

# Lecture 9: Arrange Tables

CS 7250

SPRING 2021

*Prof. Cody Dunne*

*NORTHEASTERN UNIVERSITY*

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

# CHECKING IN

Including about projects

# Viewing Feedback on Canvas

Home

Assignments

Modules

Syllabus

Grades

Announcements

Road to Revolution: Patriotism or Treason

Nov 8 by 11:59pm

10 (A)

10

1



Comments

Close

2 Good job on the assignment!

Doug Roberts, Oct 16 at 4pm

Grade: 22 / 25

2 Show Rubric

Re-submit Assignment

1 Well done completing this assignment!

Doug Roberts, Jan 16 at 2:33pm

Add a Comment:

Teachers and submitter will be notified of all comments.

Media Comment

Attach File

Save

## Submission Details

Grade: 22 / 25

Show Rubric

Re-submit Assignment

### Safety in Science - Symbols (Peer Reviews)

Emily Boone submitted Jan 16 at 2:14pm

Safety in Science.pdf 35.7 KB

View Feedback

Well done completing this assignment!

Doug Roberts, Jan 16 at 2:33pm

Add a Comment:

Teachers and submitter will be notified of all comments.

Media Comment

Attach File

Save

# Viewing Feedback on Canvas

Home




Assignments



Modules

Syllabus

Grades

Announcements







External Tool Assignment			10	
George Washington Biography Assignment	Aug 15 by 11:59pm	37	40	
George Washington Essay	Aug 19 by 11:59pm	40	40	

Position Paper May 2 by 11pm 21 25  

Assessment by Doug Roberts

Close Rubric

Essay Rubric (1)

Criteria	Ratings		
Grammar and Spelling	No grammar or spelling errors 	A few grammar or spelling errors	Many grammar or spelling errors
Analysis	Strong analysis of the topic and solid evidence provided	Some analysis and weak evidence 	No analysis or evidence provided
Thoroughness	Many examples supporting the argument	Few examples to support the argument 	No examples to support the argument
Writing Prompt Outcome	Exceeds Expectations  <a href="#">view longer description</a>	Meets Expectations	Does Not Meet Expectations
1.1.a <a href="#">view longer description</a>	Exceeds Expectations 	Meets Expectations	Does Not Meet Expectations
1.1.b <a href="#">view longer description</a>	Exceeds Expectations 	Meets Expectations	Does Not Meet Expectations

**Comments**  
Could have used more examples to support your perspective.

# Viewing Feedback on GitHub

NEU-CS-7250-S21 / assignment--d3\_basic\_charts-XXXXXXX

Unwatch 2 Star 0 Fork 0

Code Issues **Pull requests 1** Actions Projects Wiki Security Insights

Code Issues **Pull requests 1** Actions Projects Wiki Security Insights

Filters is:pr is:open Labels 9 Milestones 0 New pull request

1 Open 0 Closed

Author	Label	Projects	Milestones	Reviews	Assignee	Sort
<b>Feedback</b> ✓						1
#1 opened 14 days ago by github-classroom bot						

## Feedback #1

Open github-classroom wants to merge 3 commits into feedback from gh-pages

Conversation 1 Commits 3 Checks 4 Files changed 6 +287 -29

github-classroom bot commented 14 days ago • edited

👉! GitHub Classroom created this pull request as a place for your teacher to leave feedback on your work. It will update automatically. **Don't close or merge this pull request**, unless you're instructed to do so by your teacher.

In this pull request, your teacher can leave comments and feedback on your code. Click the **Subscribe** button to be notified if that happens.

Click the **Files changed** or **Commits** tab to see all of the changes pushed to gh-pages since the assignment started. Your teacher can see this too.

► **Notes for teachers**

Subscribed: @zxchen-88

picorana reviewed 4 days ago [View changes](#)

```
js/main.js
219 + .attr("x", event.offsetX)
220 + .attr("y", event.offsetY)
221 + .attr("class", "label")
222 + .text(kv.value);
```

picorana 4 days ago

coordinates for the tooltips are weird, they end up having coordinates relative to the bar translated to the top left corner of the svg...

the correct way would have been to use these values again

```
.attr("x", d => x1(d.key))
.attr("y", d => y(d.value))
```

as you did for the bars

Reviewers: picorana

Assignees: No one—assign yourself

Labels: None yet

Projects: None yet

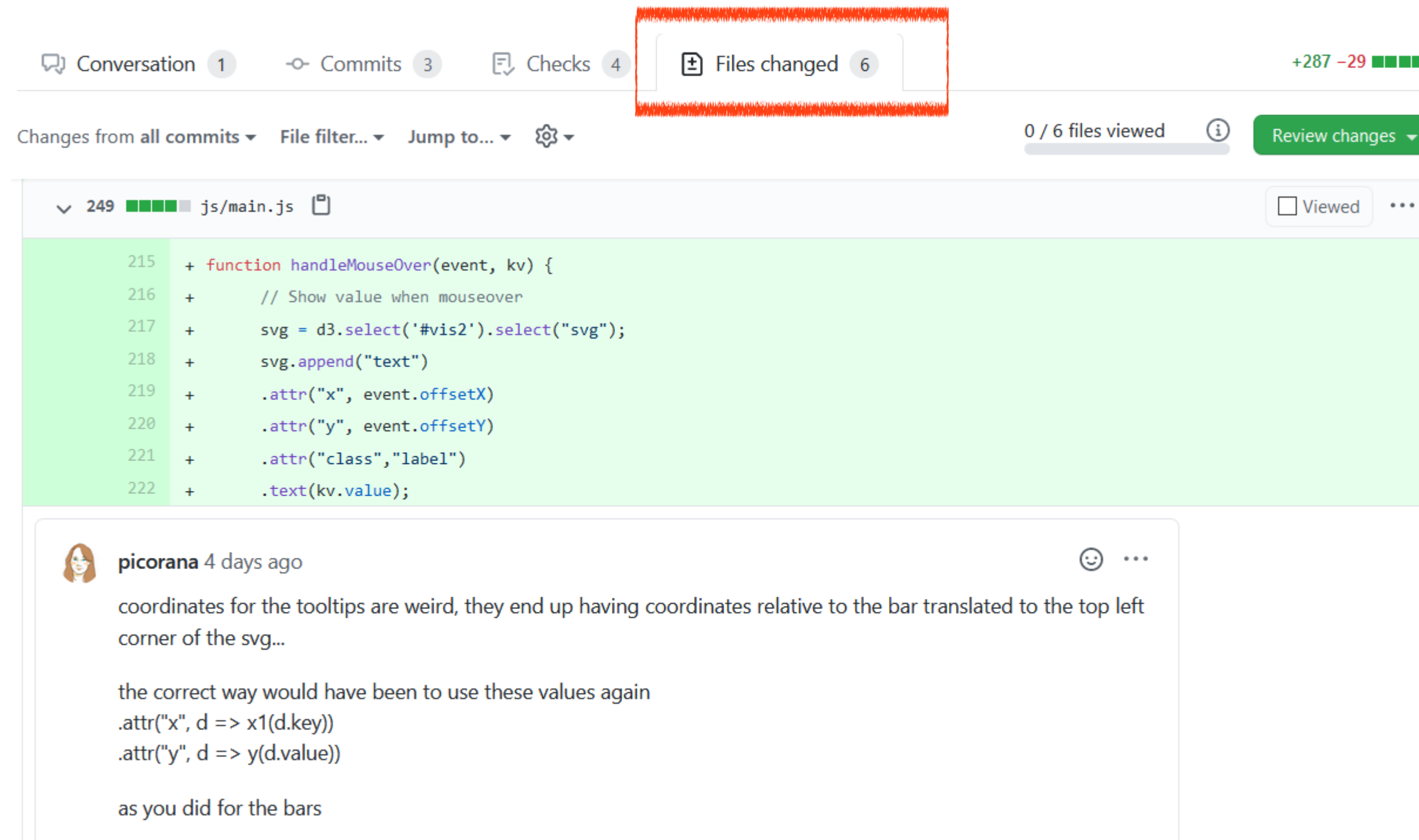
Milestone: No milestone

Linked issues: Successfully merging this pull request may close these issues.

Notifications: Unsubscribe

[Canvas rubric view docs](#)

# Viewing Feedback on GitHub



The screenshot shows a GitHub pull request interface. At the top, there are navigation tabs: Conversation (1), Commits (3), Checks (4), and Files changed (6). The 'Files changed' tab is highlighted with a red box. To the right of the tabs, there is a progress bar showing +287 -29. Below the tabs, there are filters for 'Changes from all commits', 'File filter...', and 'Jump to...'. A 'Review changes' button is visible on the right. The main content area shows a file named 'js/main.js' with 249 lines. The code is highlighted in green and shows a function 'handleMouseOver' with several lines of code. Below the code, there is a comment from user 'picorana' posted 4 days ago. The comment discusses the coordinates for tooltips and provides a corrected code snippet.

Conversation 1   Commits 3   Checks 4   **Files changed 6**   +287 -29

Changes from all commits   File filter...   Jump to...   0 / 6 files viewed   Review changes

249   js/main.js

```
215 + function handleMouseOver(event, kv) {
216 +   // Show value when mouseover
217 +   svg = d3.select('#vis2').select("svg");
218 +   svg.append("text")
219 +     .attr("x", event.offsetX)
220 +     .attr("y", event.offsetY)
221 +     .attr("class", "label")
222 +     .text(kv.value);
```

**picorana** 4 days ago

coordinates for the tooltips are weird, they end up having coordinates relative to the bar translated to the top left corner of the svg...

the correct way would have been to use these values again

```
.attr("x", d => x1(d.key))
.attr("y", d => y(d.value))
```

as you did for the bars

# VISUAL ENCODING

# Analysis

What?

DATA ABSTRACTION

Why?

TASK ABSTRACTION

How?

VISUAL ENCODING



# Analysis



What?

What data is shown?

Why?

Why is the user analyzing / viewing it?

How?

How is the data presented?



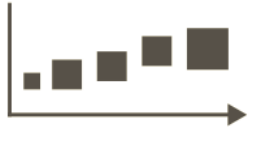


# GOALS FOR TODAY

- Learn about visual encodings, esp. arranging tables
- Learn how to pick appropriate visual representations based on attribute type and perceptual properties






# VISUAL ENCODING

Now...


## Encode

- ➔ Arrange
  - ➔ Express 
  - ➔ Separate 
  - ➔ Order 
  - ➔ Align 
  - ➔ Use 
- ➔ Map
 





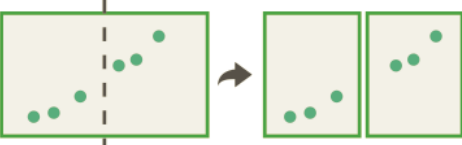




from **categorical** and **ordered** attributes

  - ➔ Color
    - ➔ Hue 
    - ➔ Saturation 
    - ➔ Luminance 
  - ➔ Size, Angle, Curvature, ...
 
  - ➔ Shape
 
  - ➔ Motion
 

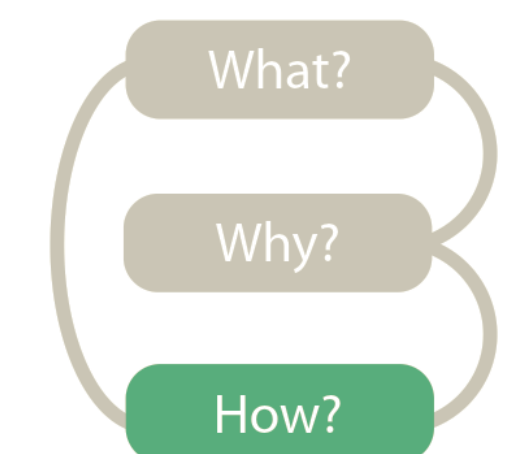
Direction, Rate, Frequency, ...



## How?

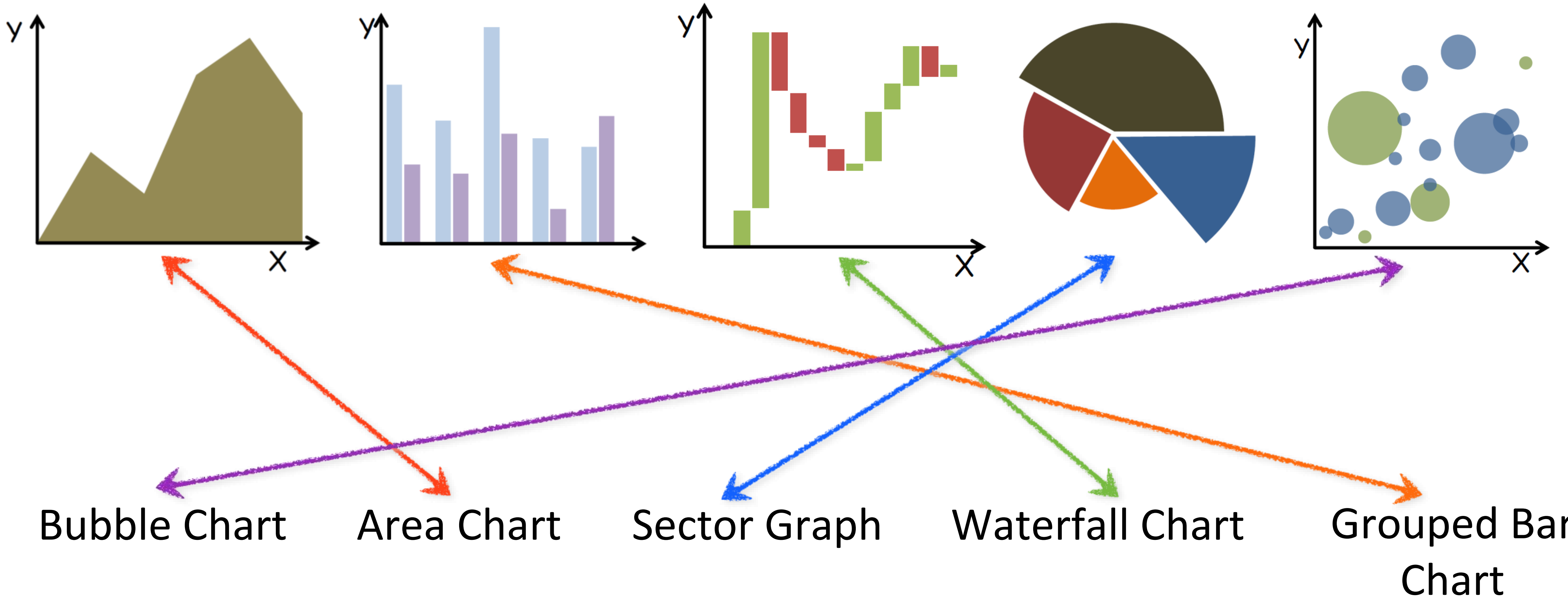
Manipulate	Facet	Reduce
➔ Change 	➔ Juxtapose 	➔ Filter 
➔ Select 	➔ Partition 	➔ Aggregate 
➔ Navigate 	➔ Superimpose 	➔ Embed 

Later this semester...

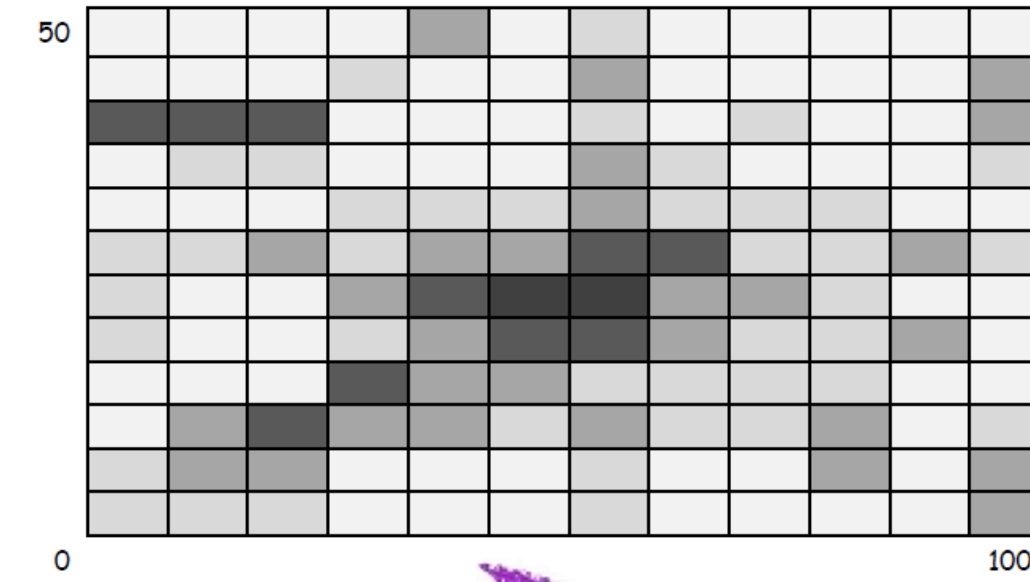
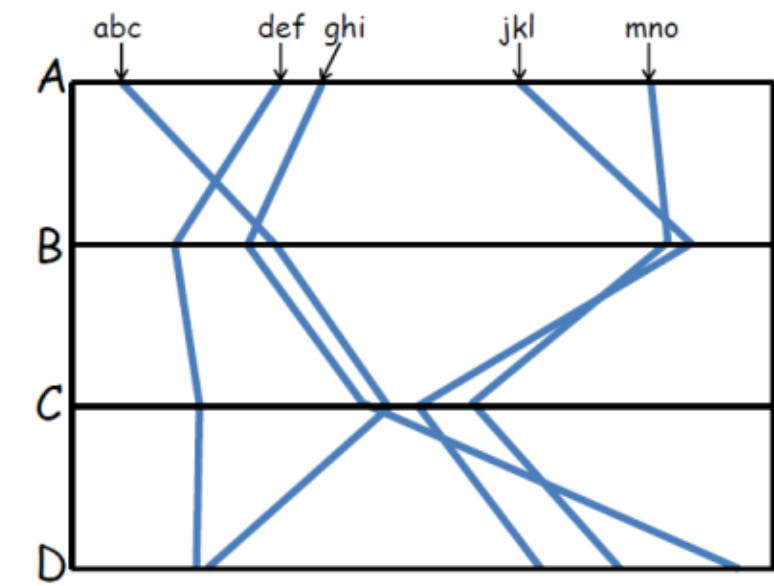
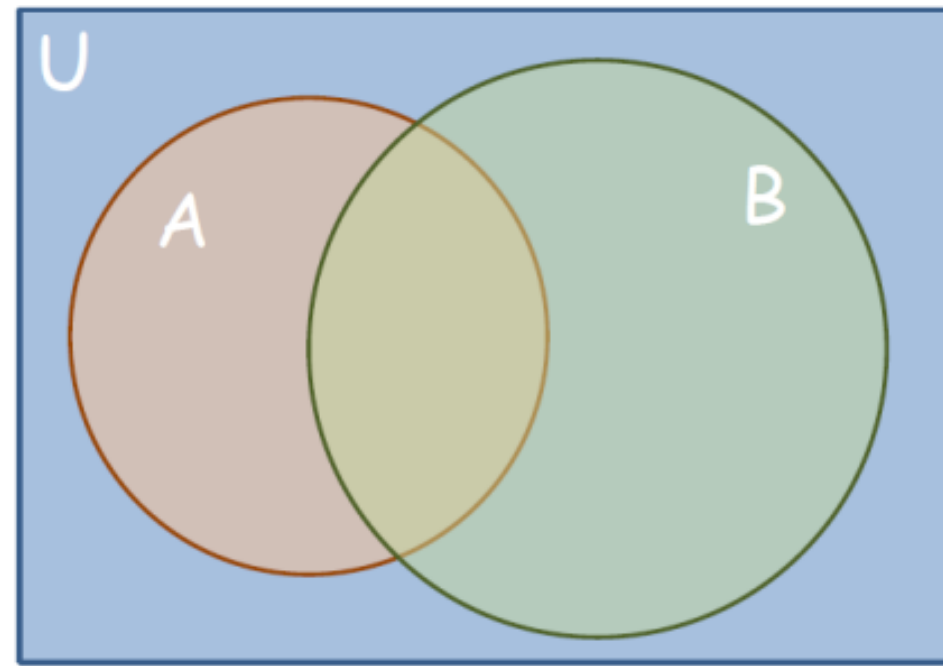
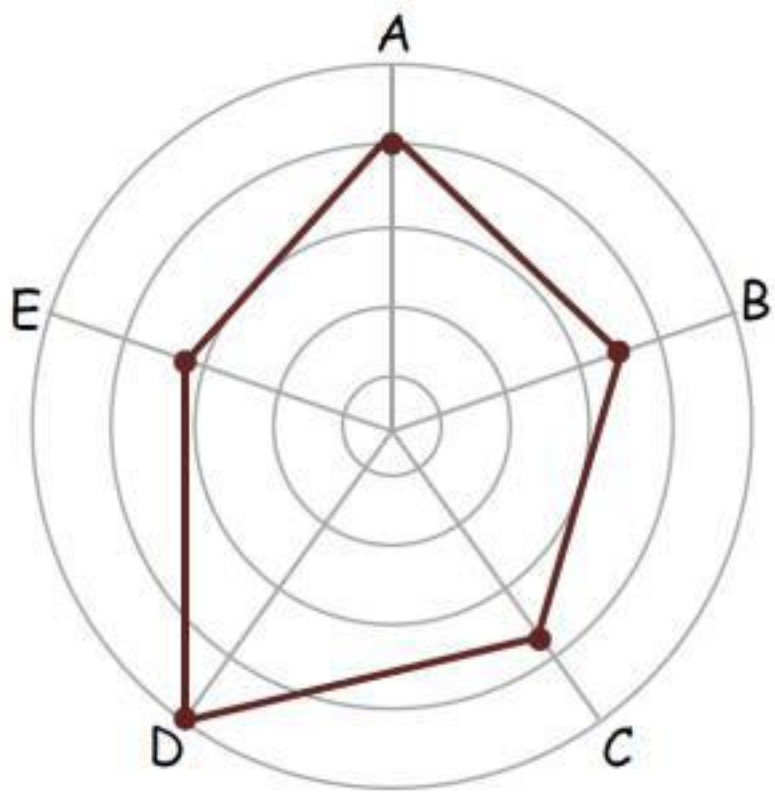


