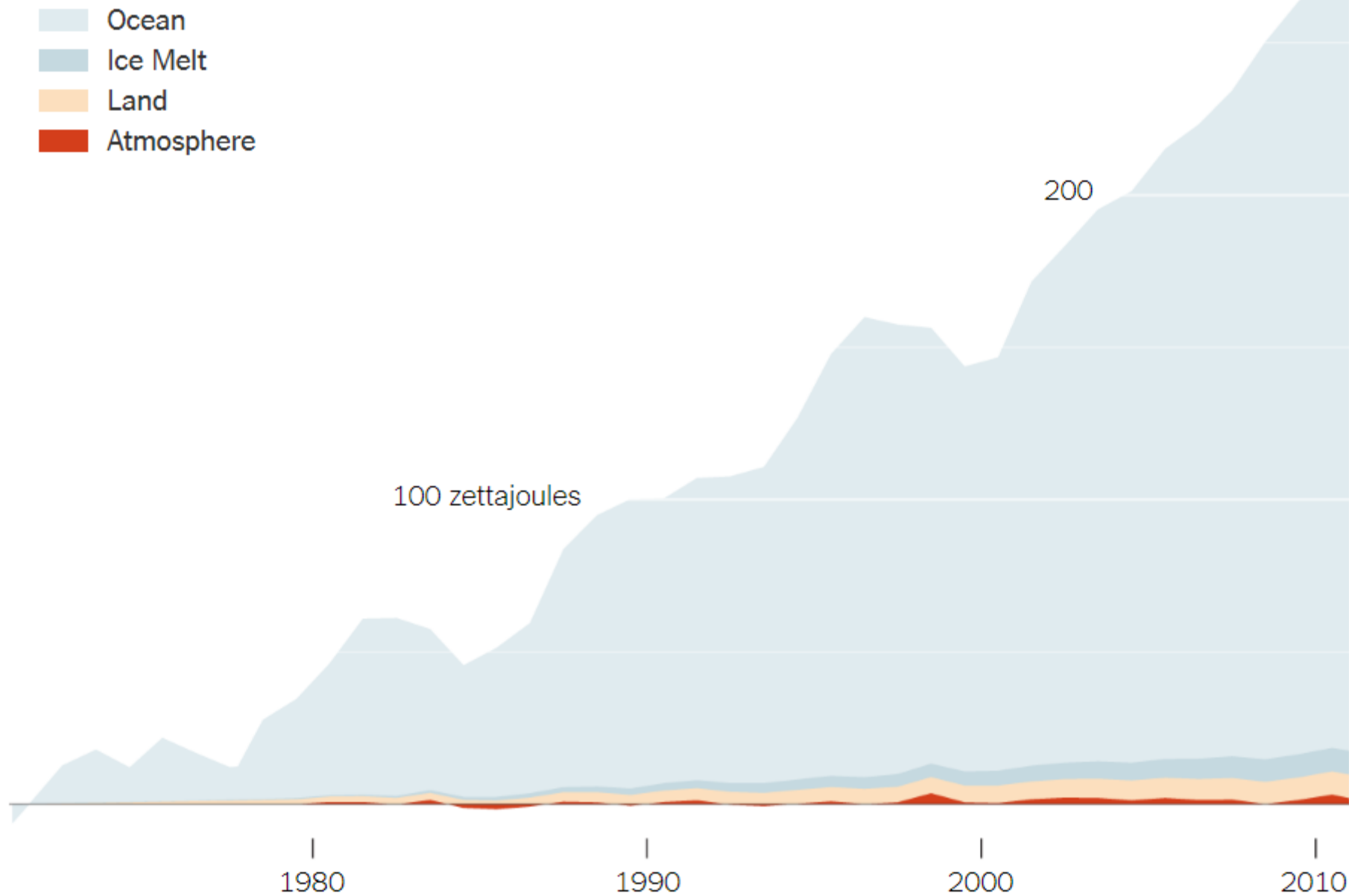
➔ Cyclic



e.g.,
time: hour of the day
packet buffers: round robin
user studies: counterbalancing
group

