



End User  
Programm

InfoVis

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Northeastern University

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TASKS, ARRANGE TABLES

# Plan for Today

- Discuss more on Tasks are and why they are so important.
- Learn the differences between high, mid, and low-level task classifications.
- Learn about visual encodings, esp. arranging tables
- Learn how to pick appropriate visual representations based on attribute type and perceptual properties

# TASK ABSTRACTION

# Analysis

What?

What data is shown?

DATA ABSTRACTION

Why?

Why is the user analyzing / viewing it?

TASK ABSTRACTION

How?

How is the data presented?

VISUAL ENCODING

# Task Abstraction

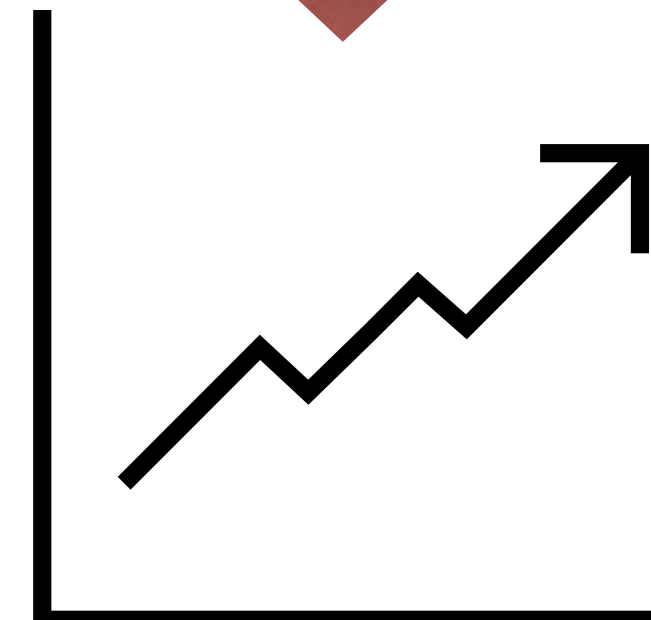
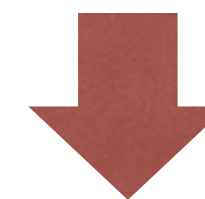
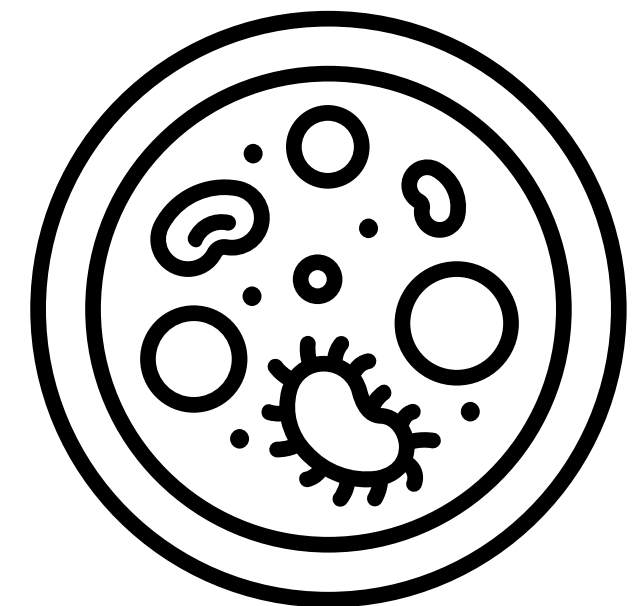
*What:*

The process of taking specific **domain tasks** and thinking about them as **abstract** (modular!) pieces

I need to perform **cellular analysis**.



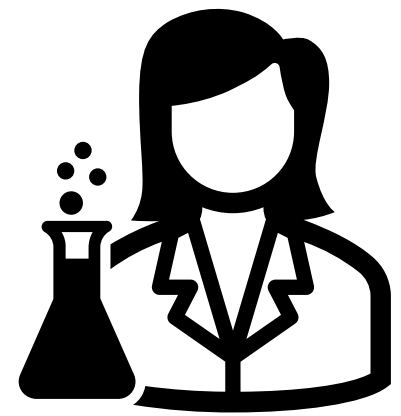
I need to **compare** measure A to B over time.



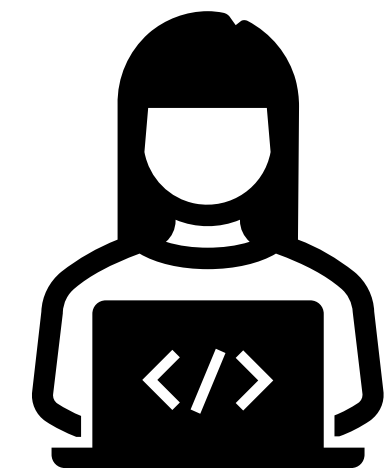
# Task Abstraction

*Why:*

To translate domain specific terms into well-known and transferable visualization tasks.



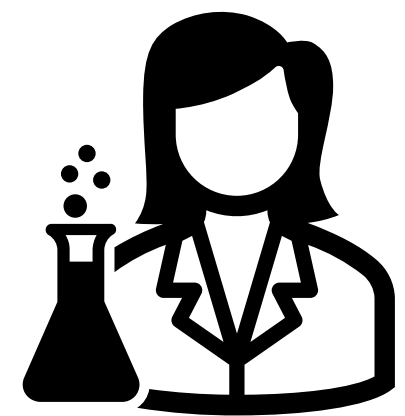
I need a visualization for performing **cellular analysis!**



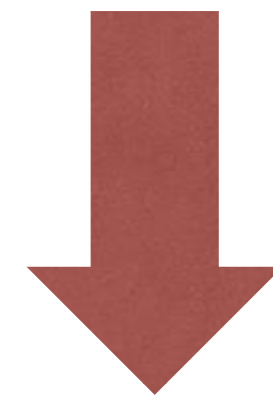
# Task Abstraction

*Why:*

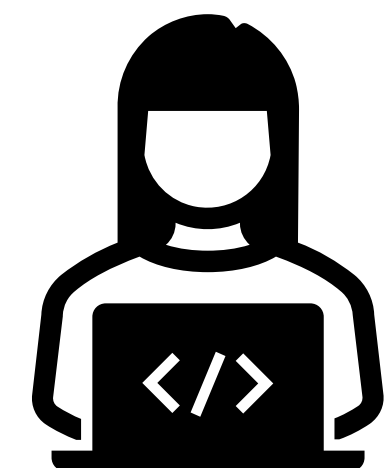
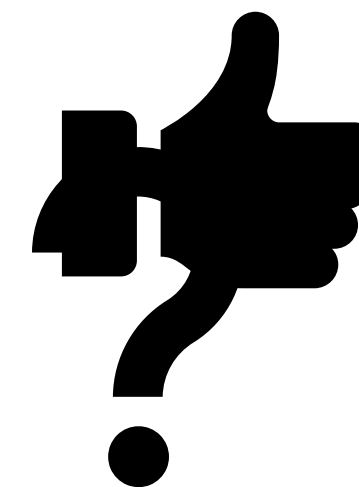
To translate domain specific terms into well-known and transferable visualization tasks.