# IN-CLASS EXERCISE: ENCODINGS MATCHUP

# Encoding Match-up



# Encoding Match-up



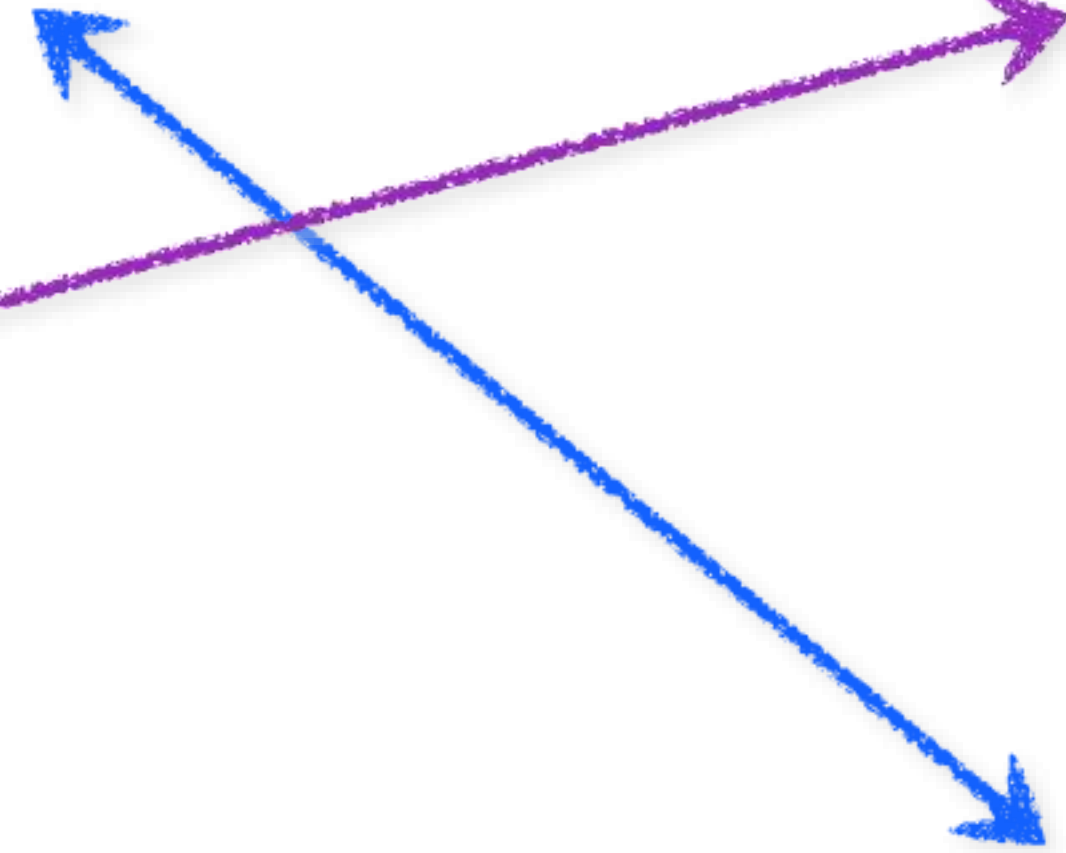
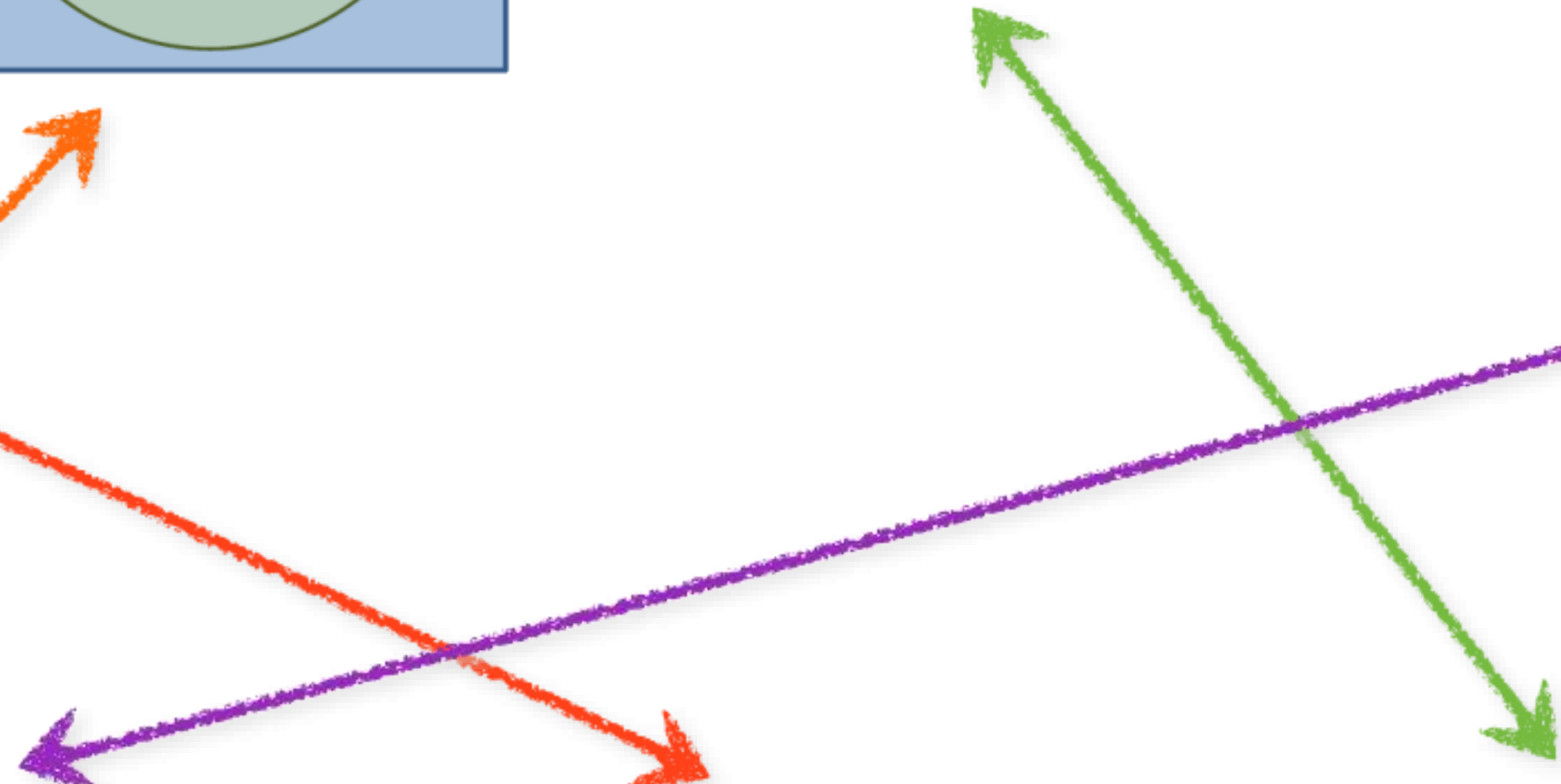
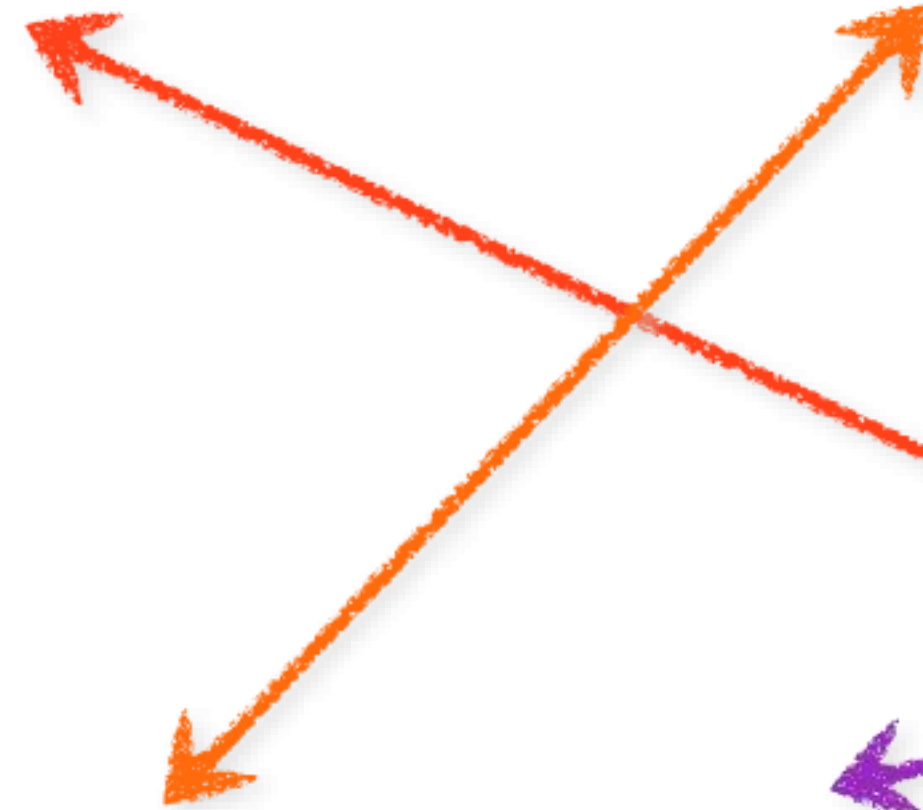
Venn Diagram

Heat Map

Star Plot

Box & Whisker Plot

Parallel Coordinates



# How?

## Encode

### → Arrange

→ Express



→ Separate



→ Order



→ Align



→ Use



### → Map

from **categorical** and **ordered** attributes

→ Color

→ Hue



→ Saturation



→ Luminance



→ Size, Angle, Curvature, ...



→ Shape



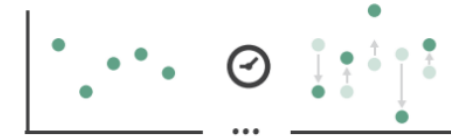
→ Motion

Direction, Rate, Frequency, ...



## Manipulate

### → Change



### → Select



### → Navigate



## Facet

### → Juxtapose



### → Partition



### → Superimpose



## Reduce

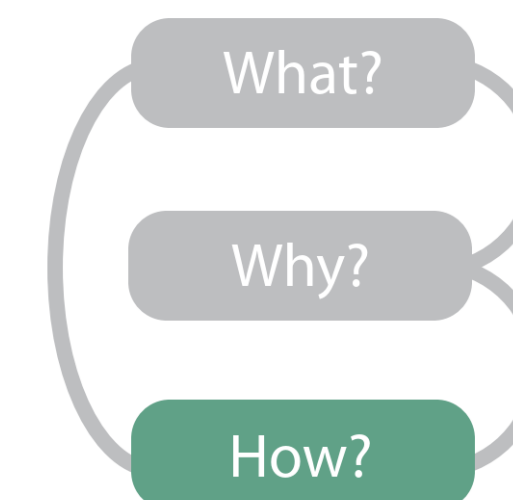
### → Filter



### → Aggregate



### → Embed



# Arrange Tables

## → Separate, Order, Align Regions

→ Separate



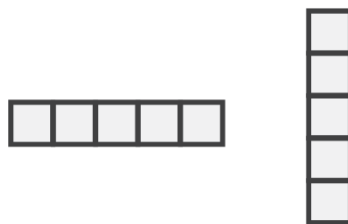
→ Order



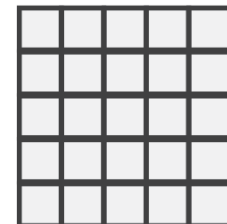
→ Align



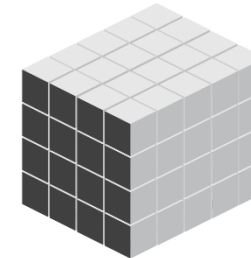
→ 1 Key  
*List*



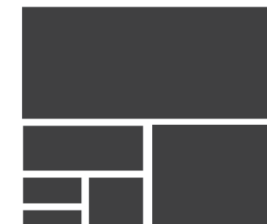
→ 2 Keys  
*Matrix*



→ 3 Keys  
*Volume*



→ Many Keys  
*Recursive Subdivision*



**Key:** an independent attribute that can be used as a unique index (Tableau Dimension)

**Value:** a dependent attribute (i.e., cell in a table) (Tableau Measures)

*Categorical or Ordinal*

*Categorical Ordinal, or Quantitative*



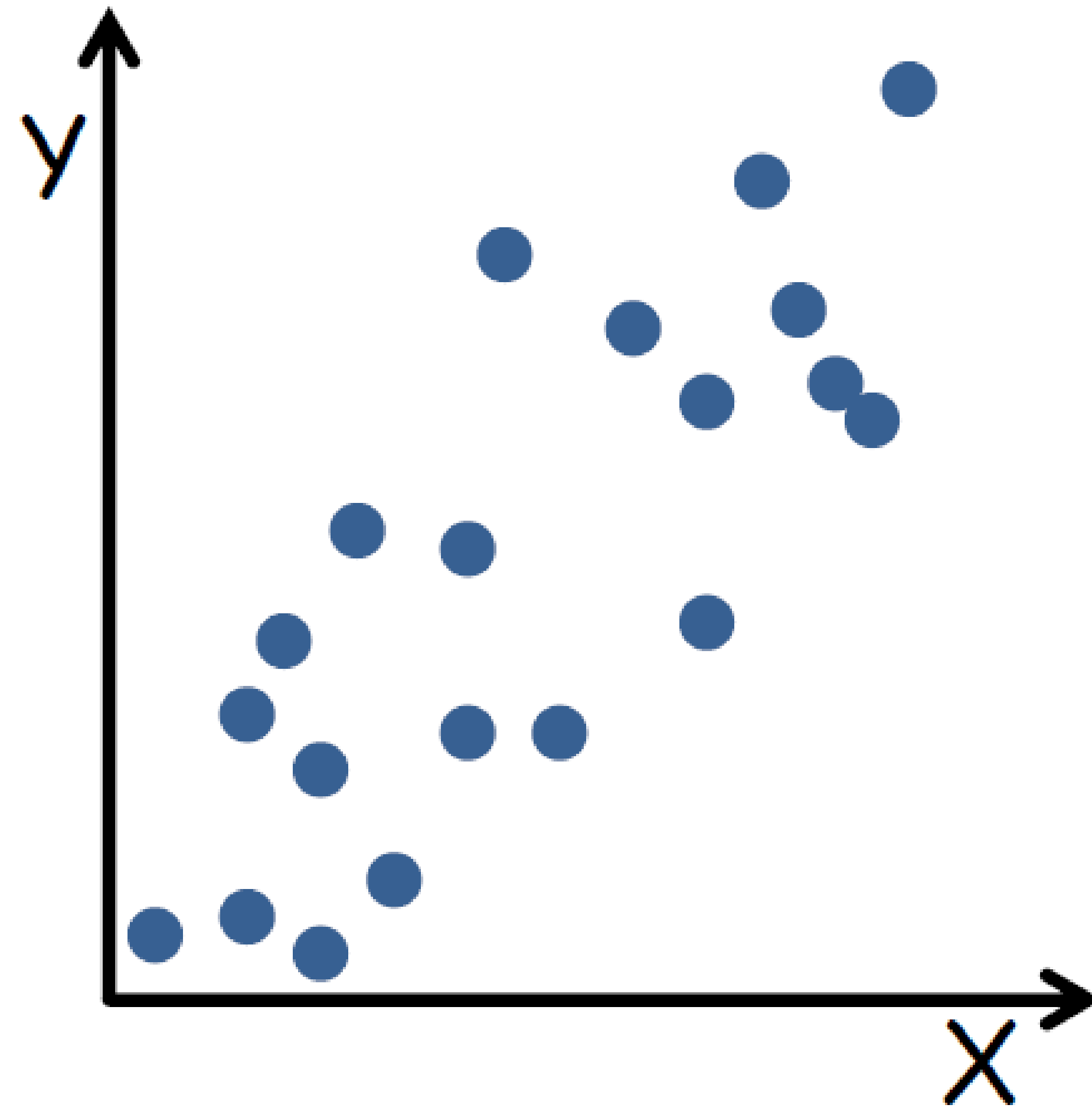
# Example Keys

*Key*

Date	Precipitation	High Temperature
May 1, 2016	0"	60
May 2, 2016	0.3"	62
May 3, 2016	1"	55
May 4, 2016	0"	67

Student	College	HW1 grade (out of 10)
John	COS	9
Jane	Khoury	10
June	Khoury	8
Joe	Khoury	8