Since 1955, more than 90 percent of the excess heat retained by the Earth as a result of increased greenhouse gases has been absorbed by the oceans, leaving ocean scientists like Eric Leuliette at the National Oceanic and Atmospheric Administration feeling that **90 percent of the climate change story is being ignored.**

Estimated Heat Accumulation



<https://www.nytimes.com/interactive/2016/09/12/science/earth/ocean-warming-climate-change.html>

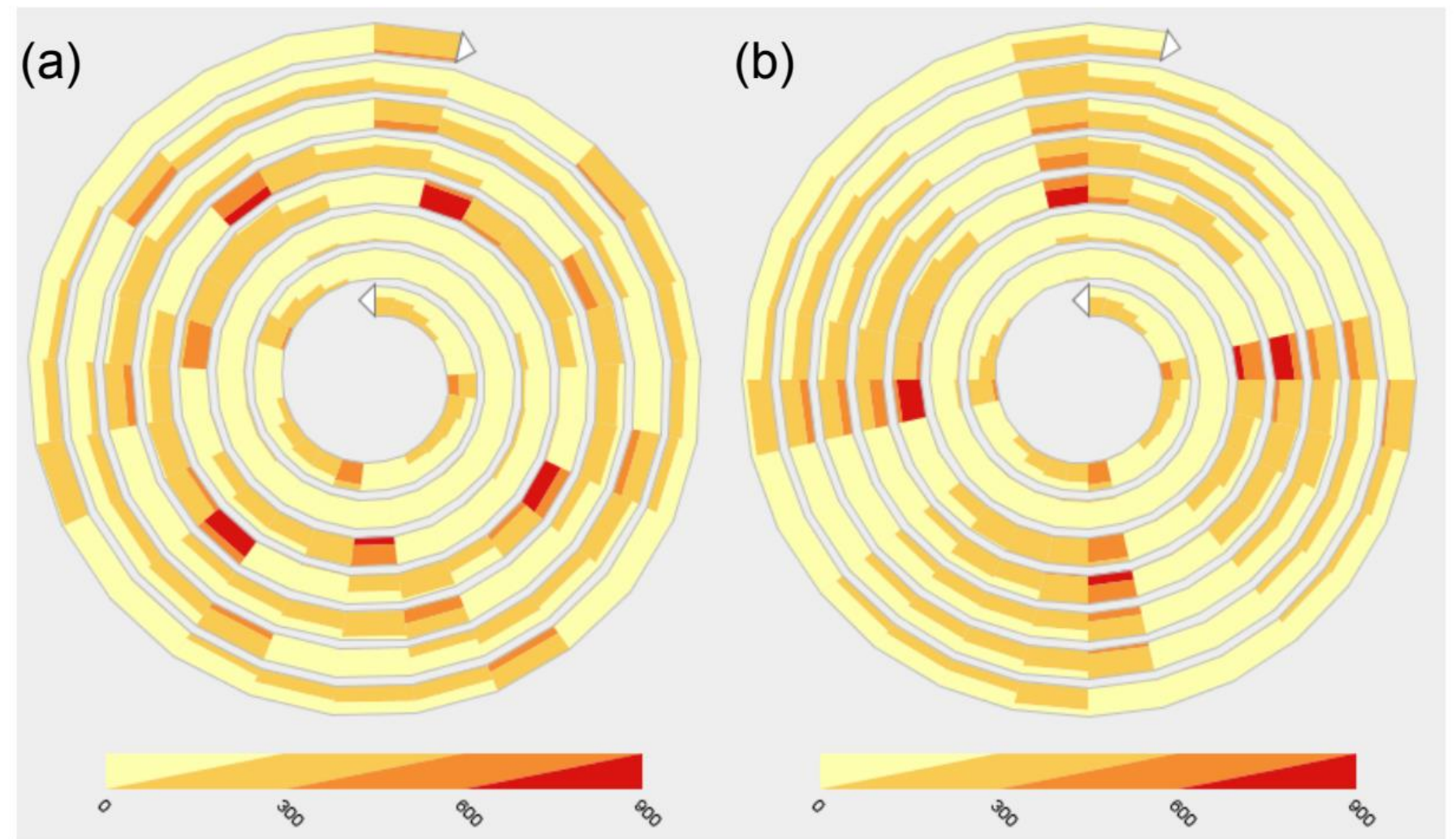
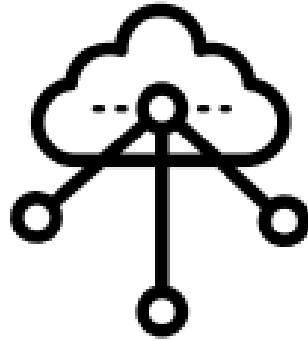