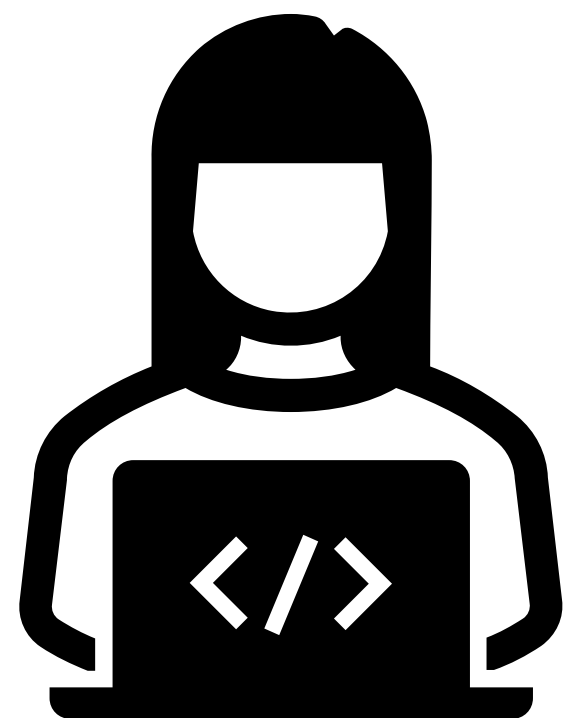


I need a visualization for performing **cellular analysis!**



I need to **compare** measure A to B over time.

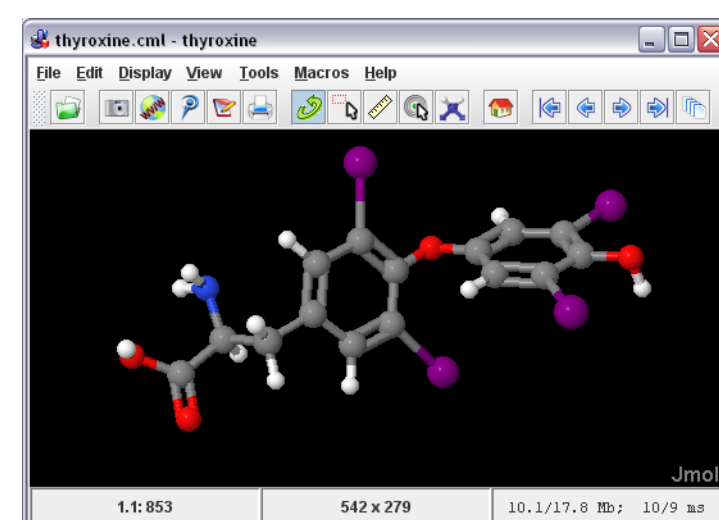




# Visualization Tools

*Specific*

*General*





# TASK ABSTRACTION

Why?

High-level

**Actions**

→ Analyze

- Consume
  - Discover
  - Present
  - Enjoy
- Produce
  - Annotate
  - Record
  - Derive

**Targets**

→ All Data

- Trends
- Outliers
- Features

→ Attributes

- One
  - Distribution
  - Extremes
- Many
  - Dependency
  - Correlation
  - Similarity

Medium-level

**Search**

	Target known	Target unknown
Location known	Lookup	Browse
Location unknown	Locate	Explore