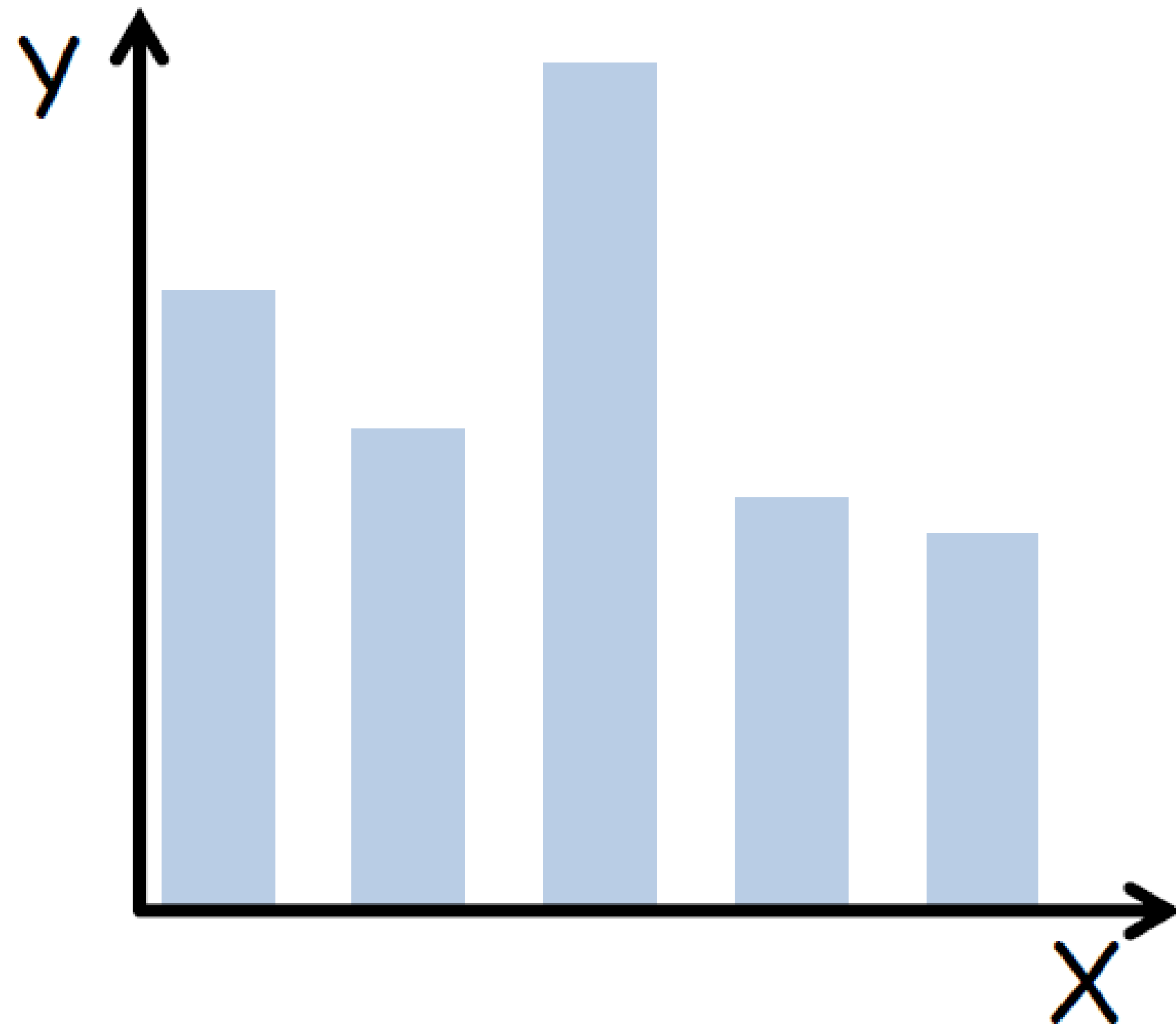
# Arrange Tables — No Key



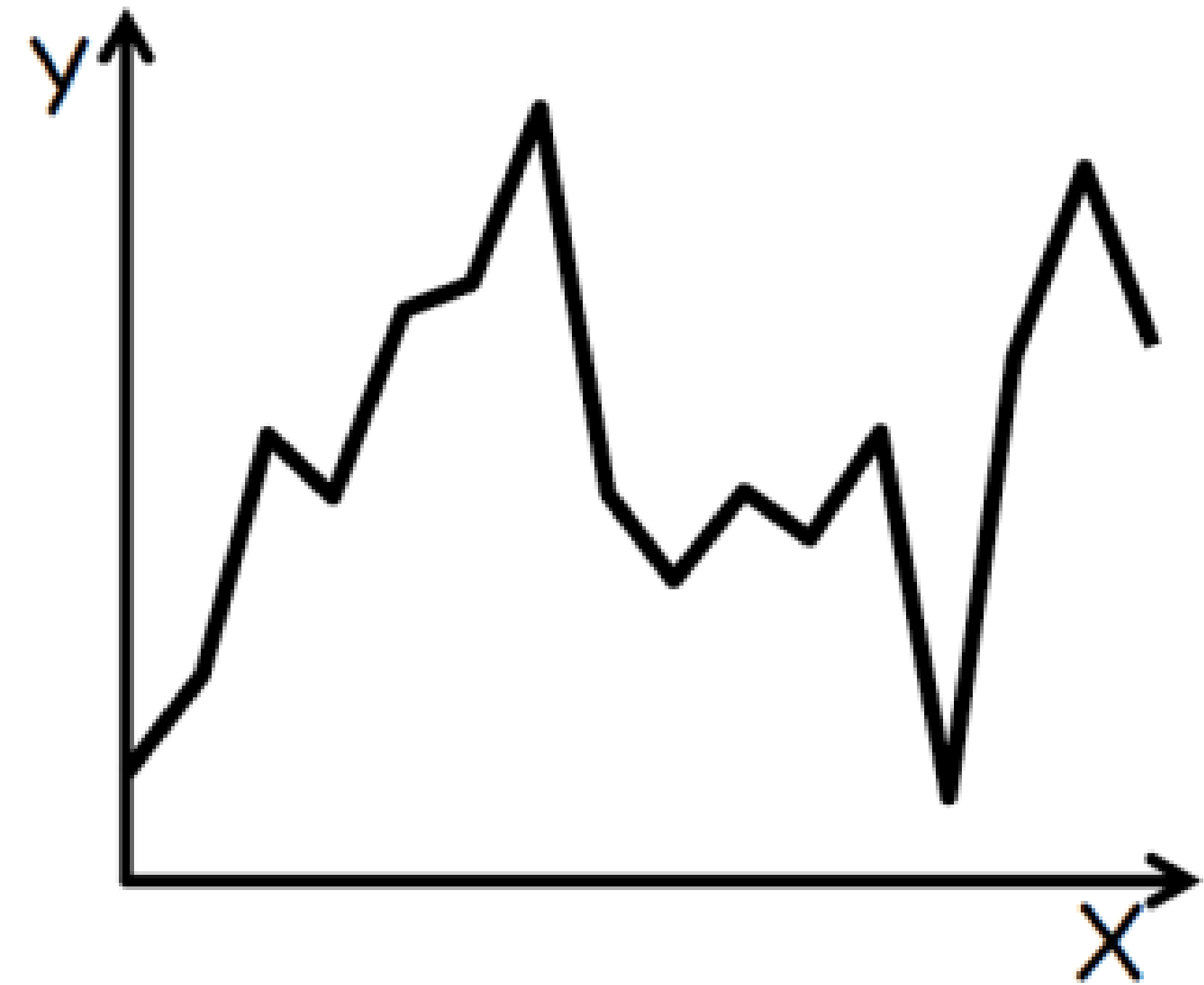
SCATTER PLOT

# Arrange Tables — One Key

→ 1 Key  
List



BAR CHART

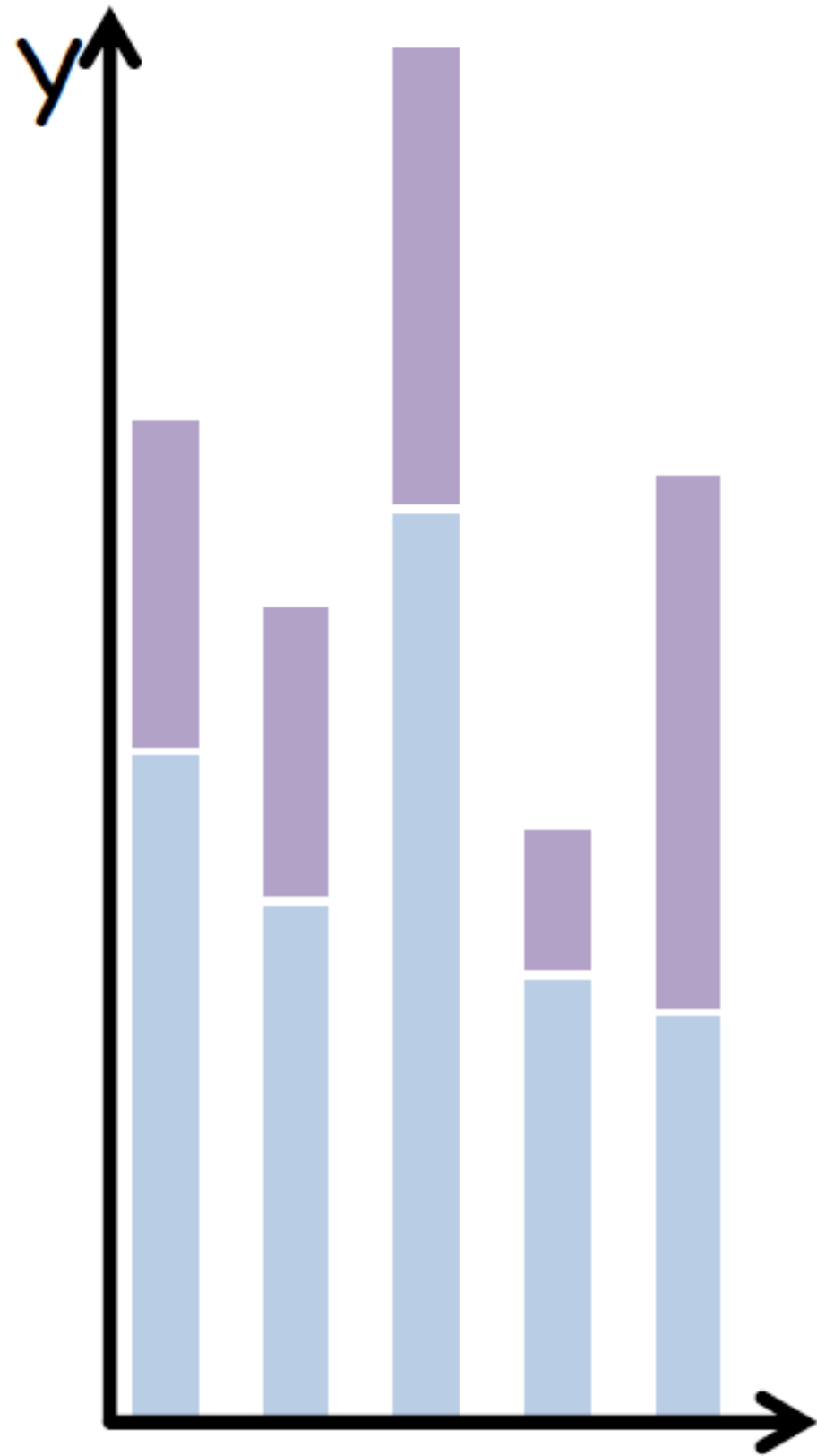
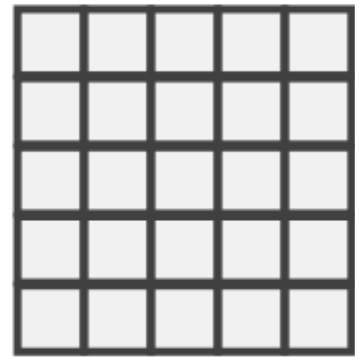


LINE GRAPH

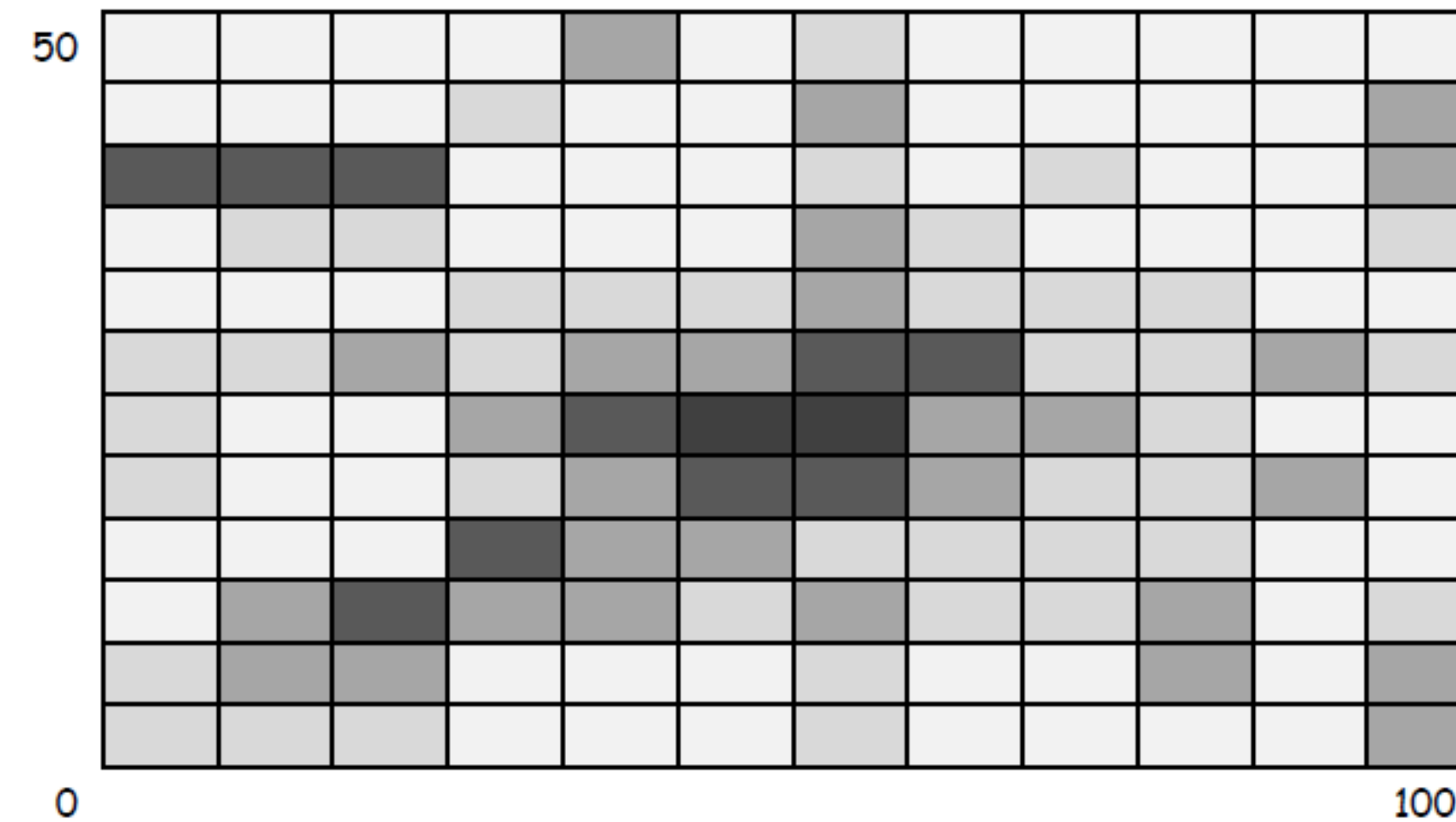
# Arrange Tables — Two Keys

→ 2 Keys

Matrix



STACKED BAR CHART

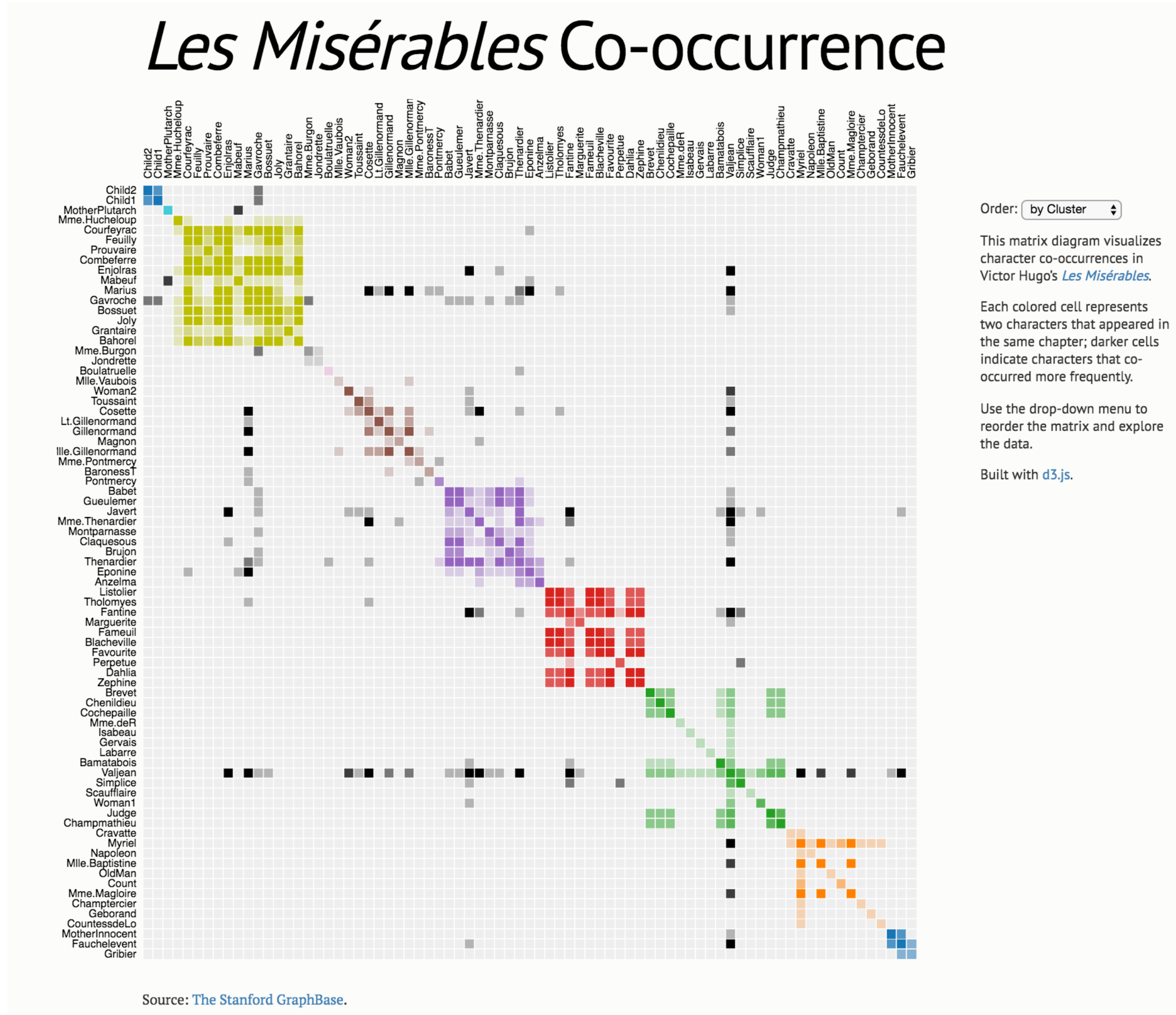
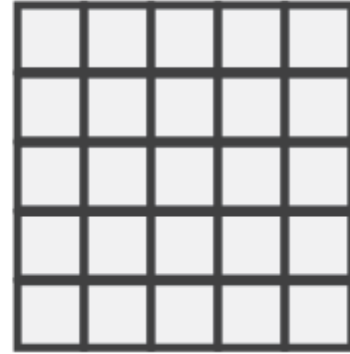


HEATMAP

# Arrange Tables — Two Keys (Network)

→ 2 Keys

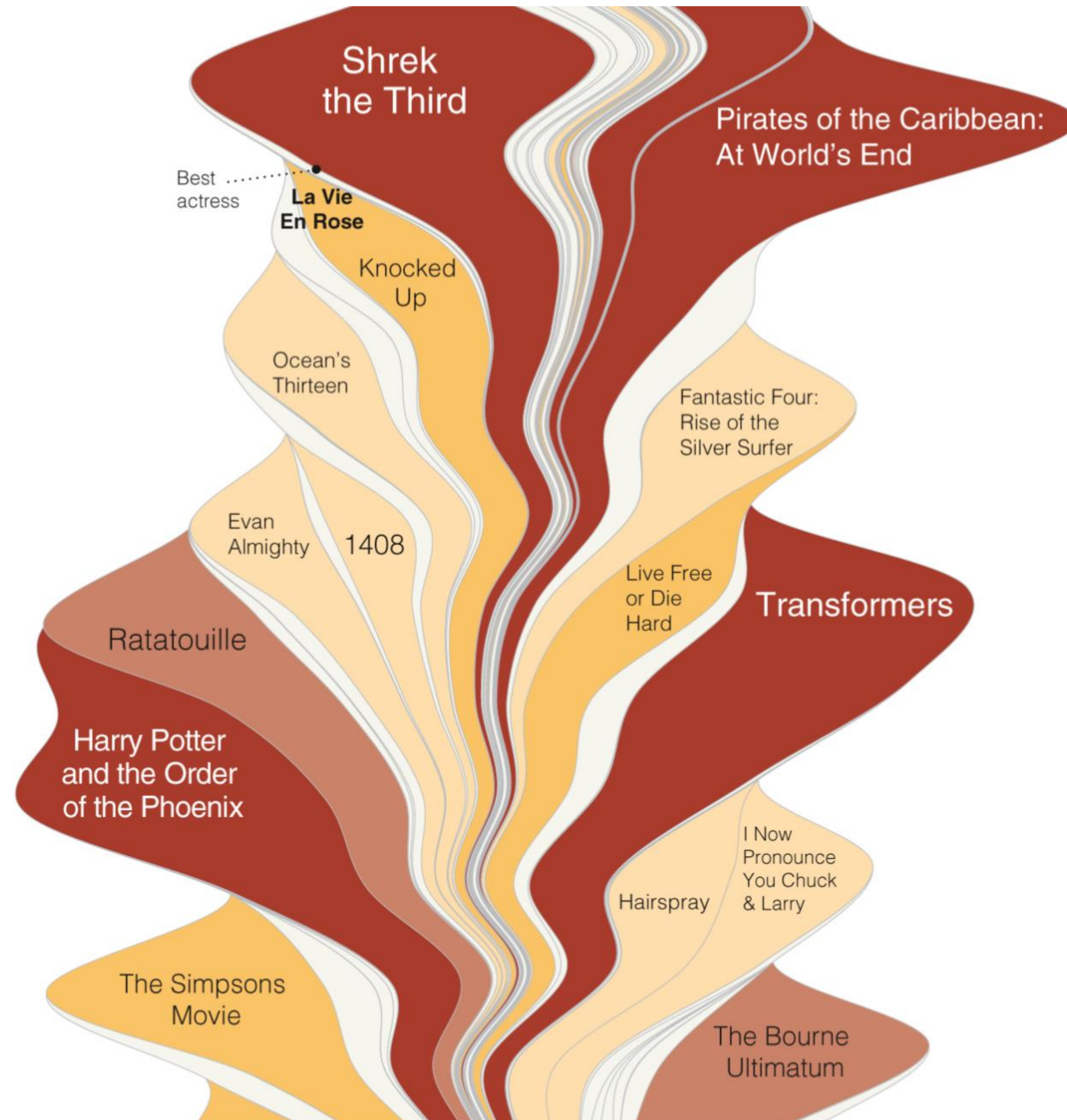
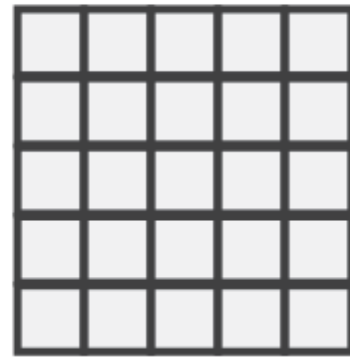
Matrix



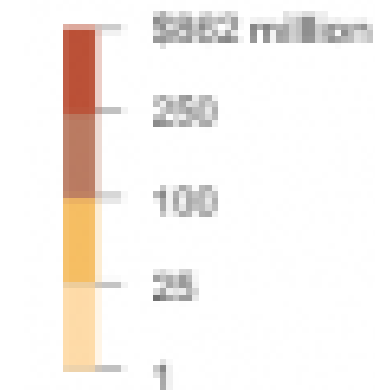
# Arrange Tables — Two Keys

→ 2 Keys

*Matrix*



The **area** of the shape (and its **color**) corresponds to the film's total domestic gross, through Feb. 21