Figure 6: *Finding a pattern – (a) Cycle length = 25; (b) Cycle length = 28*



<https://browser.timeviz.net/>

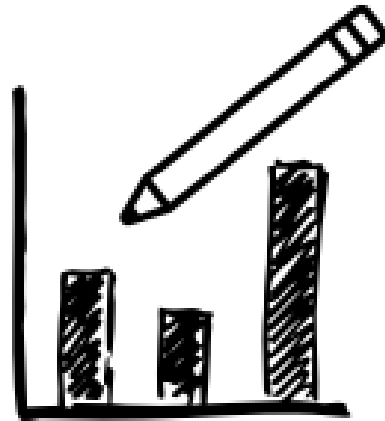
Map



Visualization Theory:

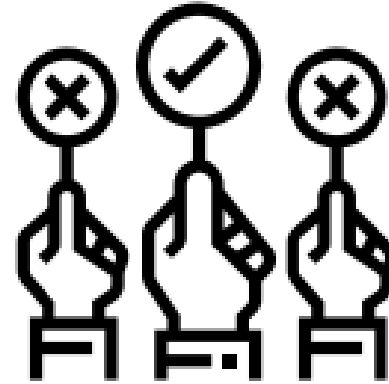
- User-Centered Design
- Data Types
- What is the question?
- Who is the audience?
- What is the data?

Sketch



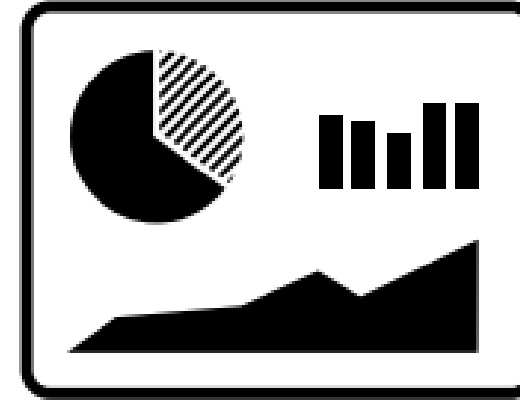
- Sketching
- Tufte's principles of visualization design
- Visual effectiveness
- Graphical Integrity

Decide



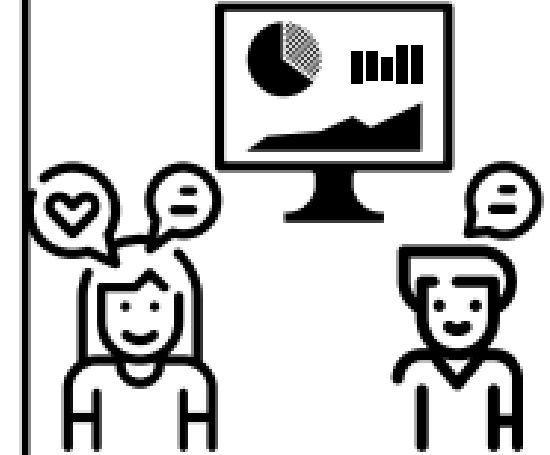
- Visual Perception
- Cognition
- Color design
- Gestalt principles

Prototype



- Basic Chart Types
- Maps
- Storytelling
- Graphic design
- Dashboards

Test



- Qualitative User Evaluation
- Think Aloud Study
- Re-Design

Office hours start this week

- TA Office Hours
 - Tuesdays in RM 238 at 5pm
 - Wednesdays Online on Zoom at 5pm
 - Saturday Online on Zoom at 2pm
 - Sunday Online on EdStem at 4pm
- Instructor Office Hours
 - In Person RM 202 from 1 – 2:45pm on Wednesdays