→ Network Data

- Topology
  -
- Paths
  -

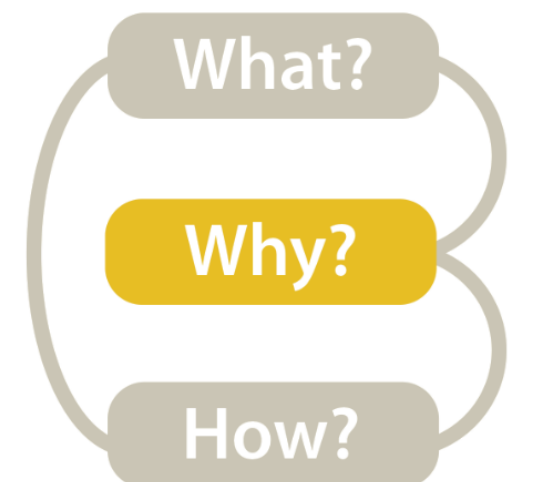
Low-level

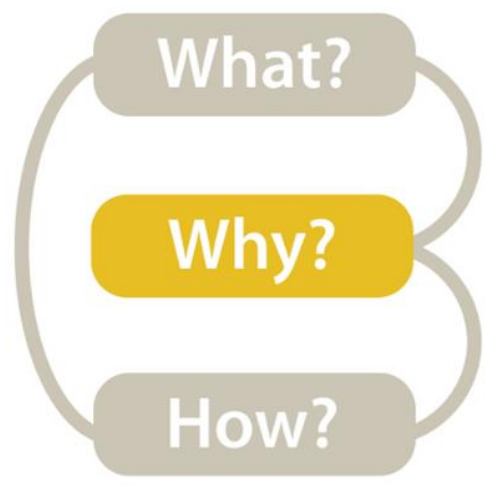
**Query**

- Identify
- Compare
- Summarize

→ Spatial Data

- Shape





# High-level → How is the vis being used to analyze?

## → Analyze

→ Consume

→ Discover



→ Present



→ Enjoy



→ Produce

→ Annotate

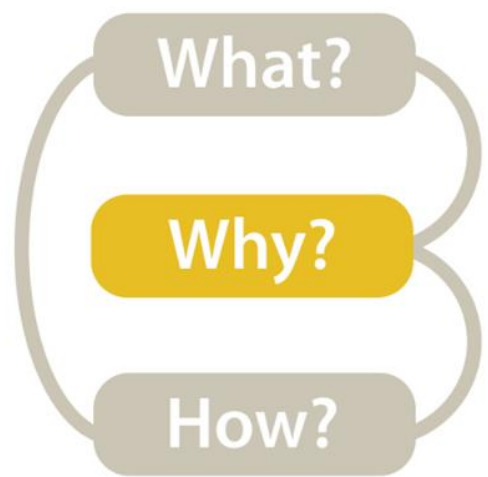


→ Record



→ Derive





# High-level → Consume → Discover

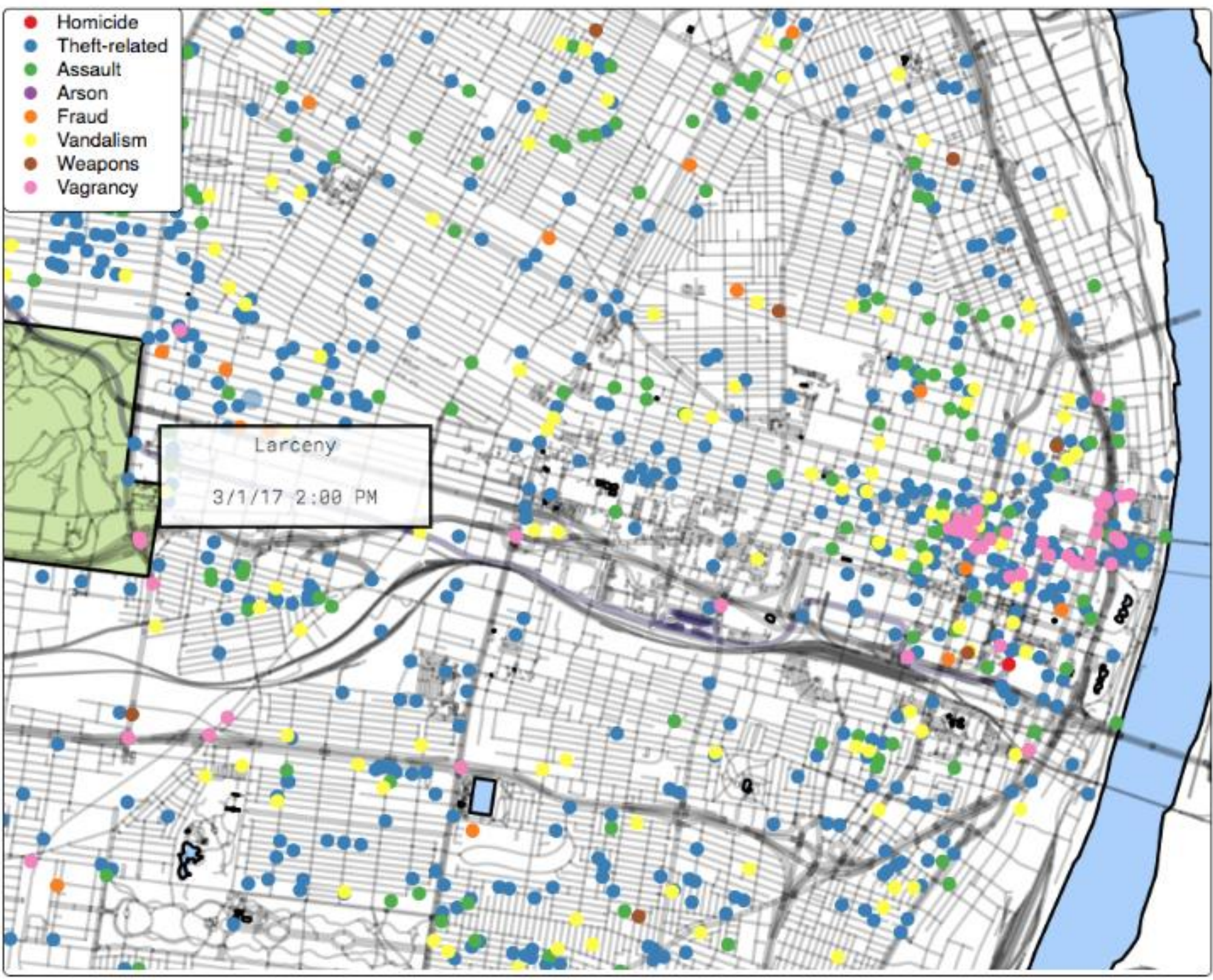
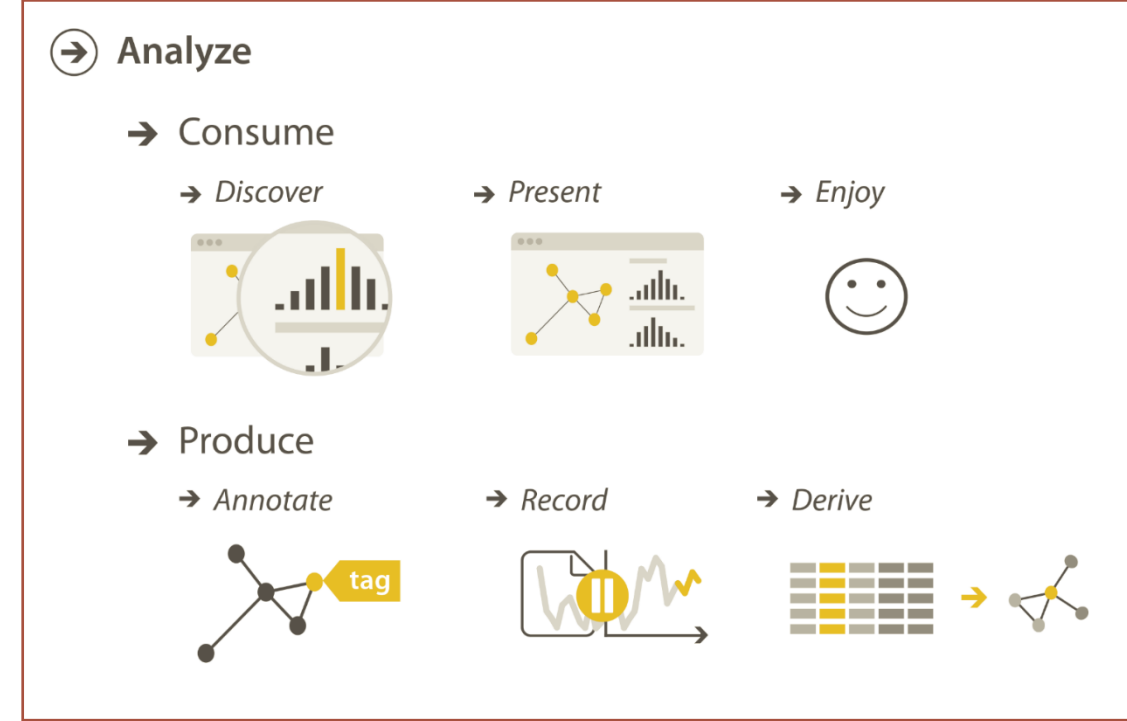


Figure 4: The interface used in our experiment. Participants used their mouse to pan and zoom the map. A tooltip displayed information about the crimes on click.