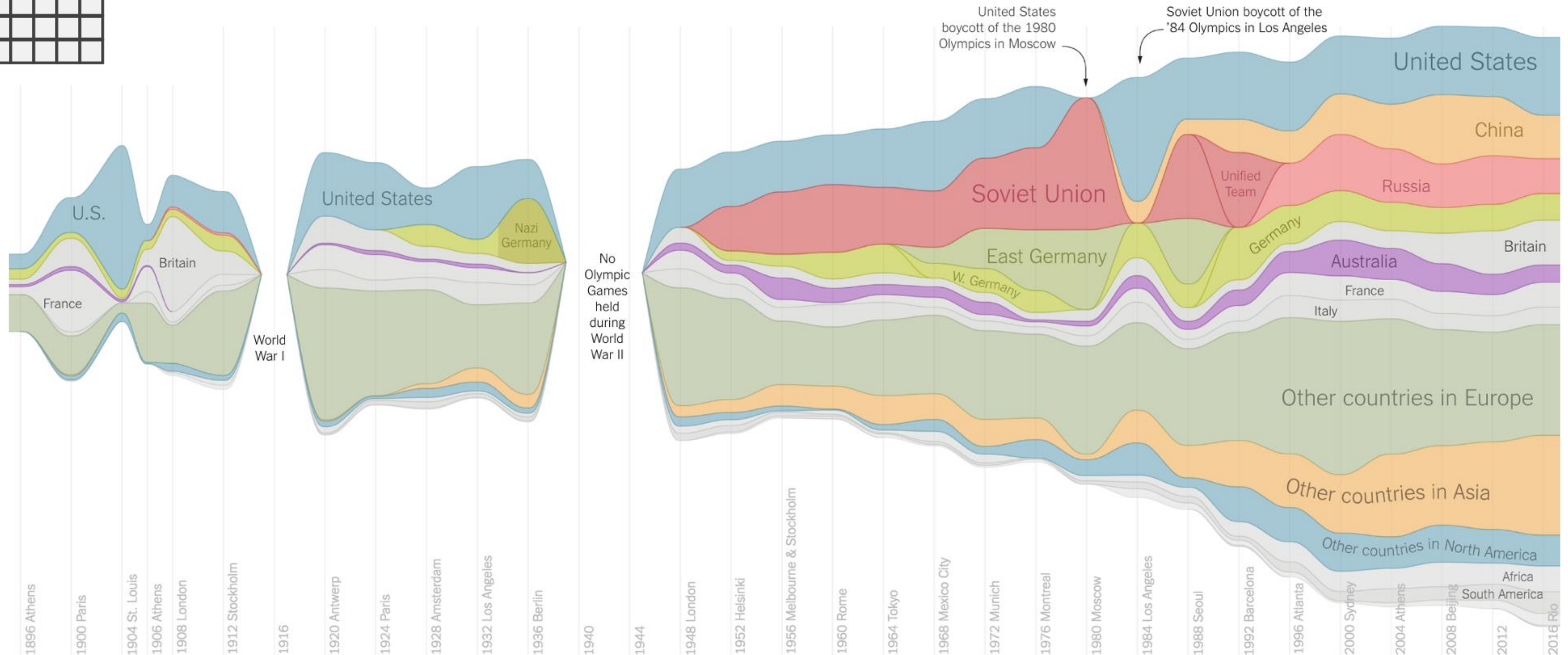
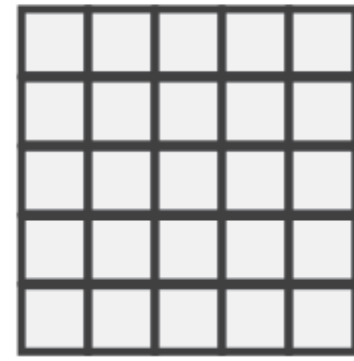


# Arrange Tables — Two Keys

→ 2 Keys  
Matrix

## A Visual History of Which Countries Have Dominated the Summer Olympics

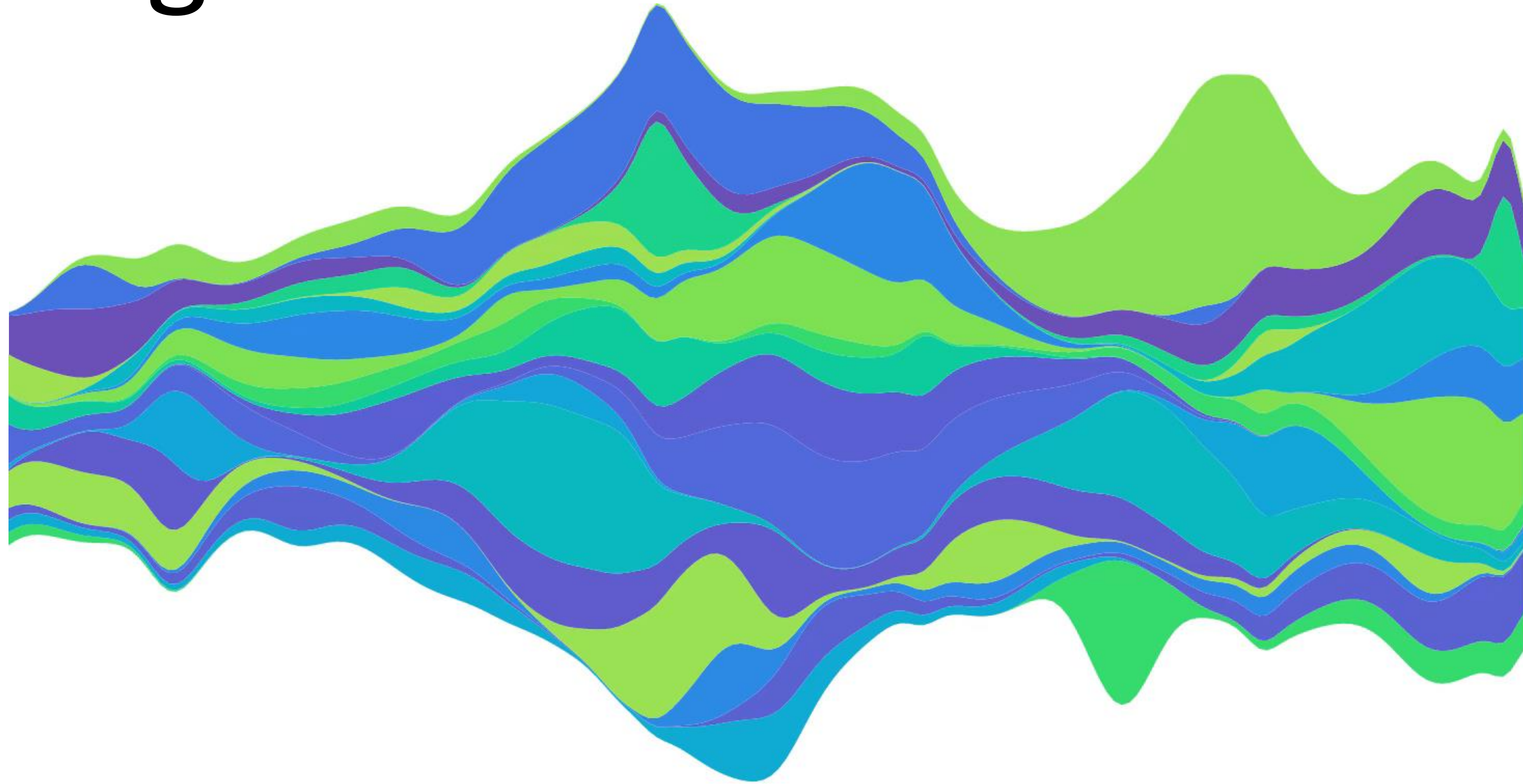
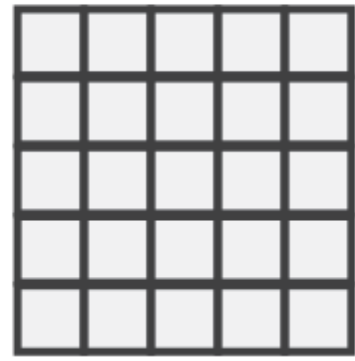
By GREGOR AISCH and LARRY BUCHANAN **UPDATED** August 22, 2016



# Arrange Tables — ~~Two~~ Three Keys

→ 2 Keys

*Matrix*



STREAMGRAPH

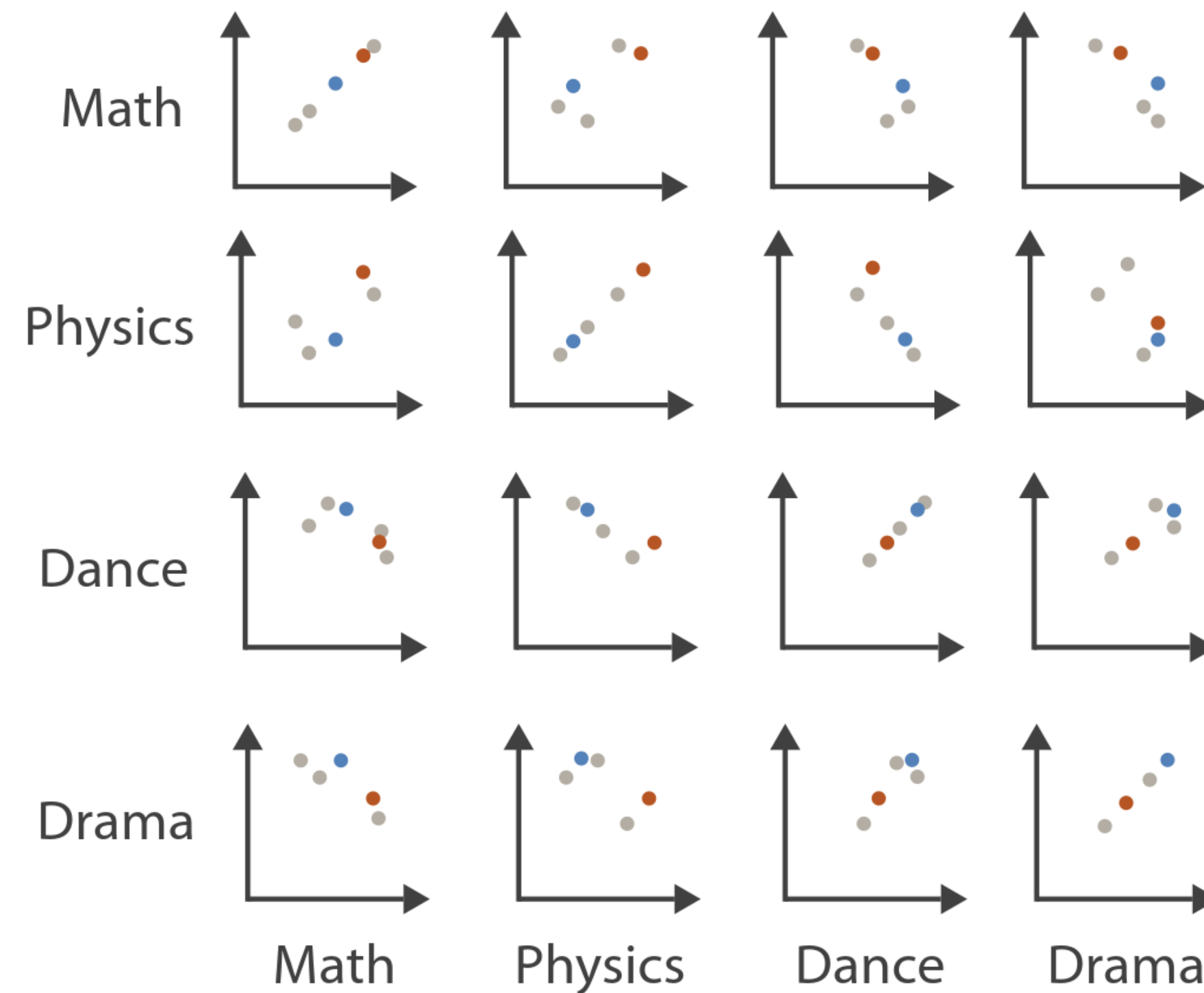


# Arrange Tables — Axes

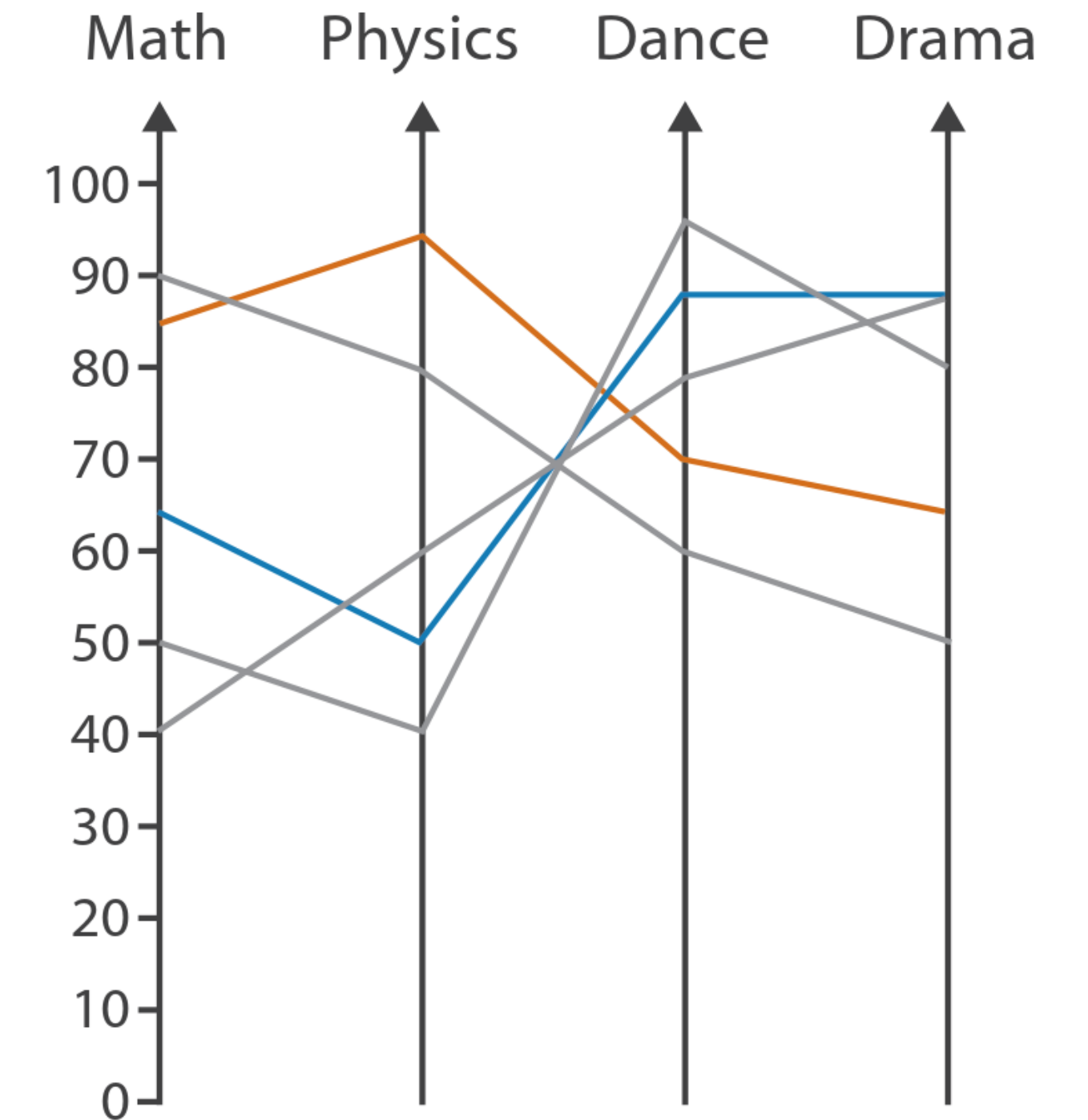
Table

Math	Physics	Dance	Drama
85	95	70	65
90	80	60	50
65	50	90	90
50	40	95	80
40	60	80	90

Scatterplot Matrix



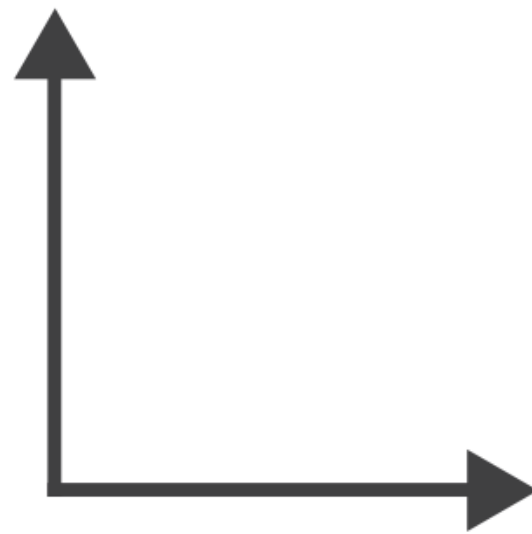
Parallel Coordinates



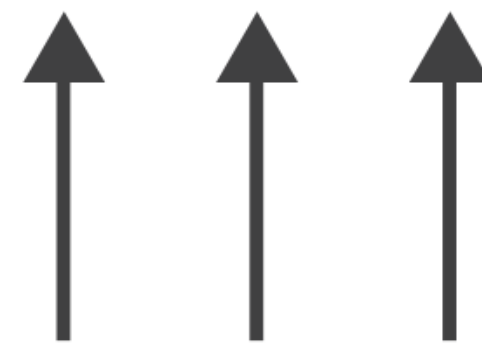
# Arrange Tables — Axes

## ➔ Axis Orientation

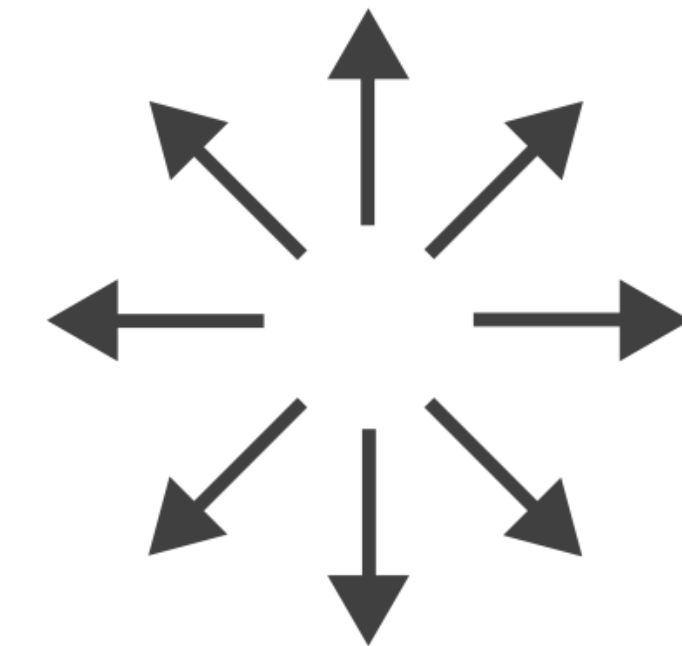
➔ Rectilinear



➔ Parallel

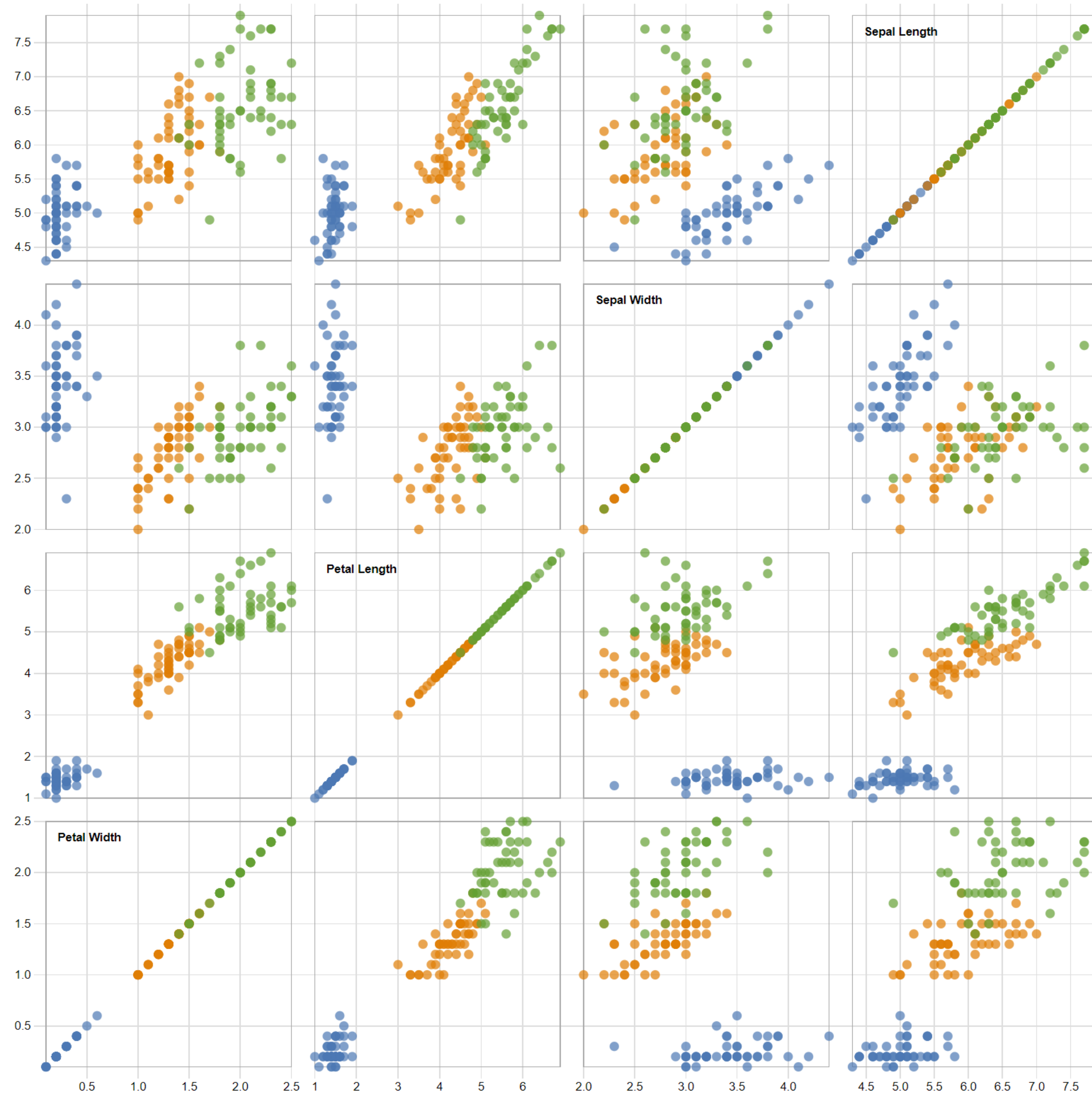
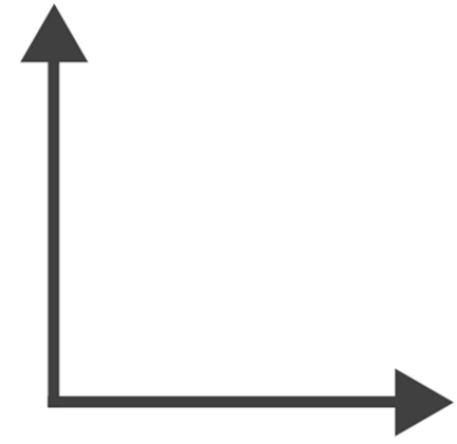