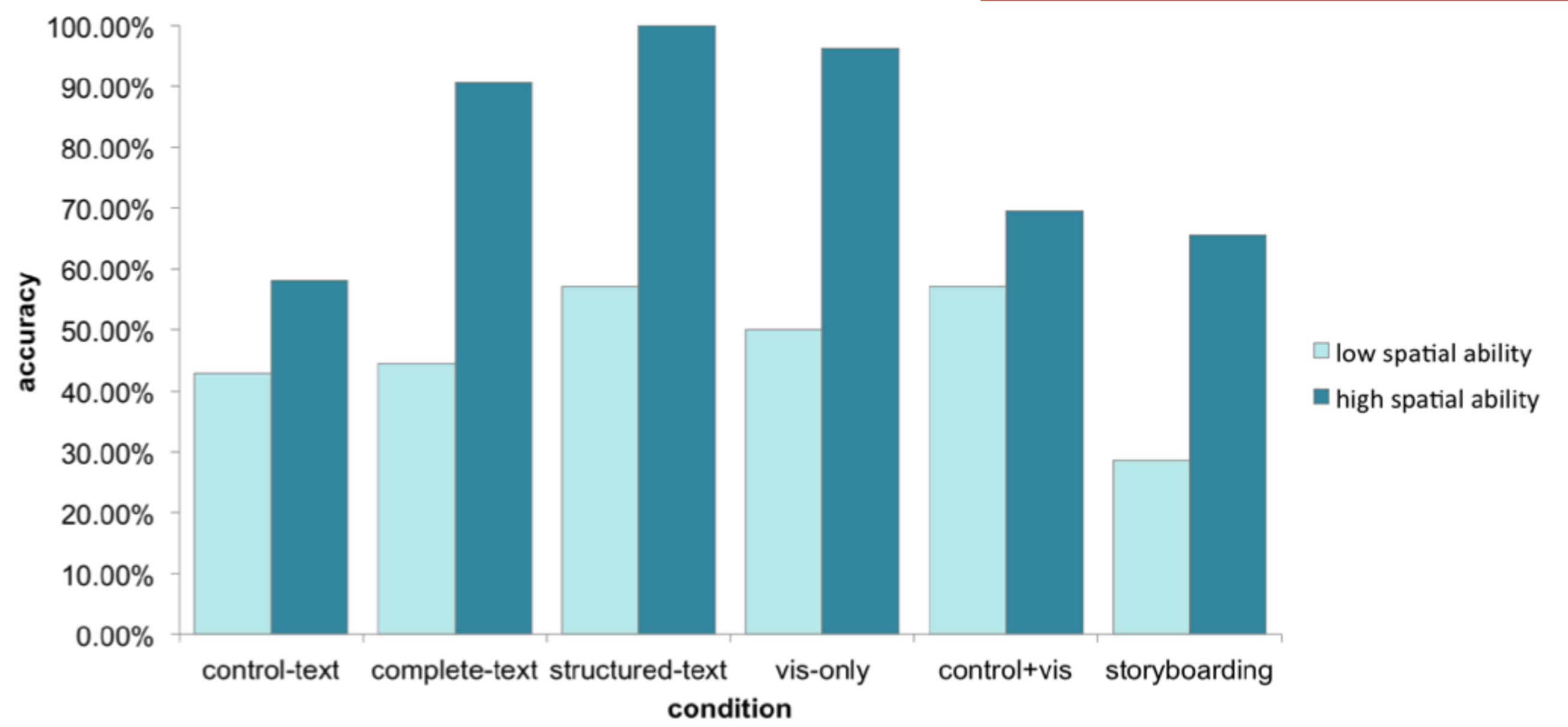
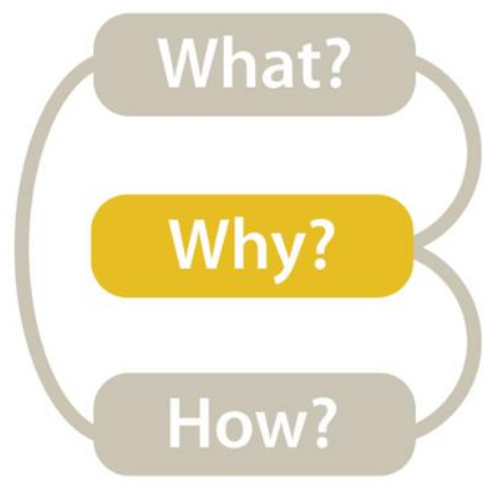
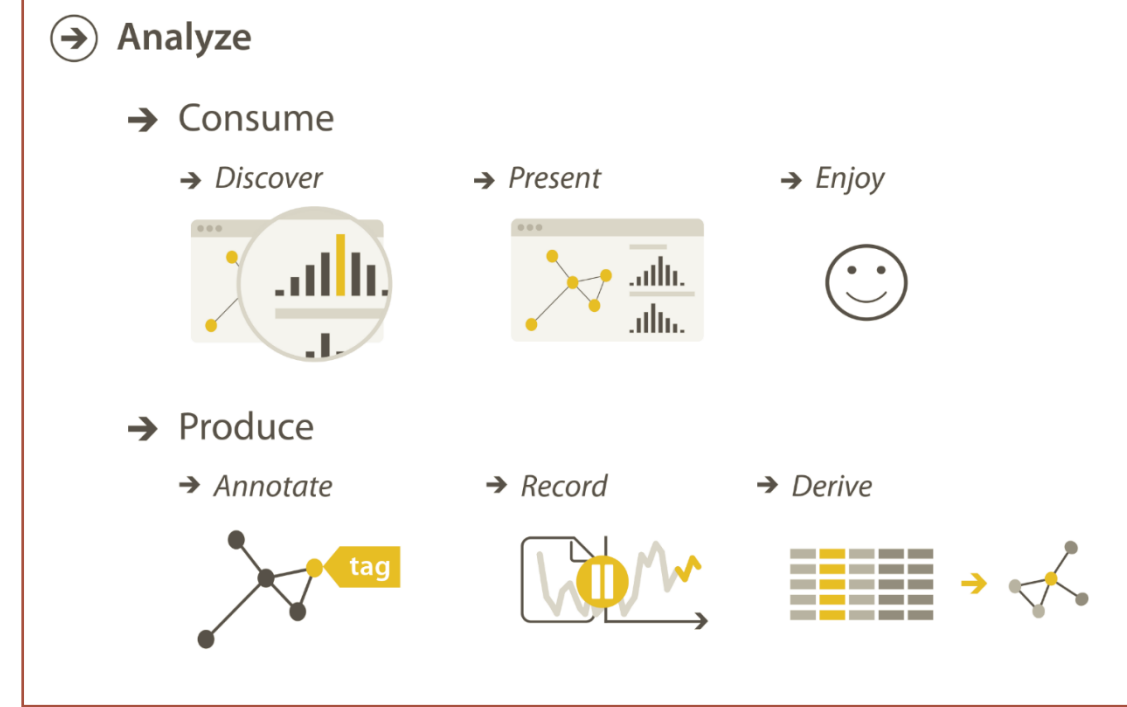


Fig. 3. Average accuracy for the low and high spatial ability groups for each design. Overall, we found that high spatial users were much more likely to correctly answer the question prompts.



# High-level → Consume → Present

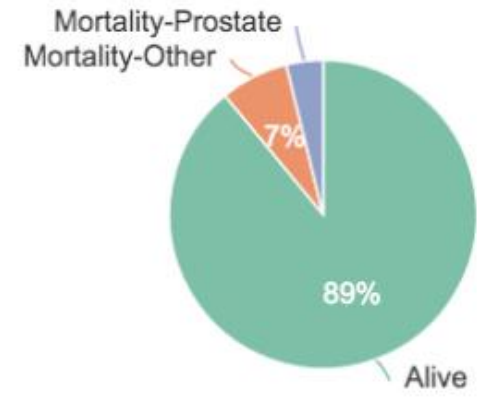


## How big of a threat is my prostate cancer?

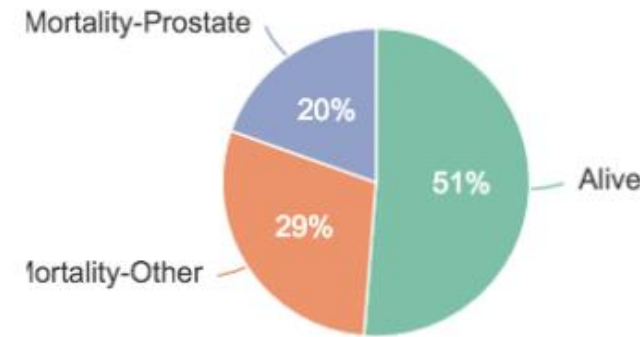
Before thinking about the benefits of specific treatments, it's helpful to first think about how big of threat your prostate cancer is to your future survival. The pie chart below shows the following:

- Your chances of being **alive** (in GREEN)
- Your chances of dying from your **prostate cancer** (in PURPLE)
- Your chances of dying from **other causes** (in ORANGE)

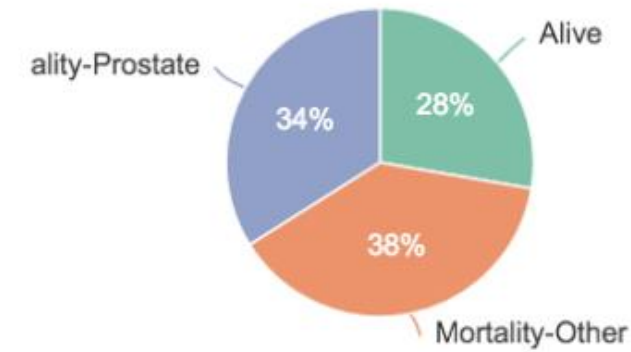
1 Year (70 years old)



5 years (74 years old)



10 Years (79 years old)



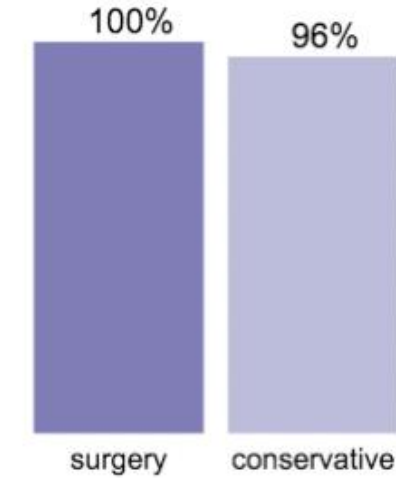
## How effective are different treatments for my prostate cancer?

The expected benefits from **surgery** and **conservative management** are listed below.

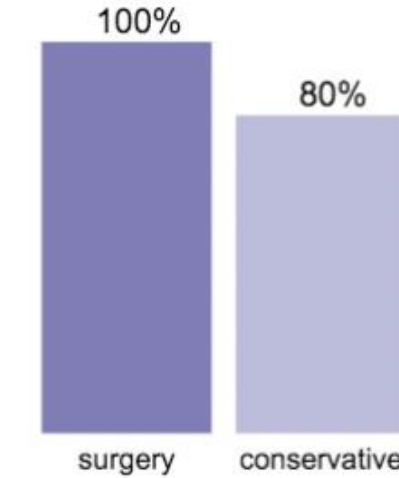
These results show your estimated chances of either surviving or dying **from your prostate cancer** at 1, 5, and 10 years, depending on whether you choose either surgery (**DARK PURPLE BAR**) or conservative treatment (**LIGHT PURPLE BAR**).

You can view these risks in terms of either survival or mortality.

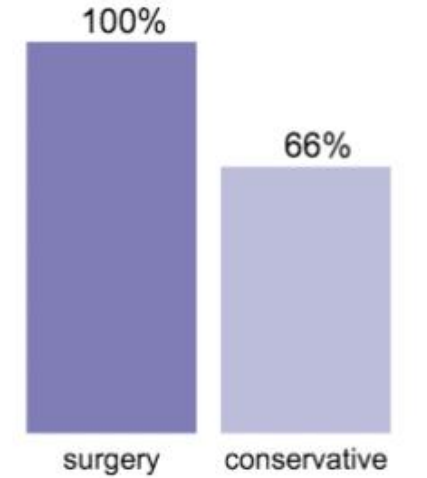
Surviving your Prostate Cancer after 1 year (70 years old)

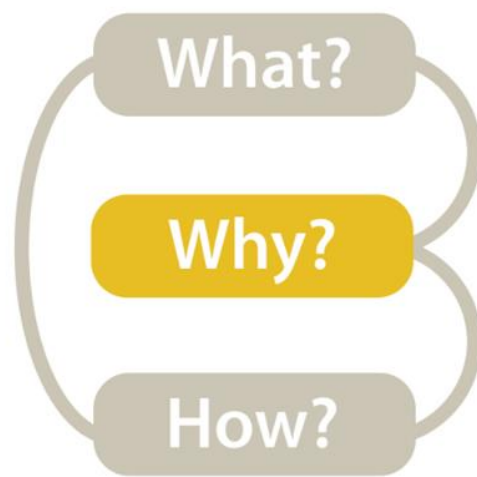


Surviving your Prostate Cancer after 5 year (74 years old)



Surviving your Prostate Cancer after 10 year (79 years old)





# High-level → Consume → Enjoy

NameVoyager: Explore baby names and name trends letter by letter

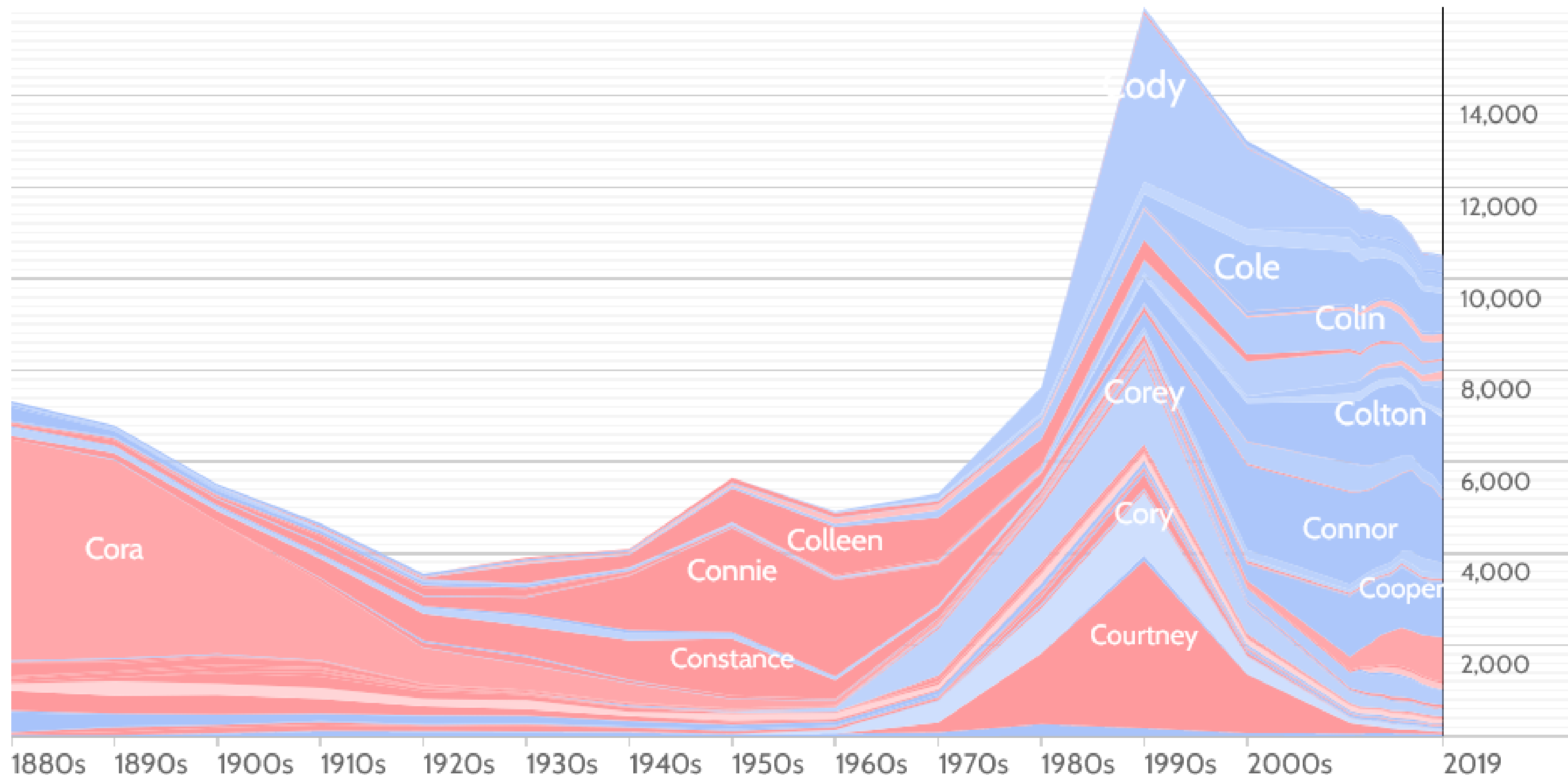
Baby Name >   Both  Boys  Girls

boys	1000	500	100	25	1
girls	1000	500	100	25	1

Current rank:

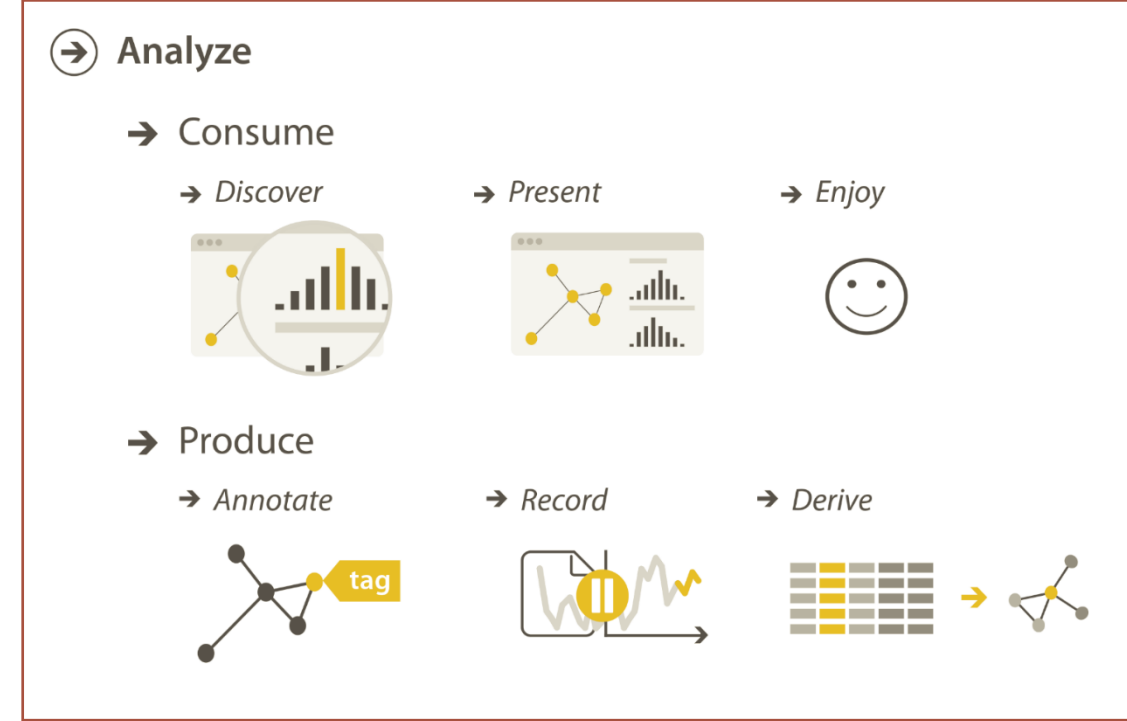
Names starting with 'CO' per million babies

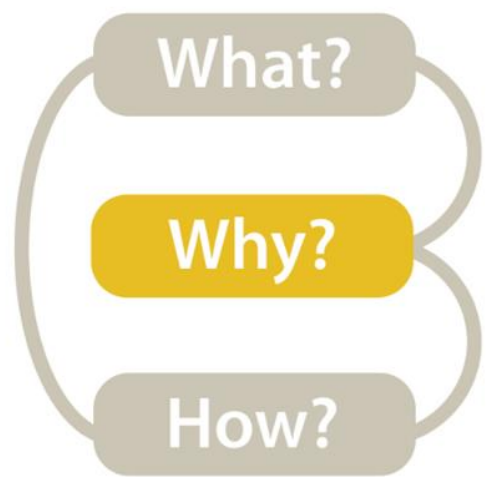
per million births



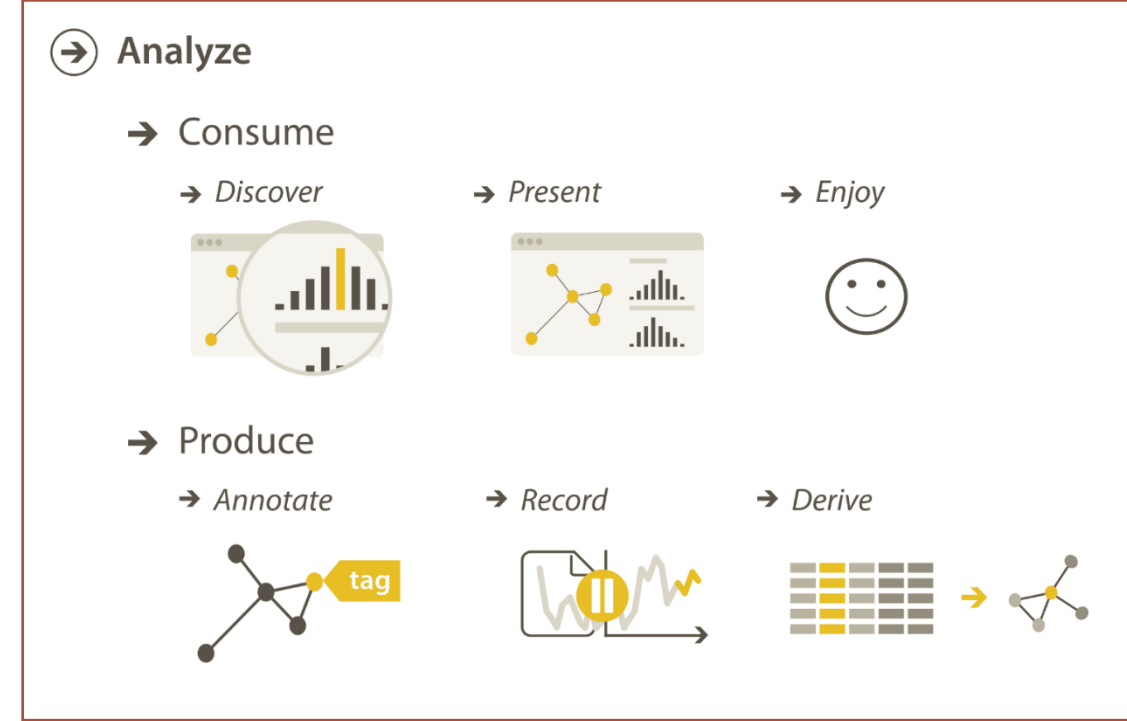
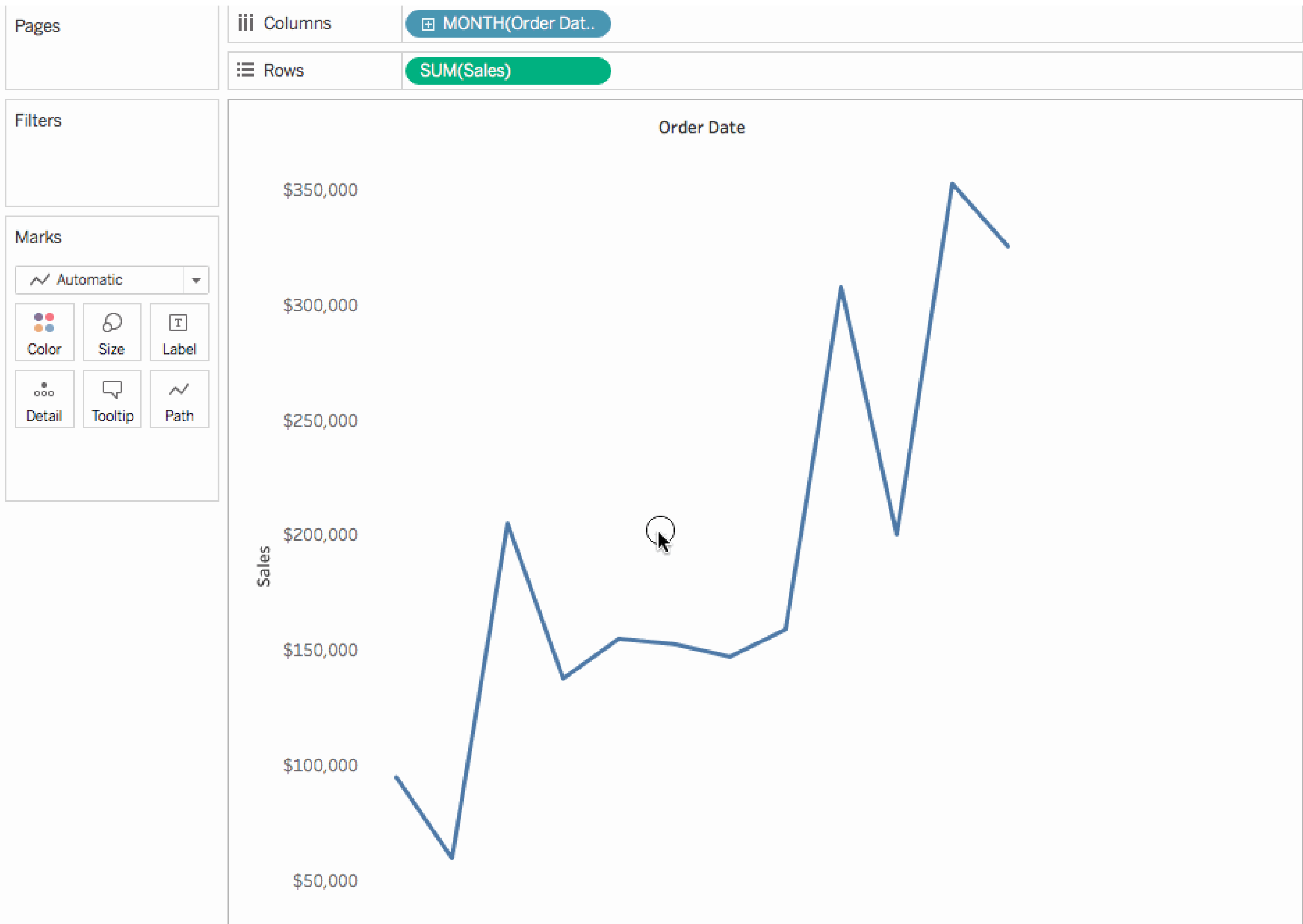
Click a name graph to view that name. Double-click to read more about it.