➔ Radial

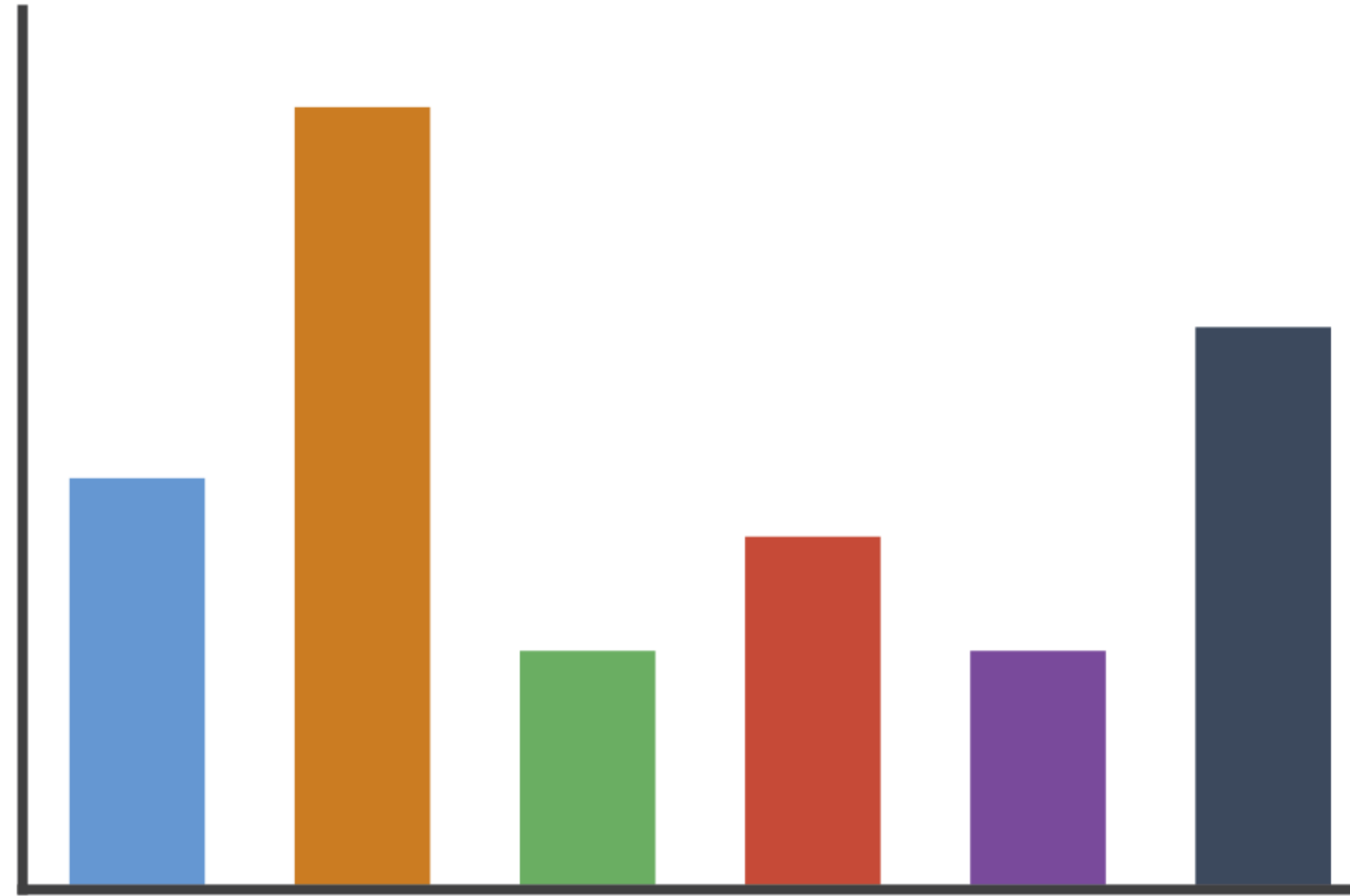


# Scatterplot Matrix Brushing

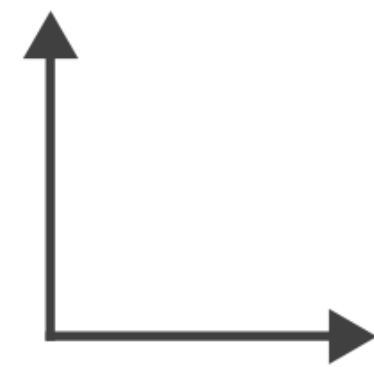
→ Rectilinear



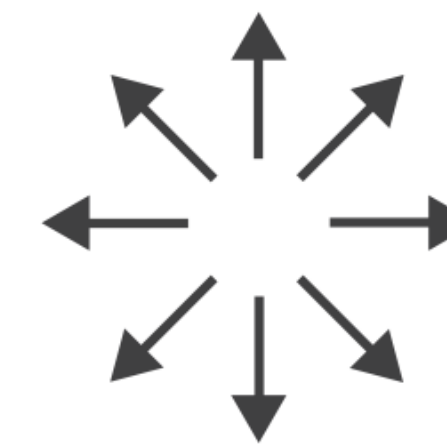
# Arrange Tables



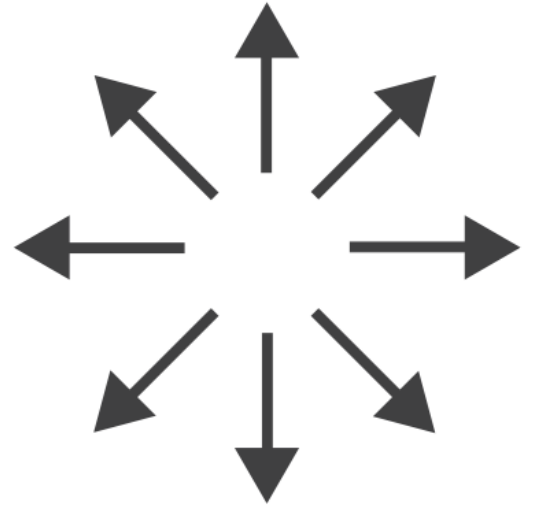
→ Rectilinear



→ Radial

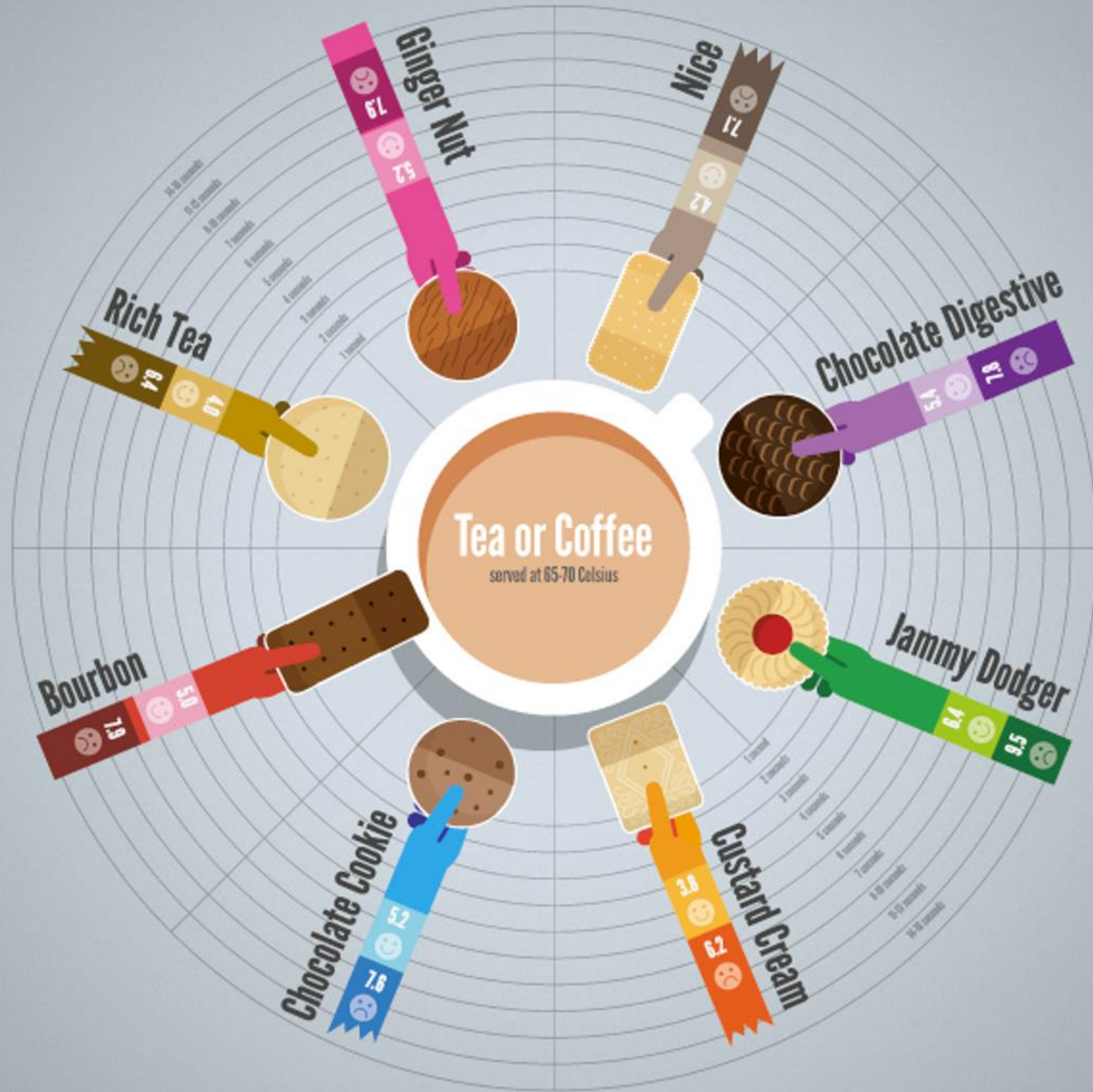


→ Radial



Key

- 😊 Perfection!
- 😞 Risk of extreme sogginess!
- 🚩 Floppage likely

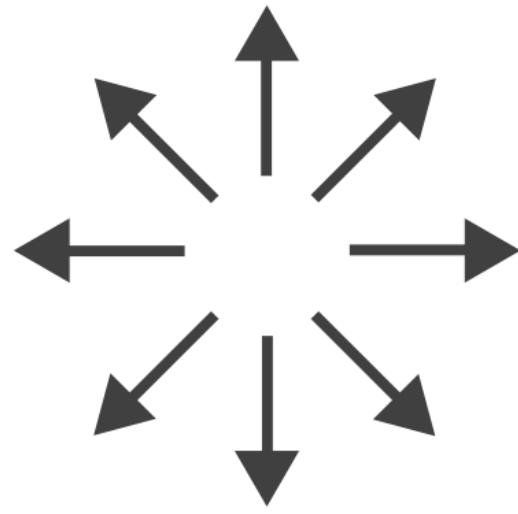


Through extensive research at the Green Hat office we have produced this helpful guide for those who like to dunk their biscuits, without fear of floppage!

[www.greenhatdesign.co.uk](http://www.greenhatdesign.co.uk)

**Disclaimer:**  
This research was carried out by graphic designers with no formal training in any field of scientific research whatsoever, in a studio which was not a controlled environment. Therefore all results should be treated with biscuit firmly in cheek.

→ Radial



2.  
APRIL 1855 to MARCH 1856.

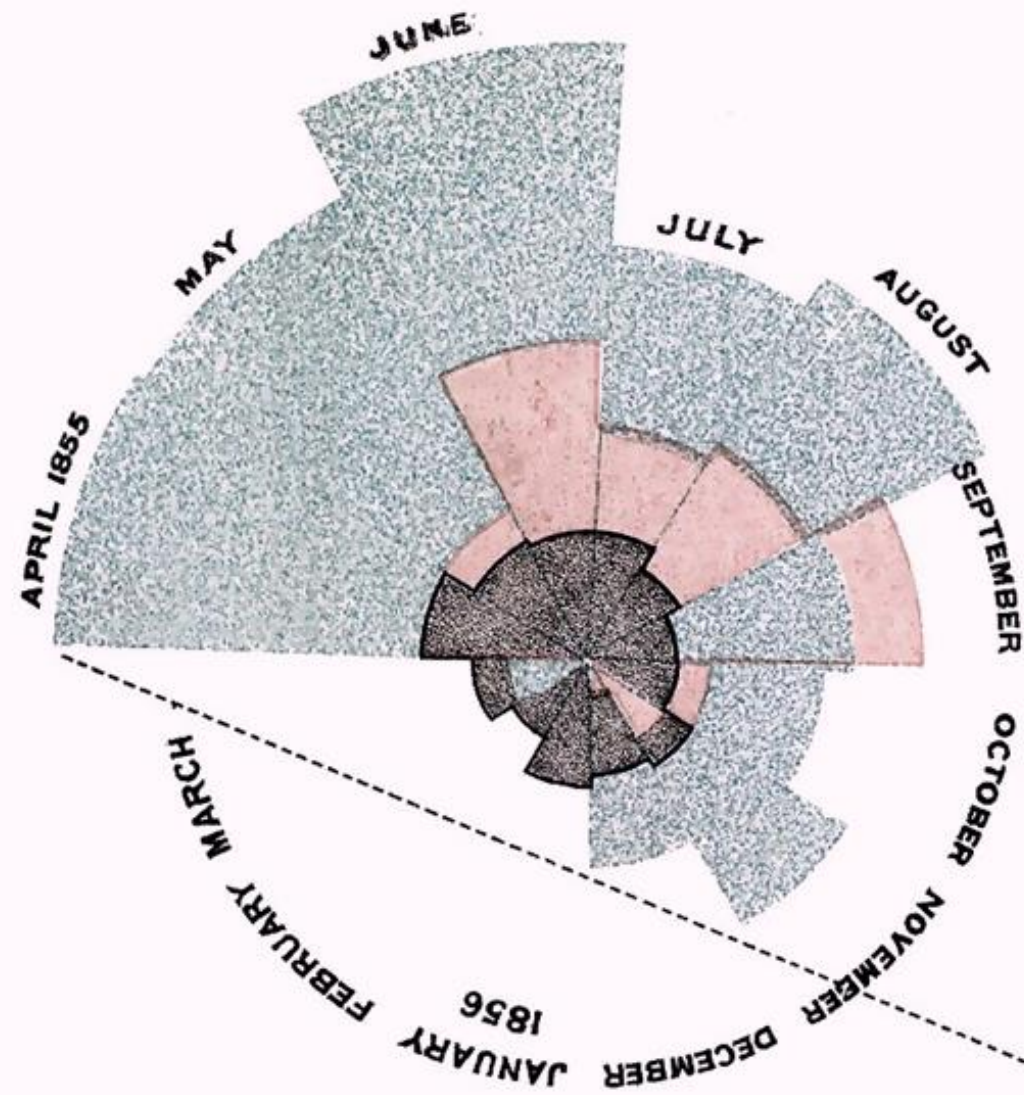
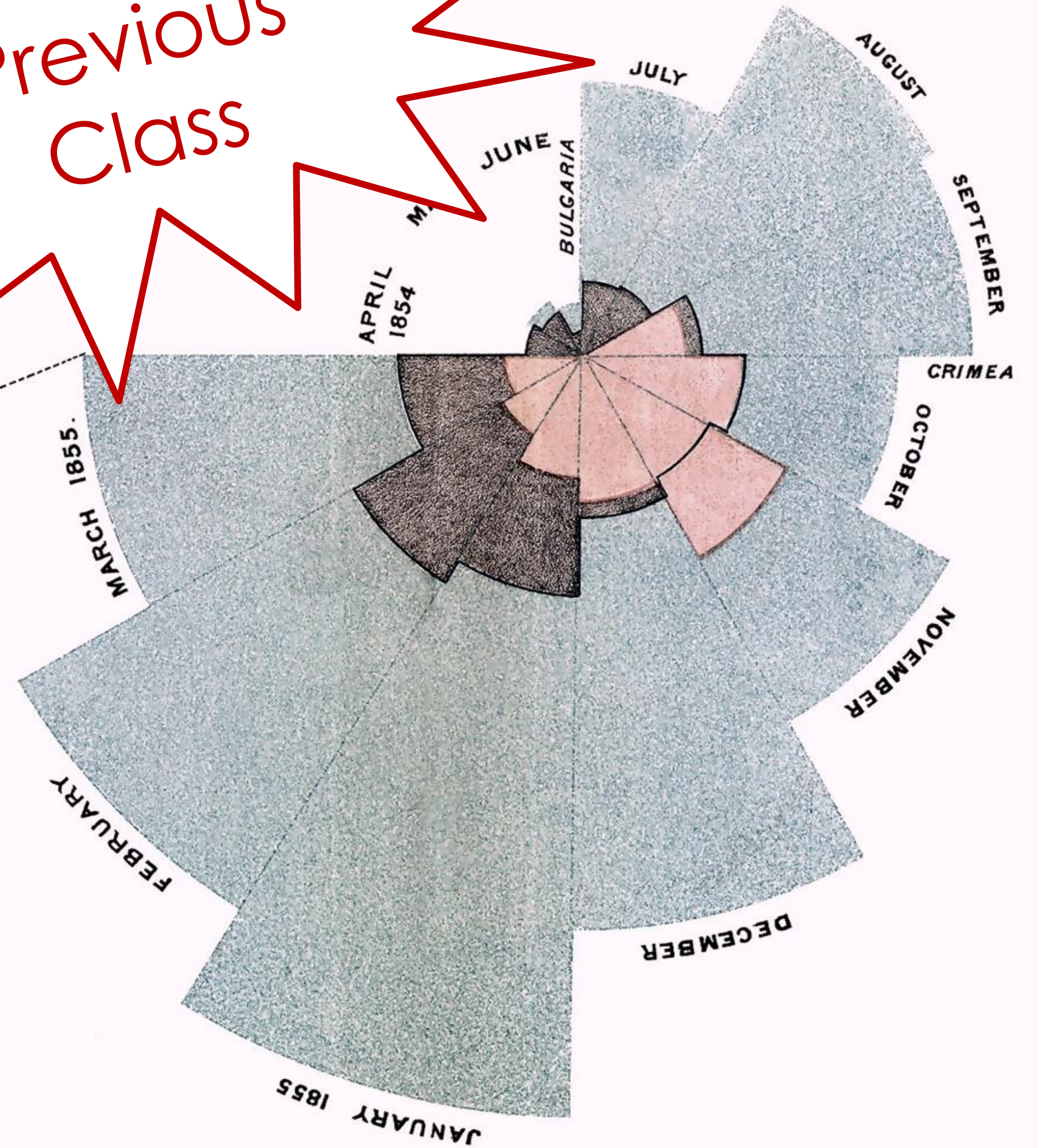


DIAGRAM OF THE CAUSES OF DEATH  
IN THE ARMY

1.  
APRIL 1854 to MARCH 1855.

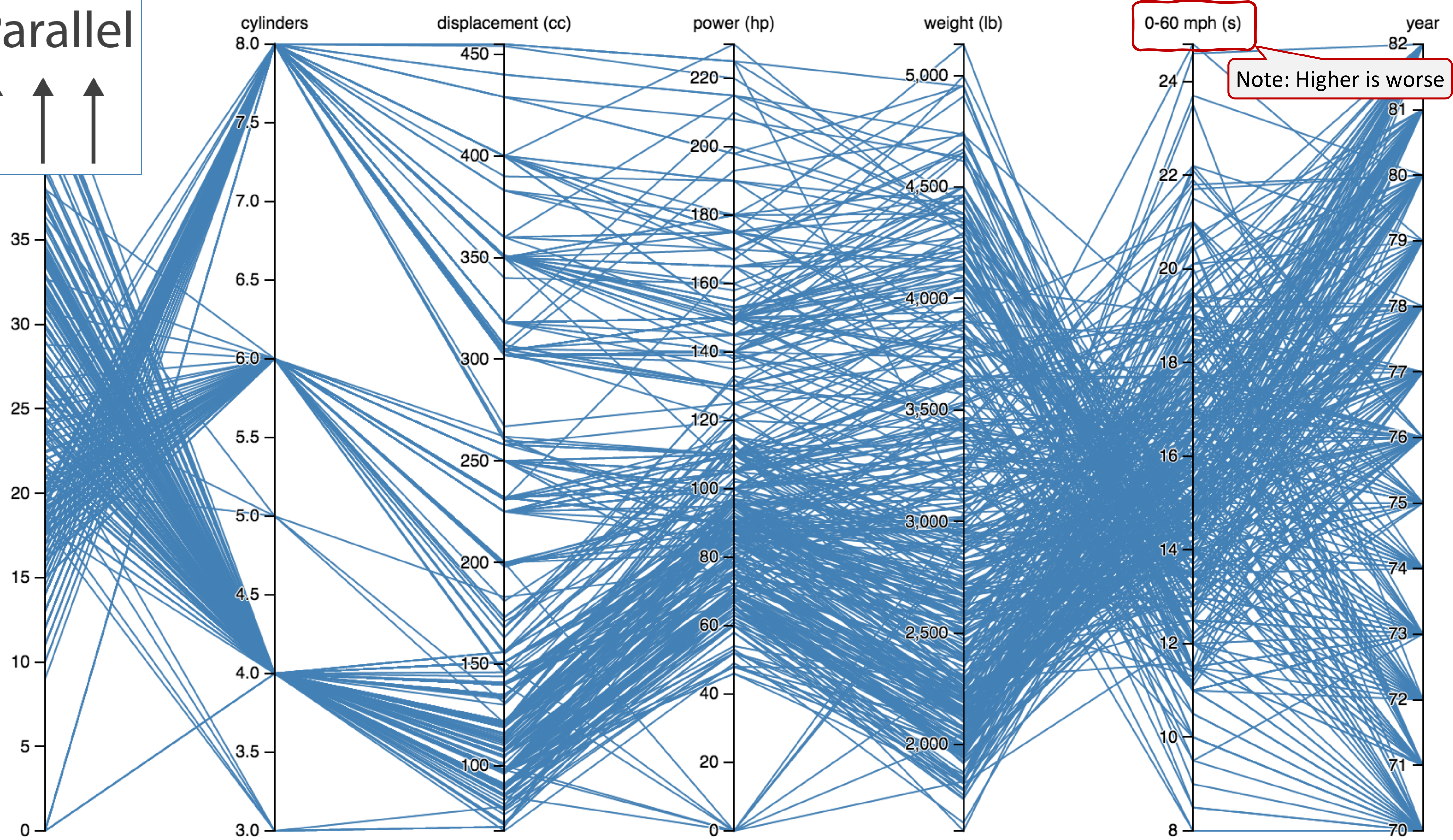
Previous Class



*The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex.  
The blue wedges measured from the centre of the circle represent area for area the deaths from Preventible or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes.  
The black line across the red triangle in Nov. 1854 marks the boundary of the deaths from all other causes during the month.  
In October 1854, & April 1855, the black area coincides with the red; in January & February 1856, the blue coincides with the black.  
The entire areas may be compared by following the blue, the red & the black lines enclosing them.*

FLORENCE NIGHTINGALE (c. 1858)

→ Parallel  
↑ ↑ ↑



# Arrange Tables — Many Keys (Tree)

→ Many Keys  
Recursive Subdivision



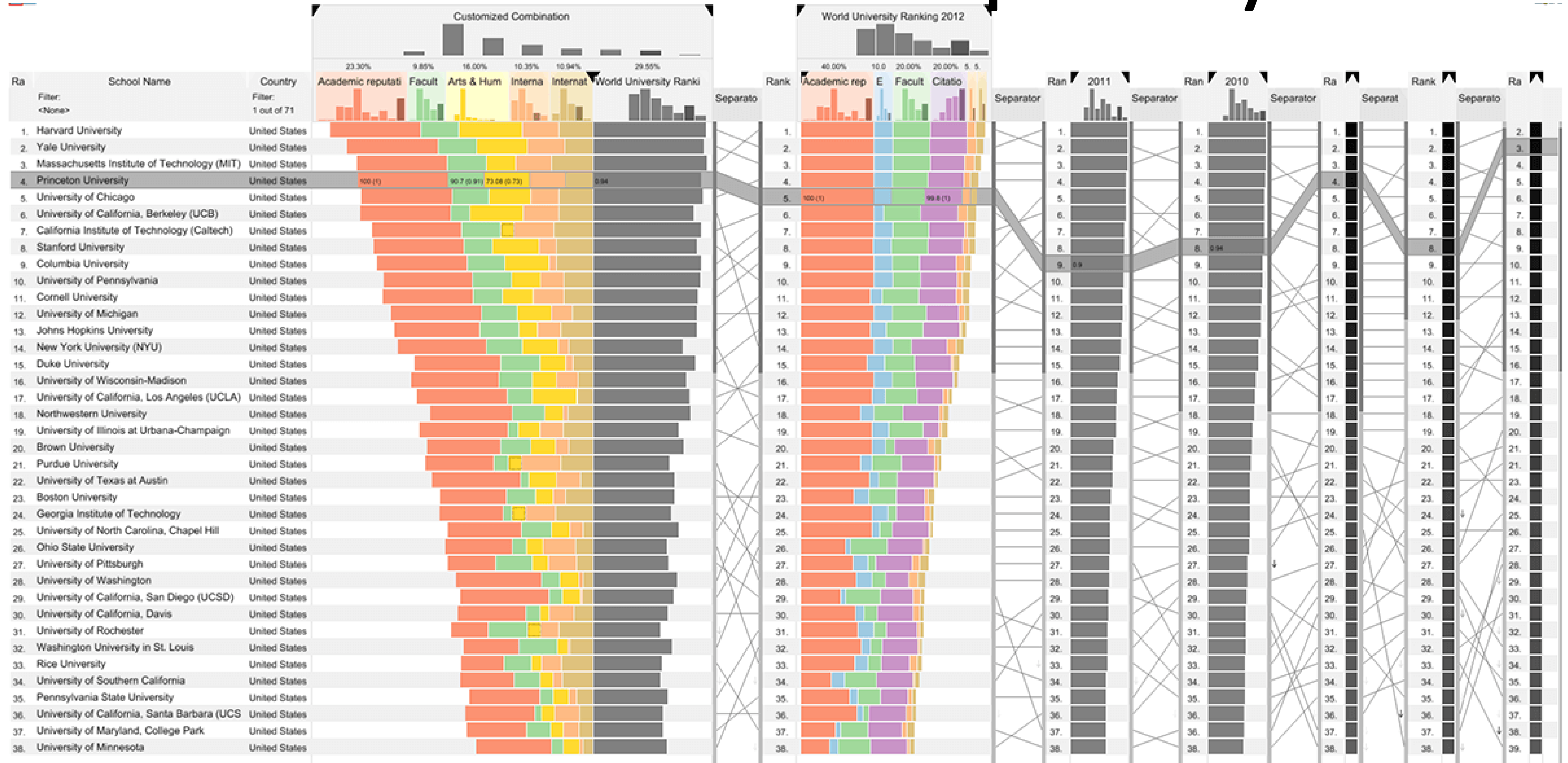


# How to handle multiple keys...?

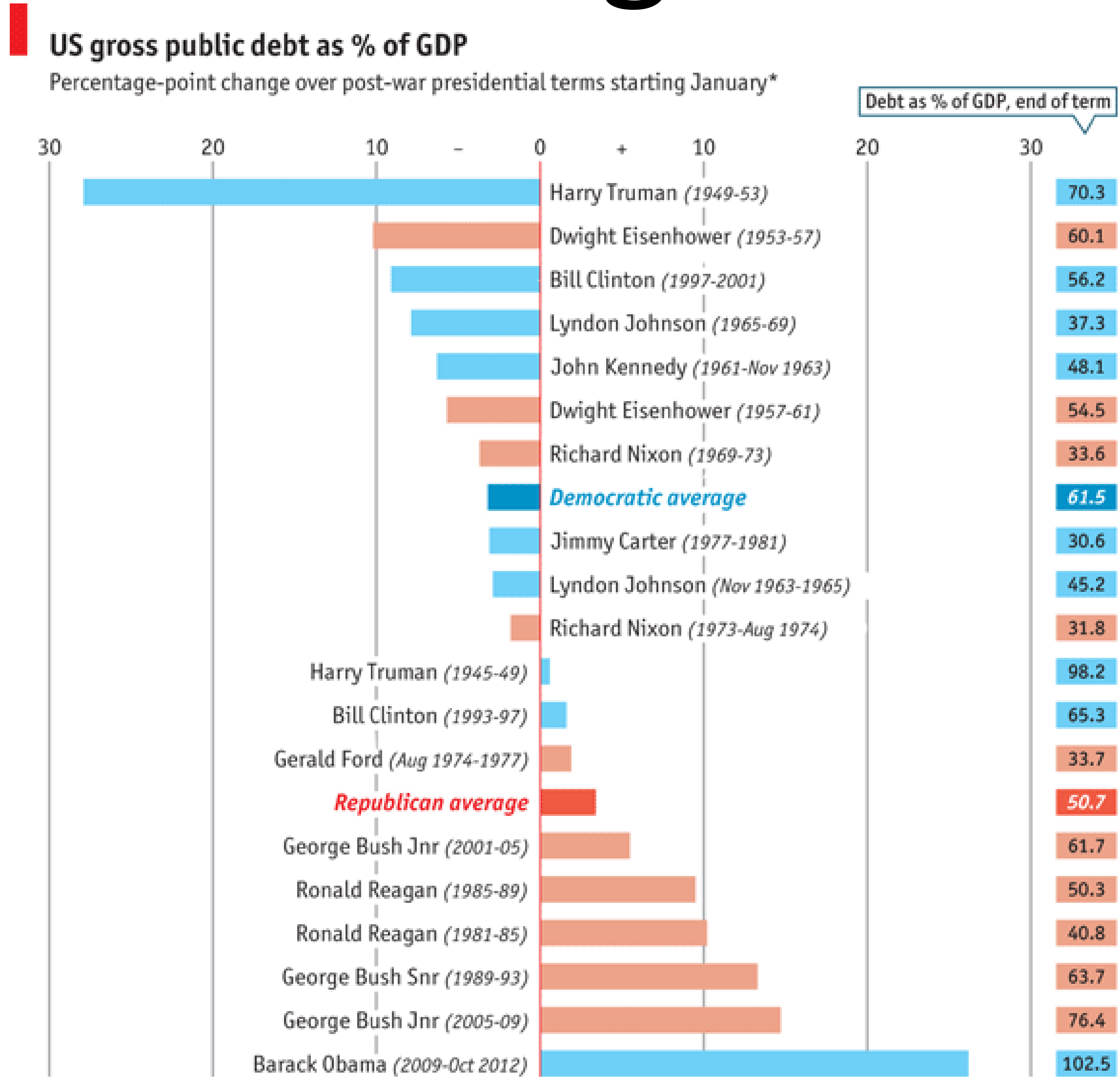
A collage of various newspaper pages, including headlines, photos, and text columns, arranged in a circular pattern. A central blue rounded rectangle contains the text "Rankings are omnipresent".

Rankings are  
omnipresent

# How to handle multiple keys...?



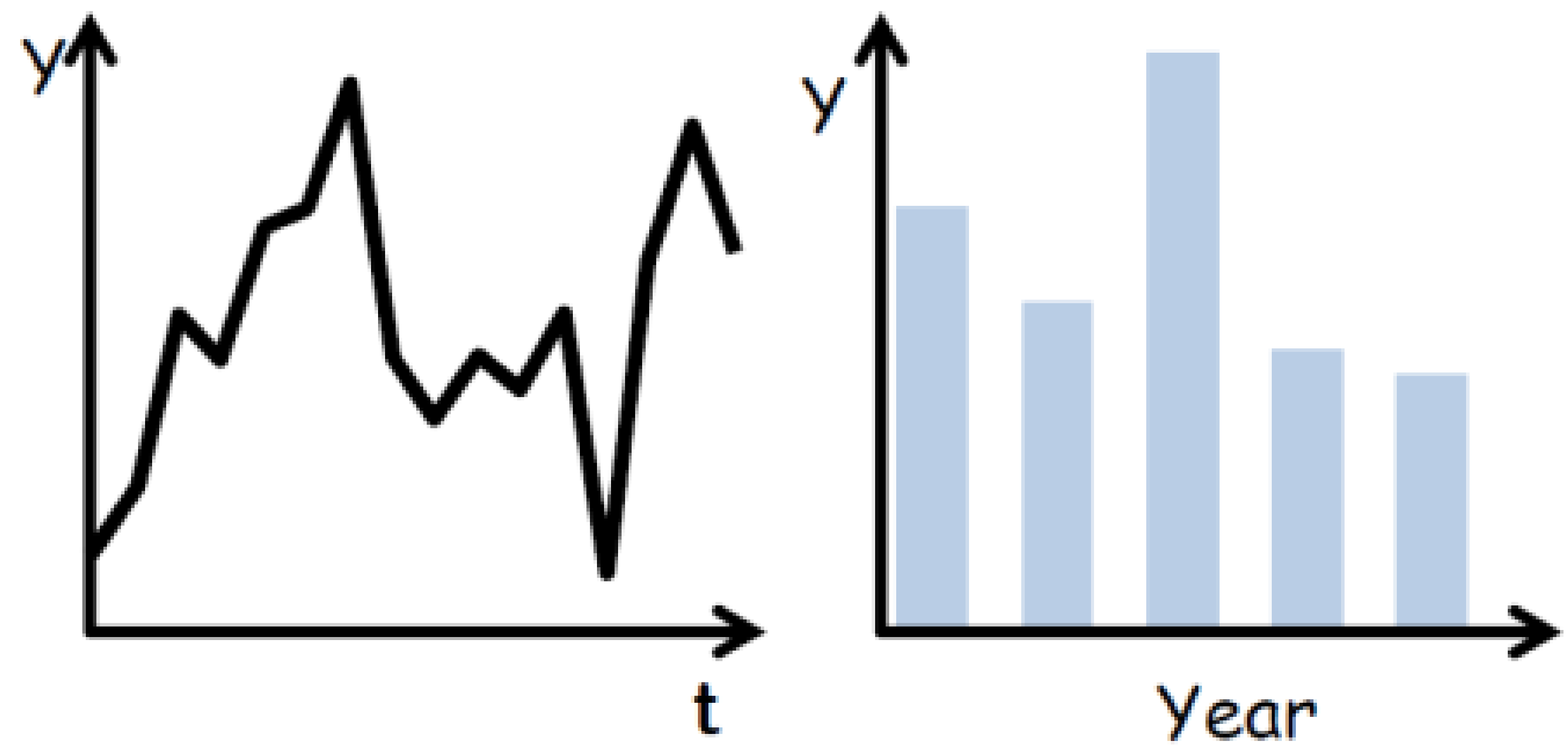
# Divergent



Sources: Bureau of Economic Analysis; Thomson Reuters; White House; *The Economist*

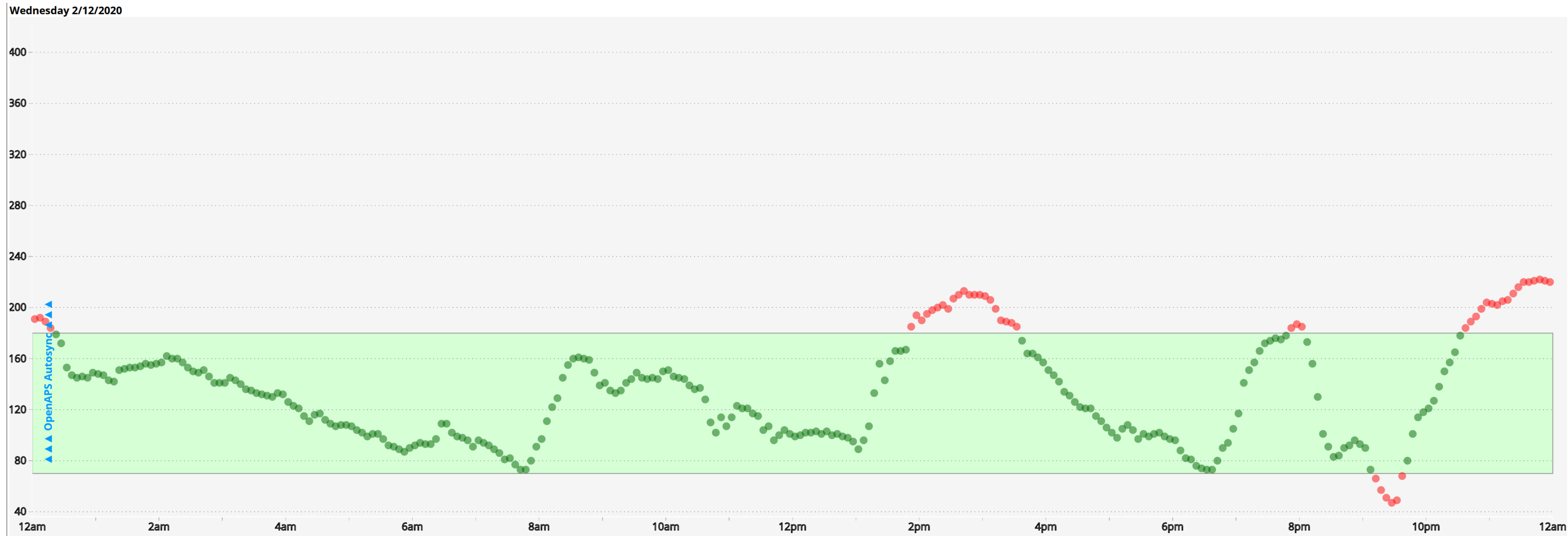
\*Unless otherwise stated

# Time Series



(Quantitative data over time)

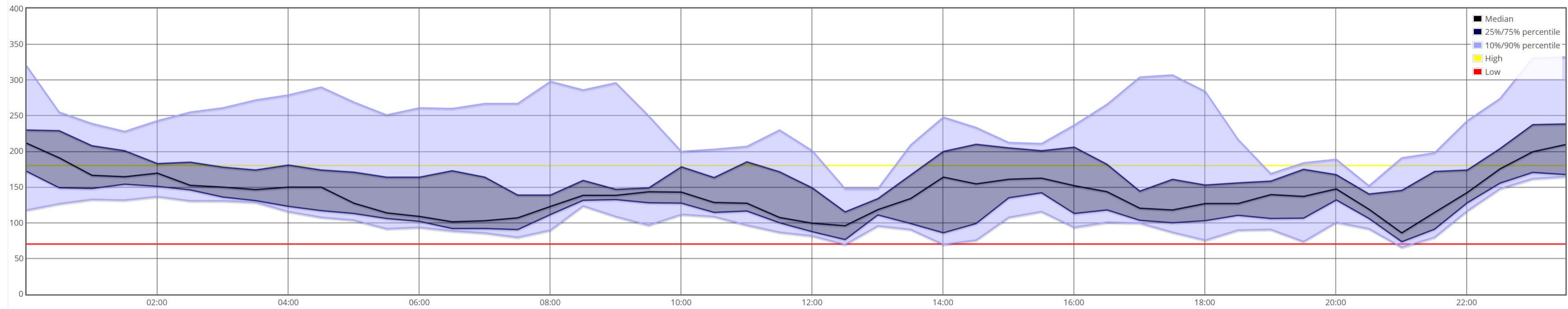
# Time Series



(Quantitative data over time)