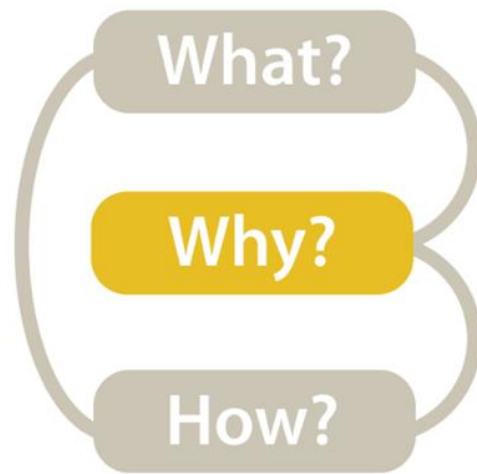
[enlarge](#)



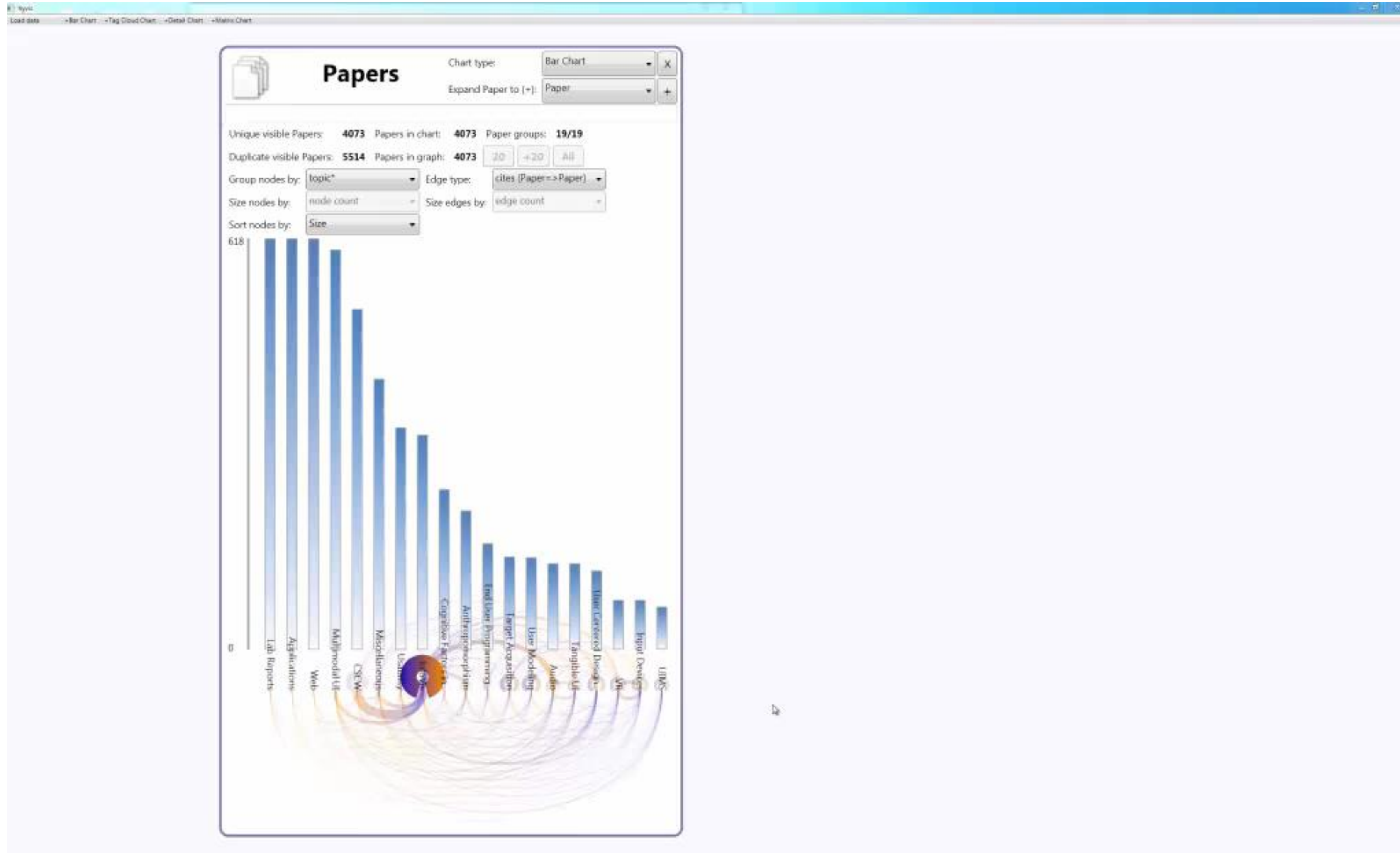
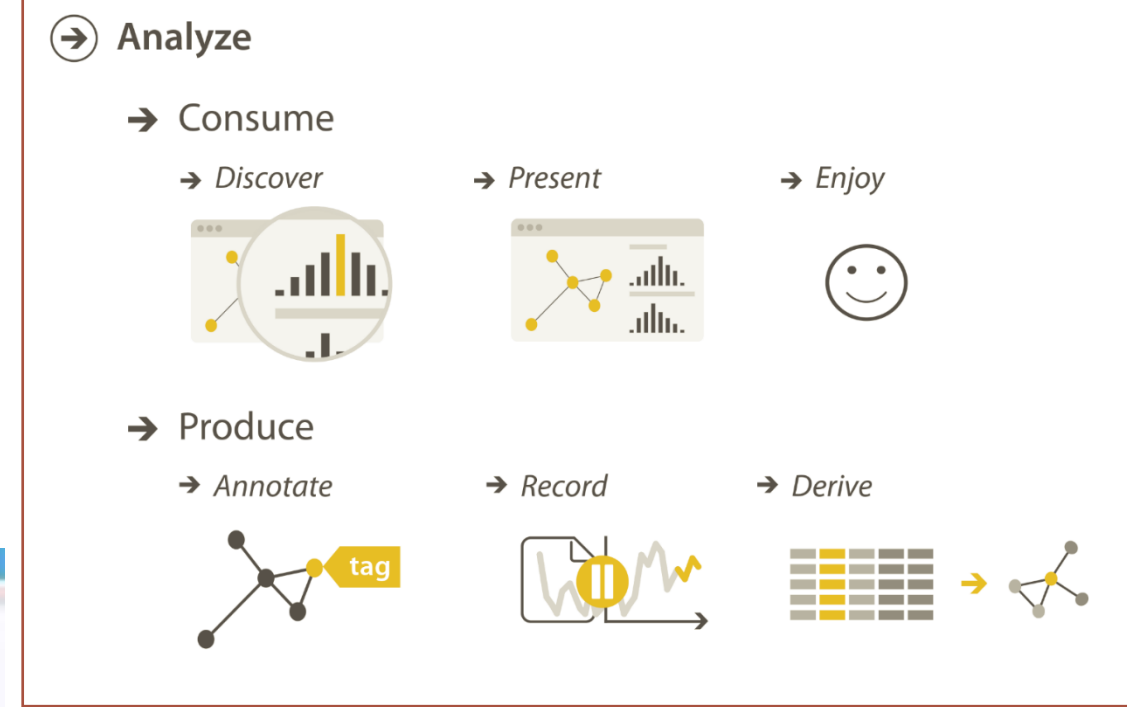