# Time Series Distributions

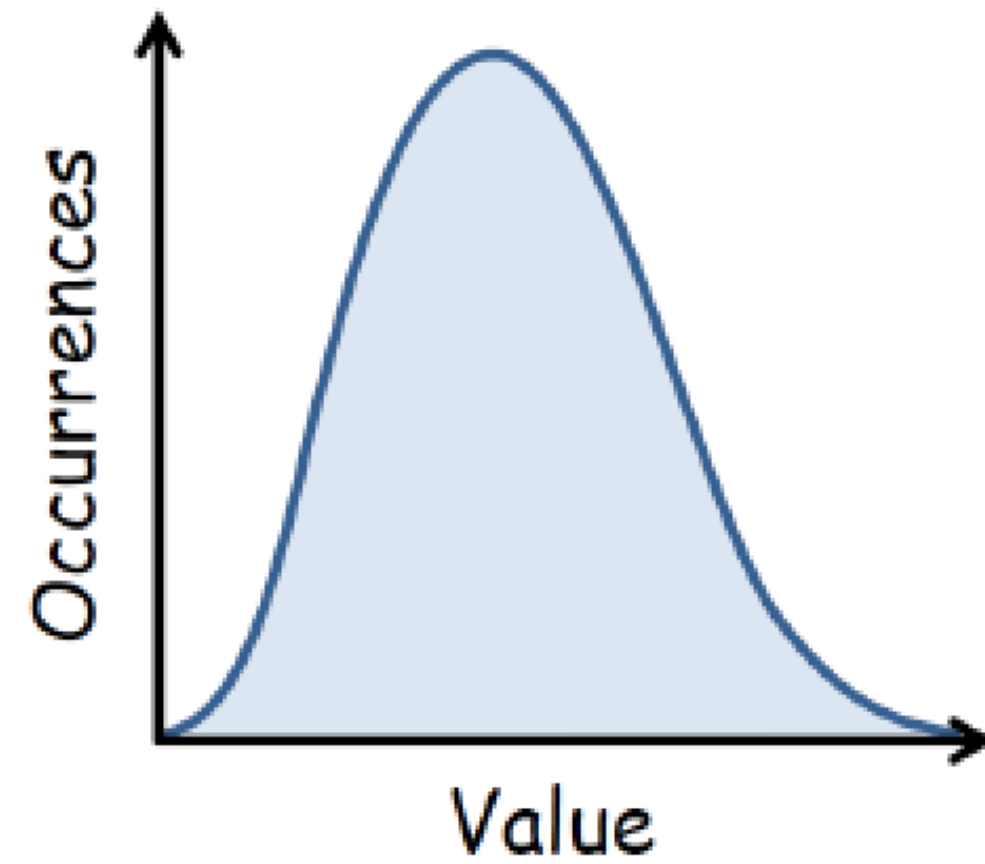
Glucose Percentile report



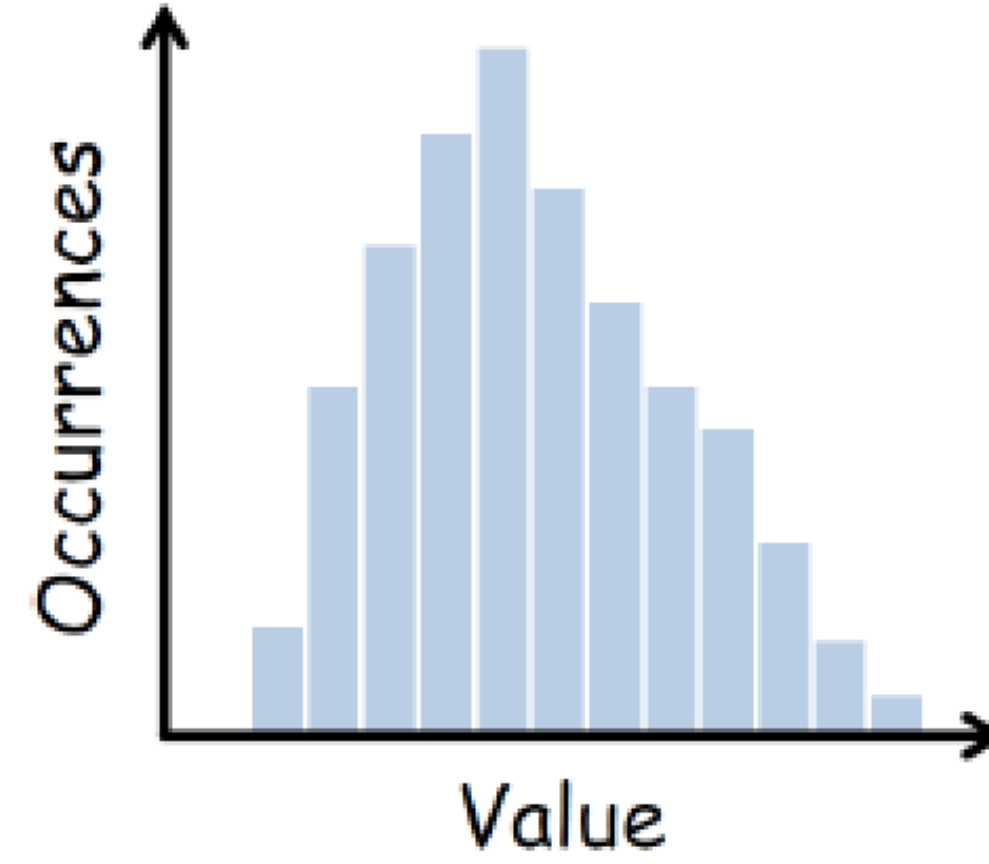
(Quantitative data over time)

# Distributions & Correlations

Distribution Curve



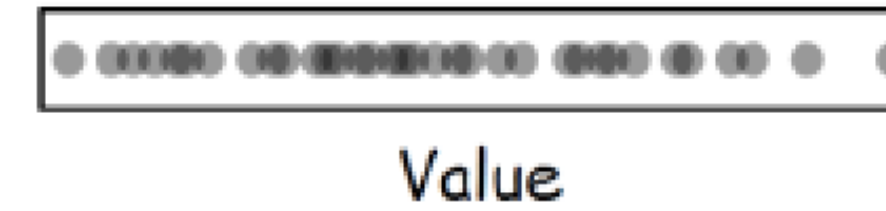
Histogram



Box-And-Whisker Plot



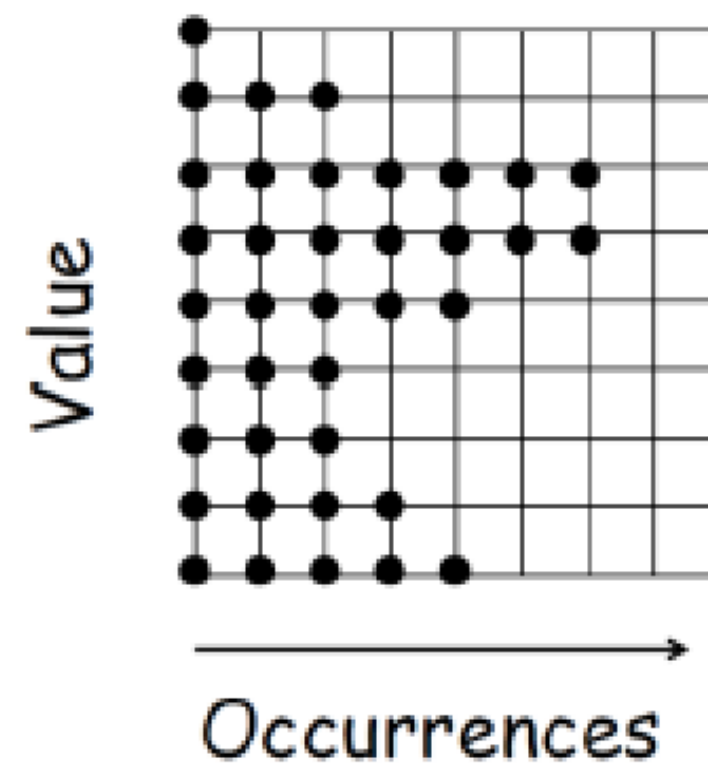
Point Graph



Stripe Graph



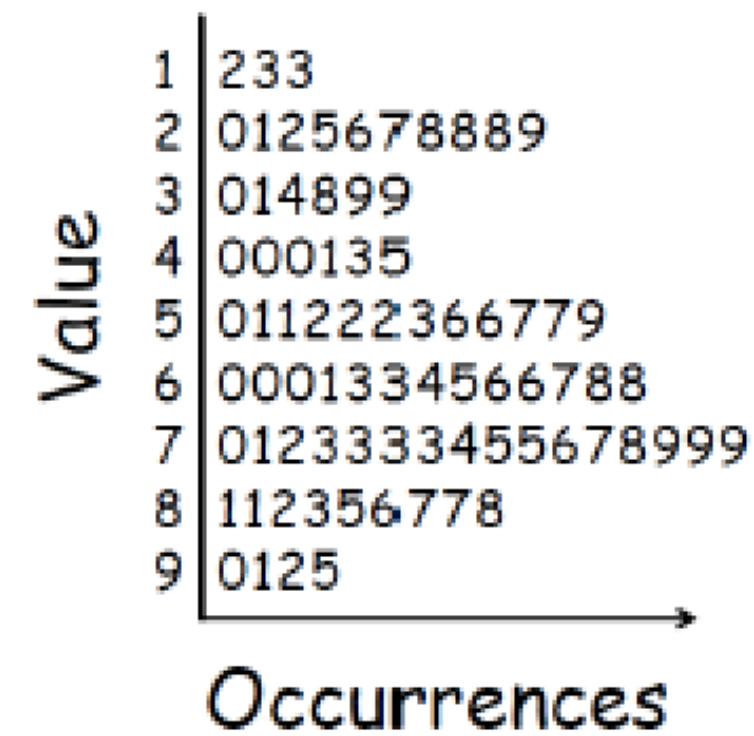
Dot Array



Tally Chart

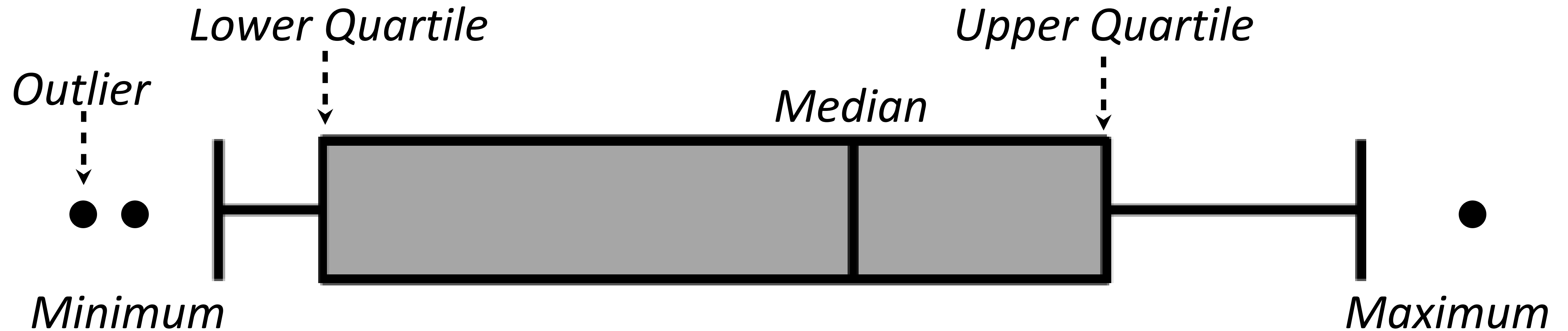


Stem-And-Leaf Plot



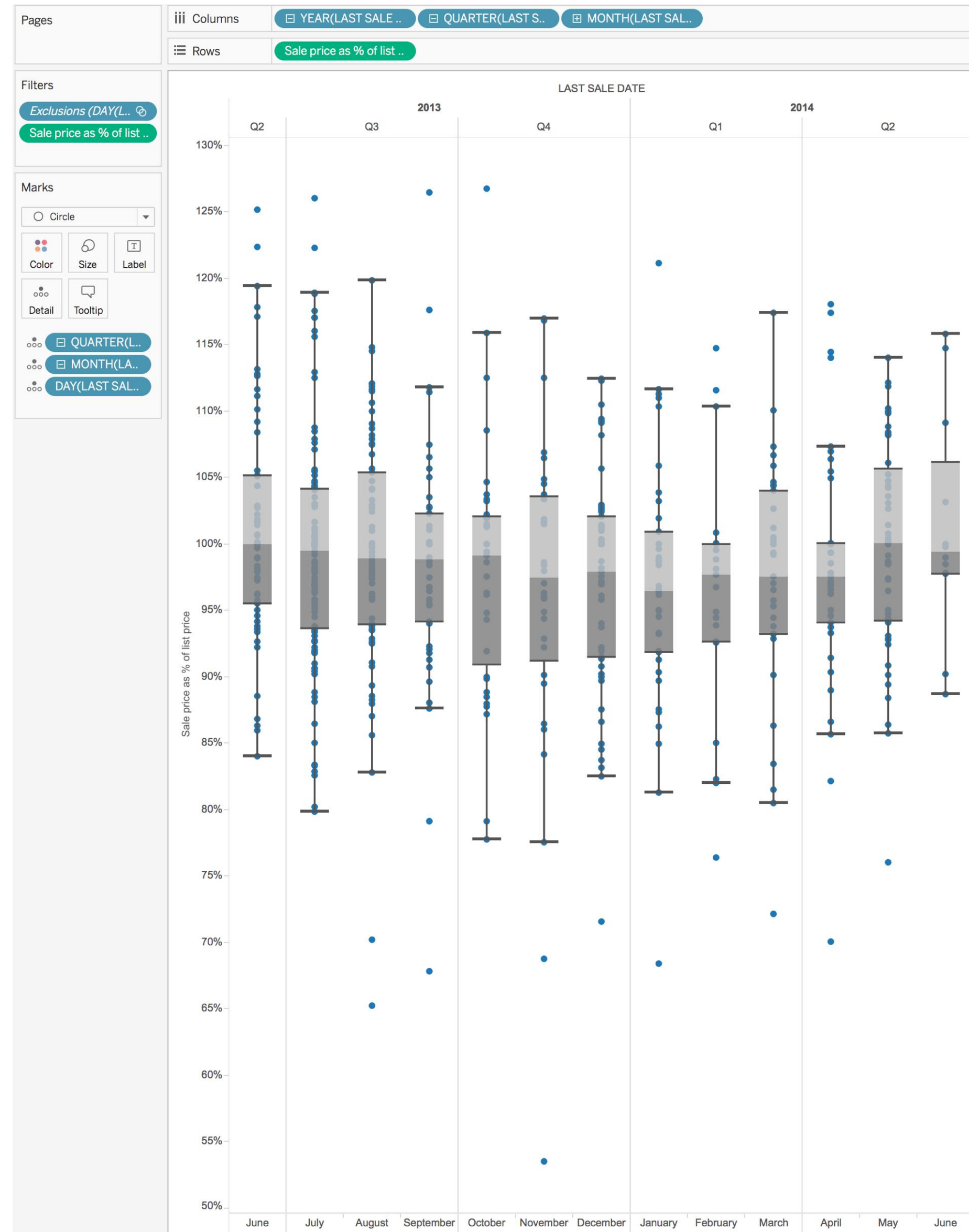


# Distributions & Correlations



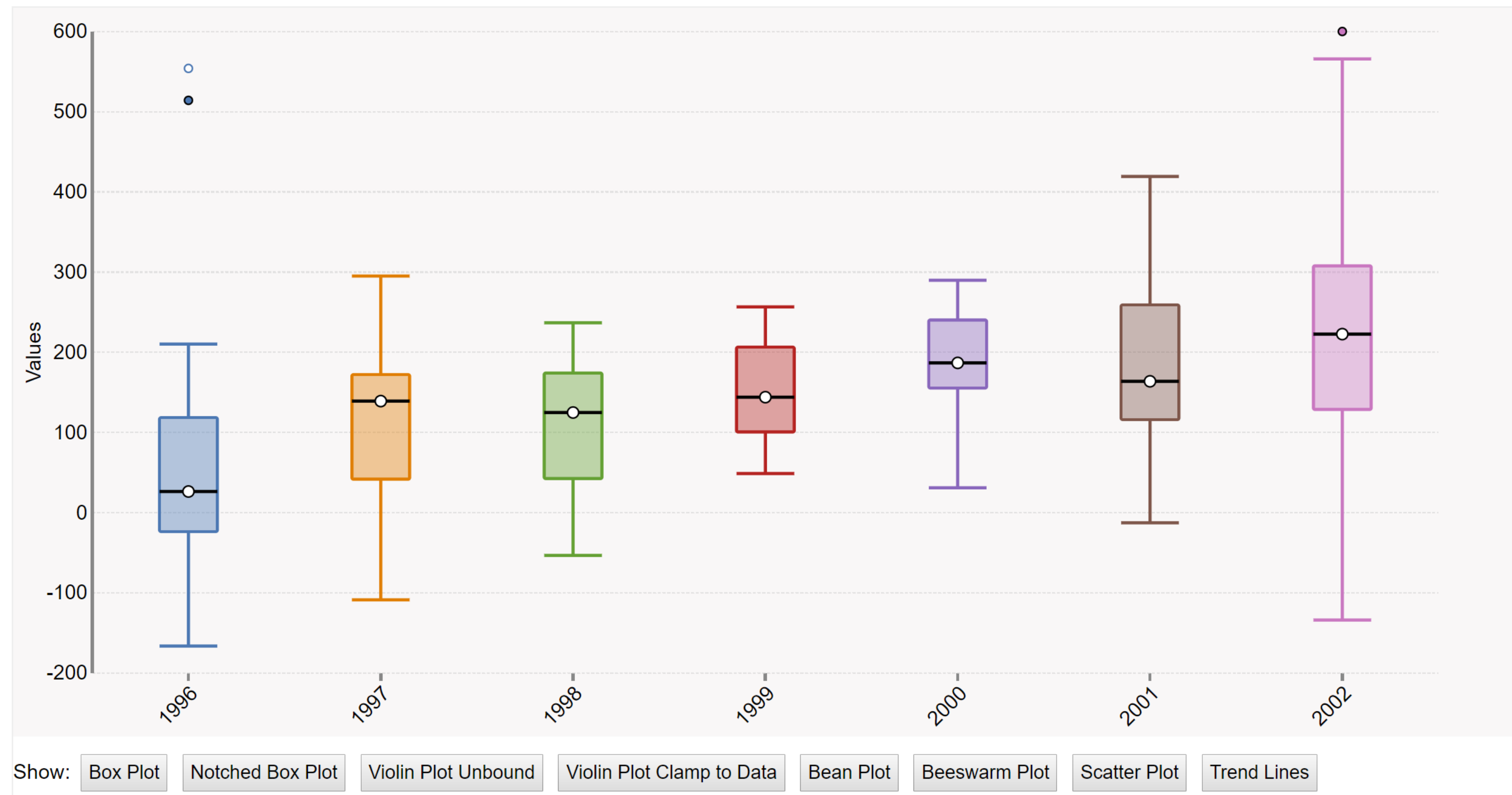
BOX AND WHISKER PLOT

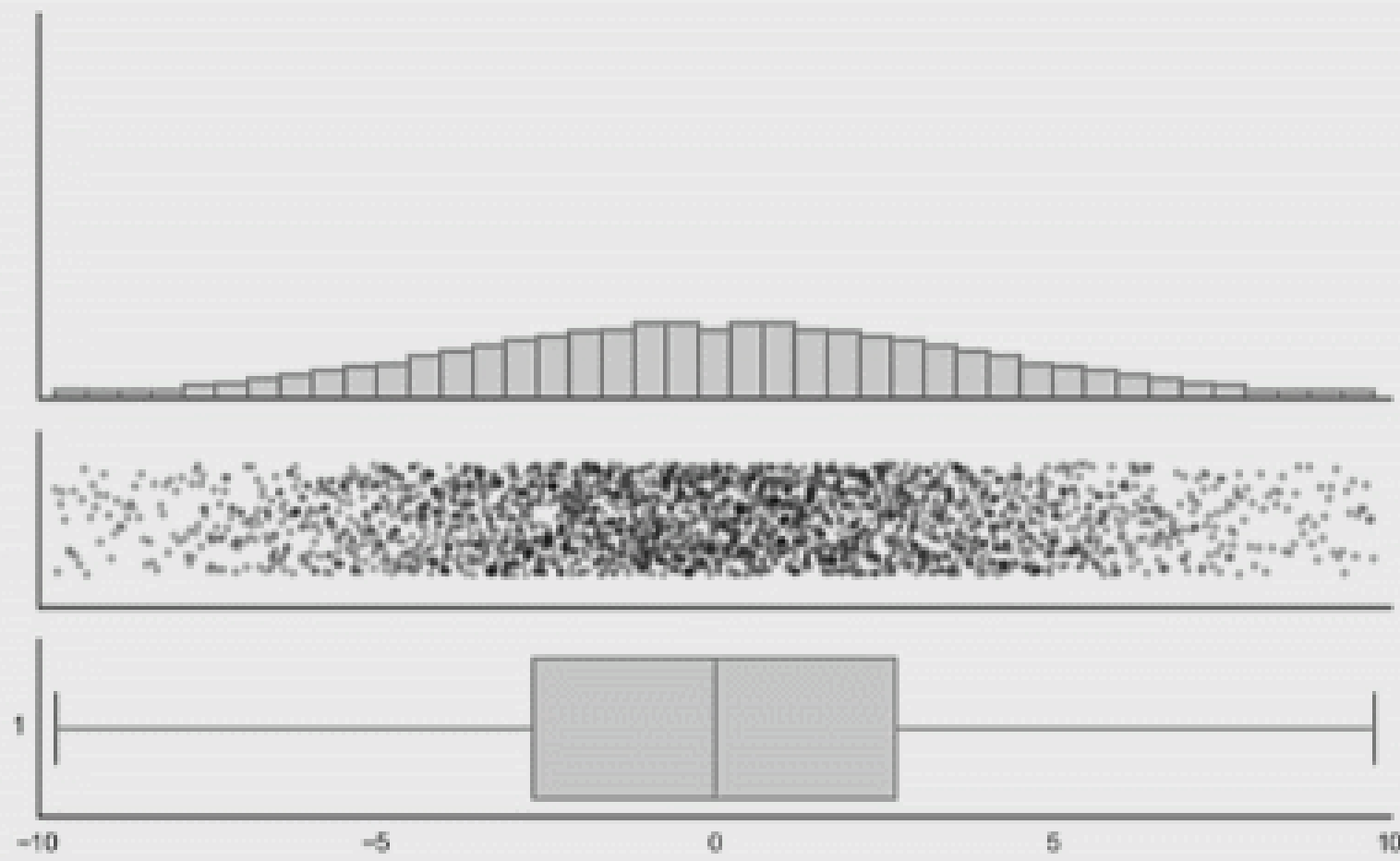
# Distributions & Correlations



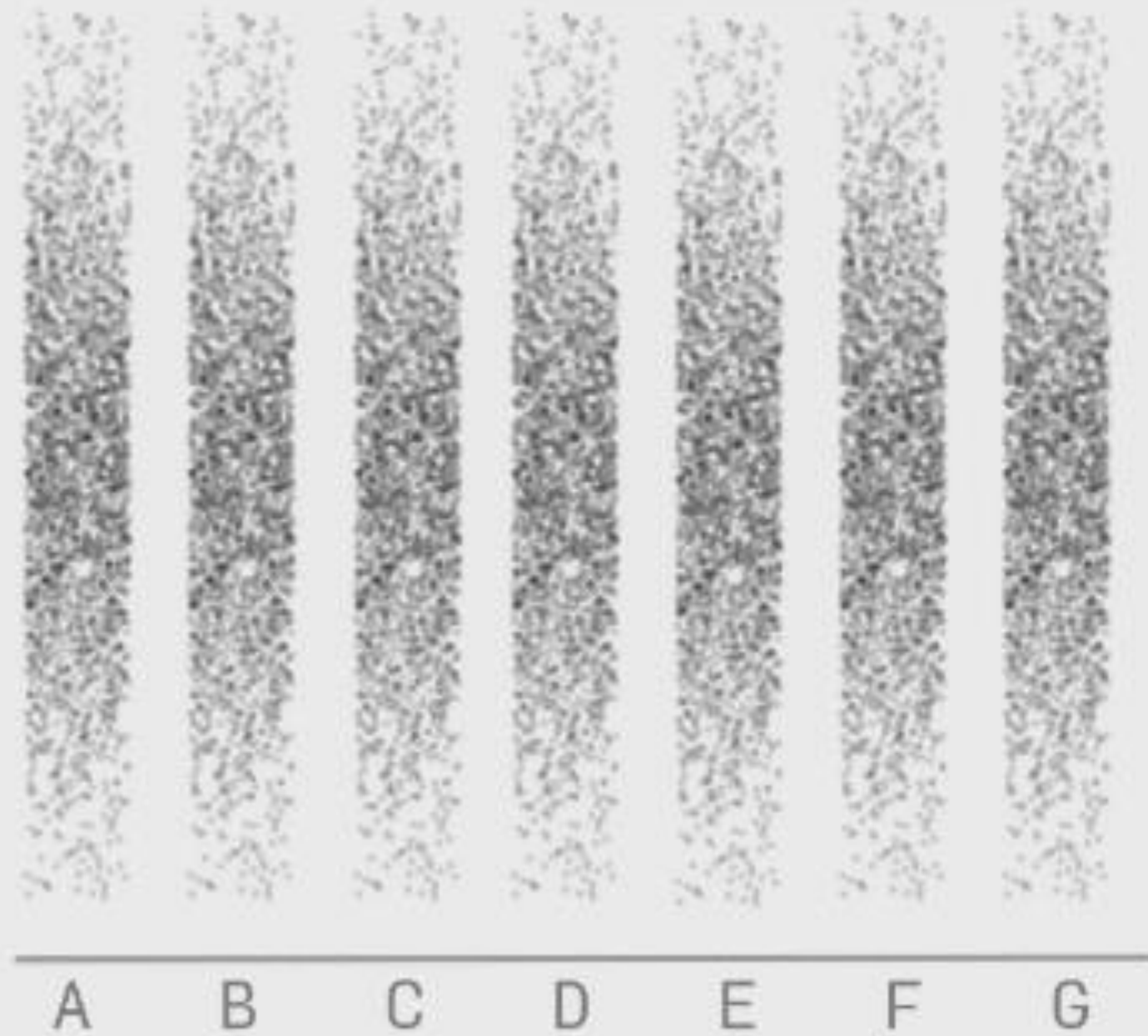
# Distributions & Correlations

## Violin Plot + Box Plot v3

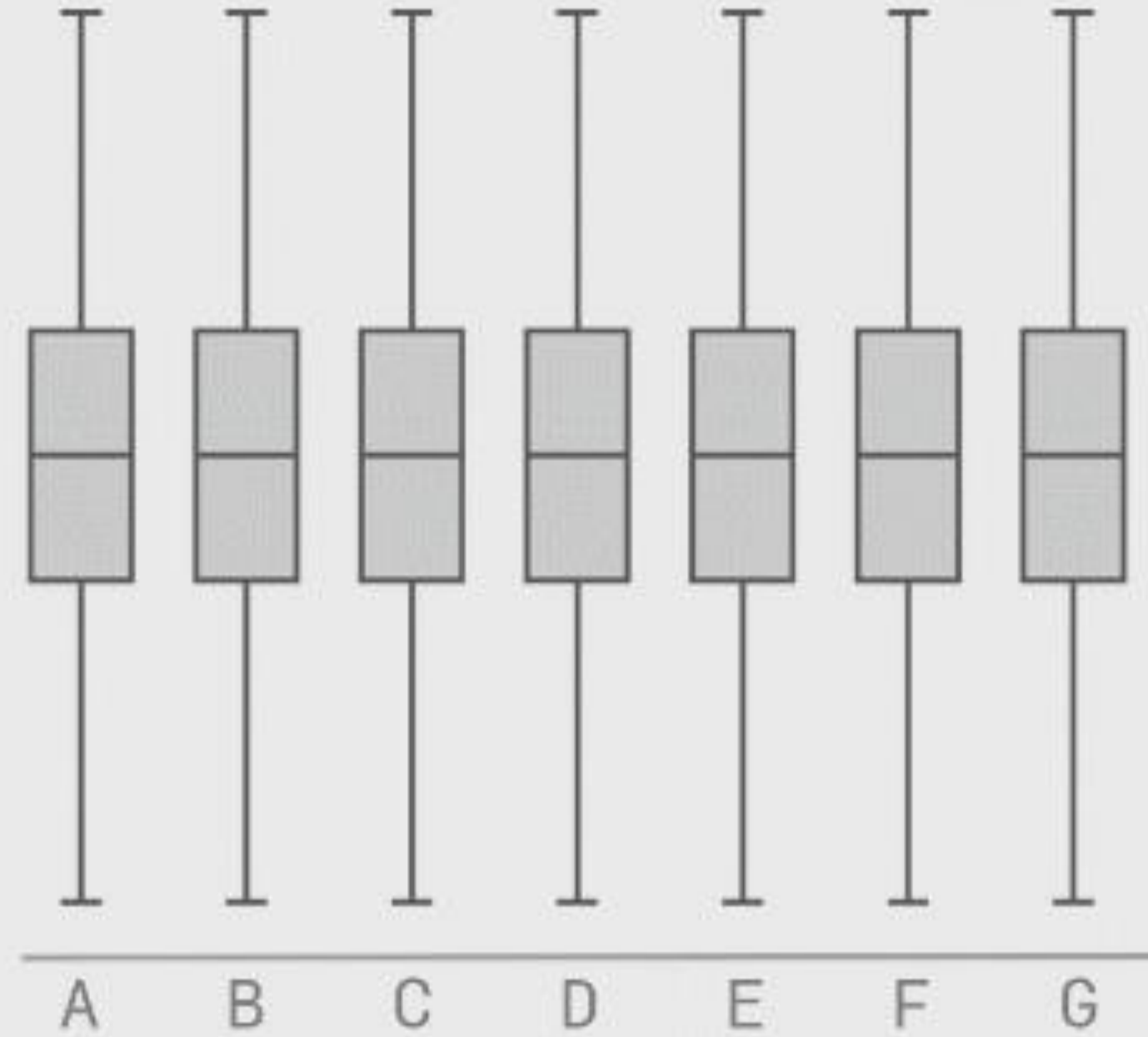




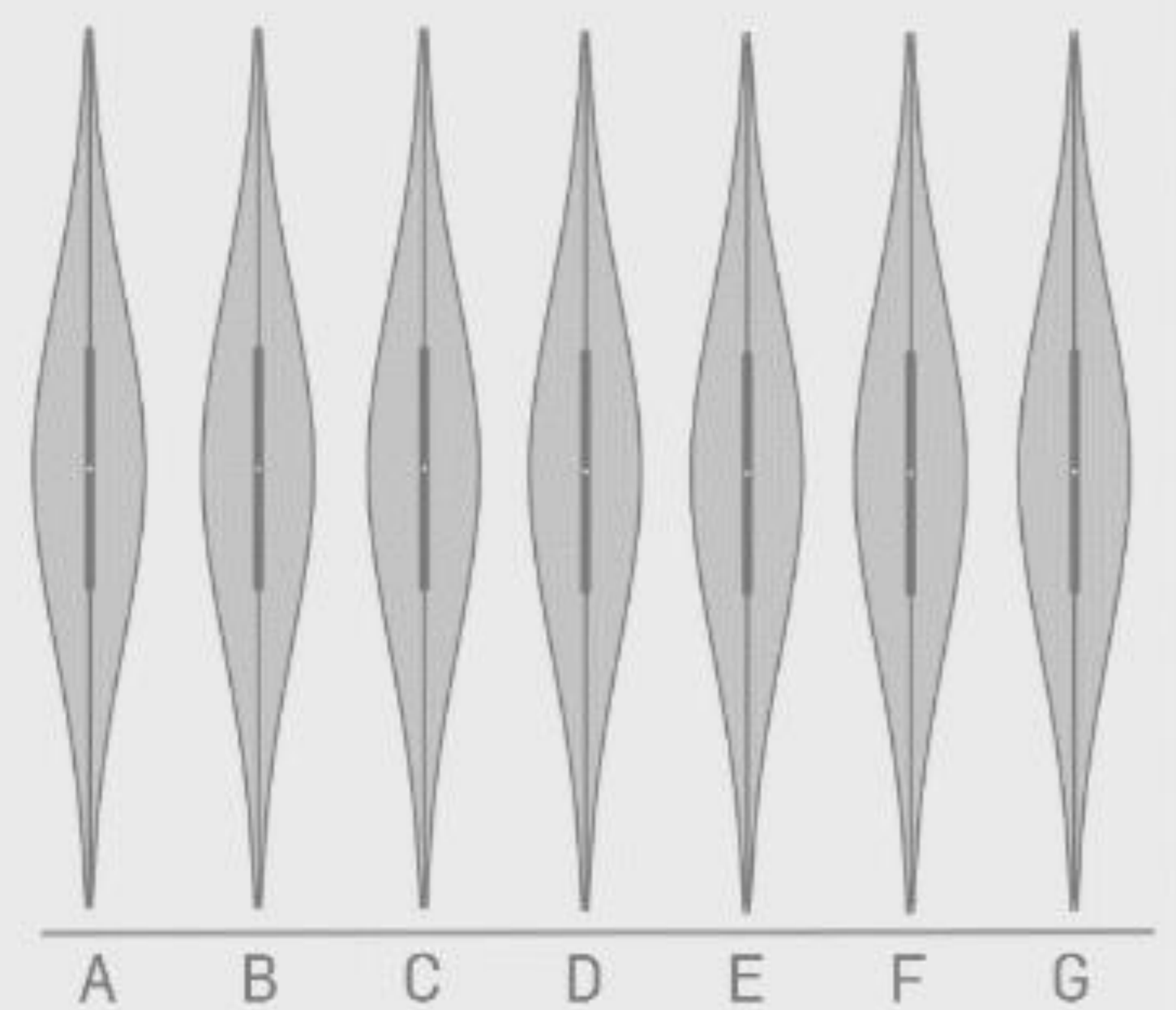
**Raw Data**

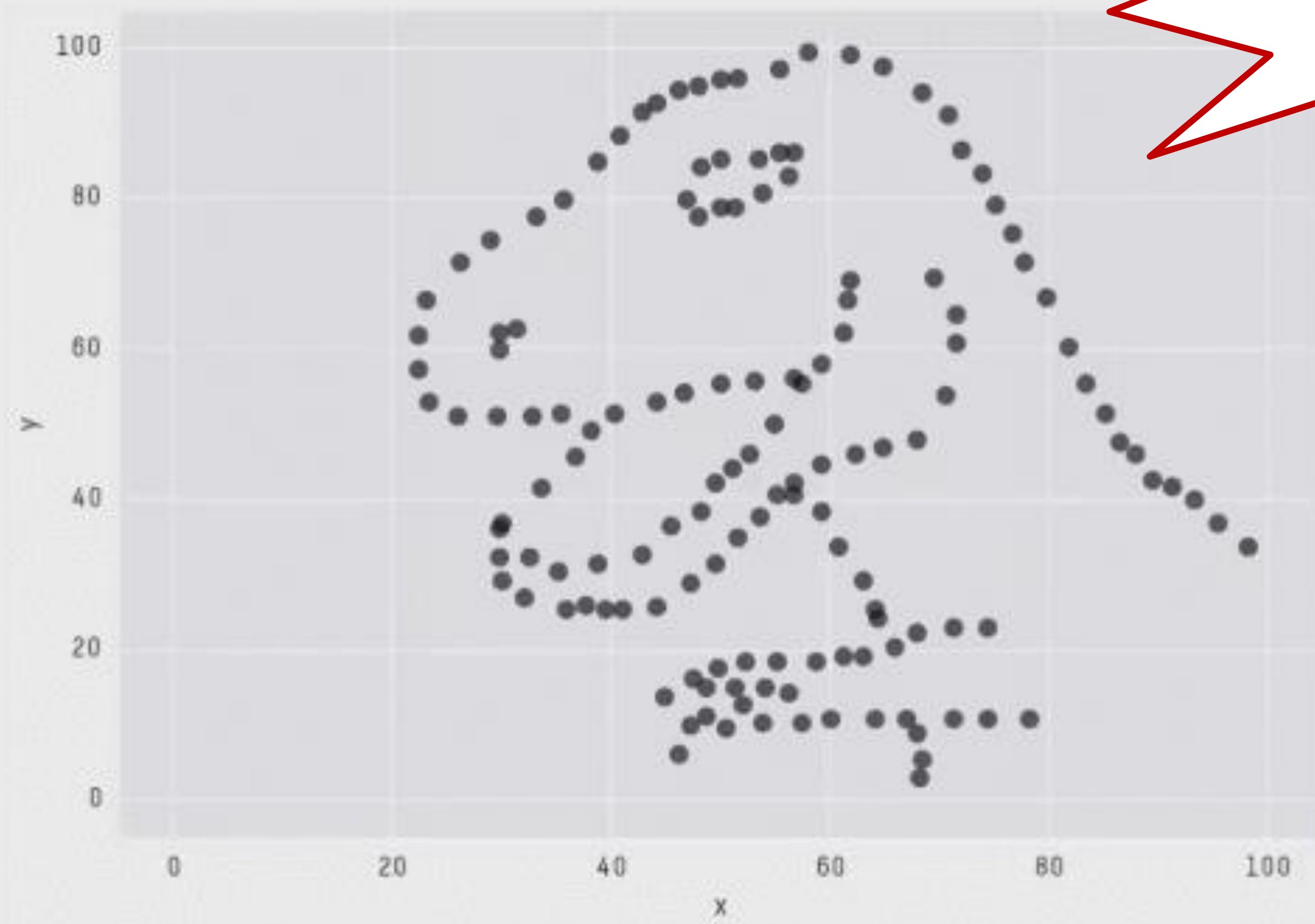


**Box-plot of the Data**



**Violin-plot of the Data**

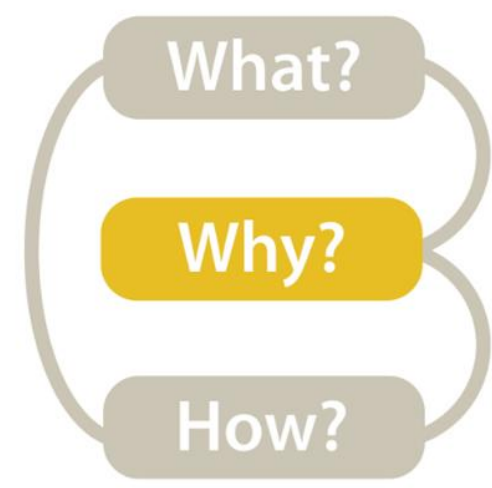




Previous Class

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

IN-CLASS EXERCISE:  
DESIGN FROM TASK ANALYSIS



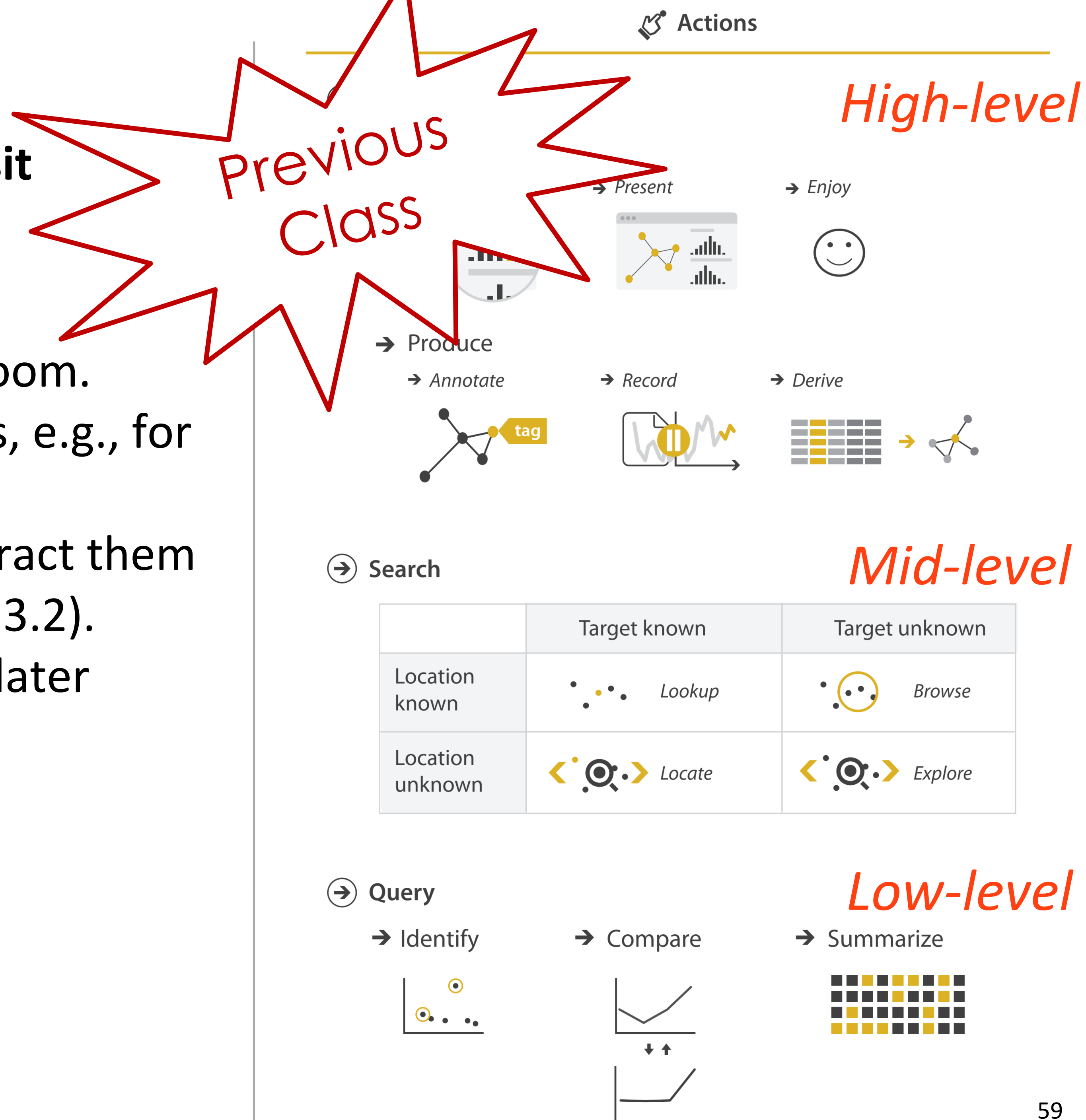
# Task Analysis

## Visualization for Public Transit Development

20m

### INSTRUCTIONS:

- We will break you into groups of ~3 on Zoom.
- Pretend you are transportation engineers, e.g., for the MBTA, City of Boston.
- Discuss the user tasks and goals and abstract them using the taxonomy from VAD (right, Fig. 3.2).
- Save your **notes & group members** for a later exercise!!!



What?

Why?

How?

# In-Class Design

## Task Analysis → Visualization for Public Transit Development

38 min


### INSTRUCTIONS:

- [In-Class Design — Task Analysis → Visualization for Public Transit Development](#) on Canvas


Channels: Expressiveness Types and Effectiveness Ranks

#### ➔ Magnitude Channels: Ordered Attributes

Position on common scale 

Position on unaligned scale 

Length (1D size) 

Tilt/angle 

Area (2D size) 

Depth (3D position) 

Color luminance 

Color saturation 

Curvature 


Volume (3D size) 

#### ➔ Identity Channels: Categorical Attributes

Spatial region 

Color hue 

Motion 

Shape 

Most

Effectiveness

Least

Same

Same



# Upcoming Assignments & Communication

Look at the upcoming assignments and deadlines regularly!

- Textbook, Readings, & Reading Quizzes — Variable days
- In-Class Activities — 11:59pm same day as class
  - F: Lecture
  - T: Lecture
  - F: In-class project feedback meetings & work
  - T: Lecture
- Assignments & Projects— Generally due **R 11:59pm**
  - R (2 days):** Assignments 6a (Altair) and 6b (critique)
  - Next R (9 days):** Assignment 7 (D3 Events)
    - Project 3 — Interview & Task Analysis**
  - Next-Next R (16 days):** Project 4 — Data Collection & Exploration, Sketches

Use Canvas Discussions for general questions, email the TAs/S-LTA/instructor for questions specific to you: [codydunne-and-tas@ccs.neu.edu](mailto:codydunne-and-tas@ccs.neu.edu). Include links!

If you're emailing about a particular assignment, please **include the URL of the Submission Details page**. ([Canvas documentation](#).)

If you have a project question, **give us your group number**. E.g., include: `Group ## — Topic` with `##` replaced by your group number and `Topic` replaced by your topic.