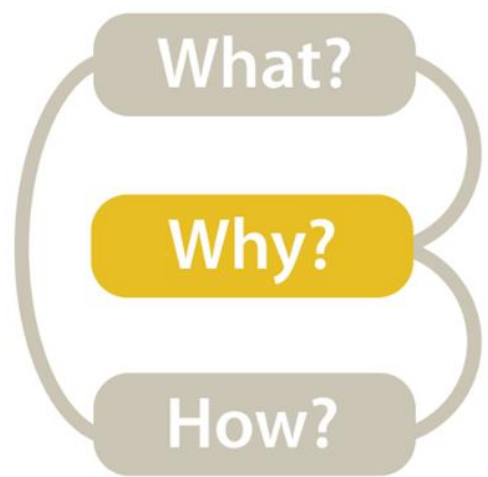
# High-level → Produce → Annotate



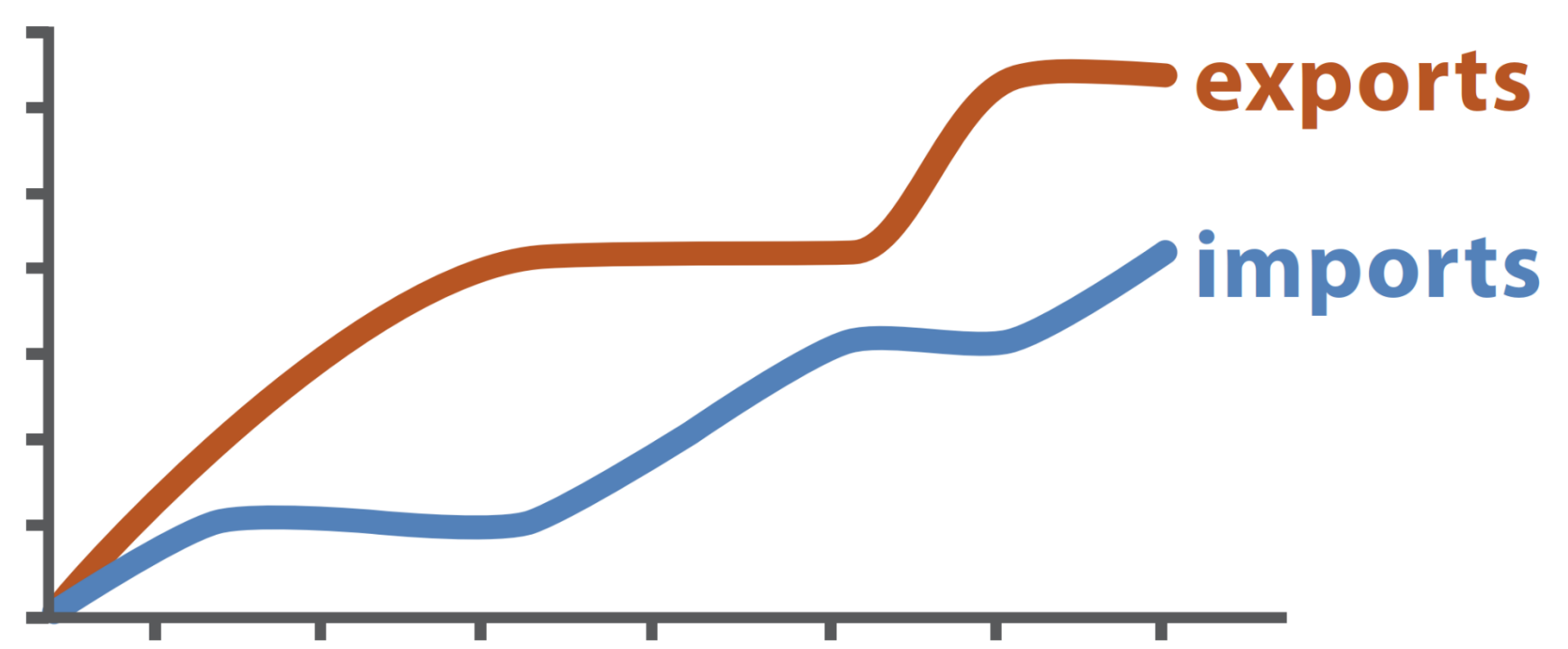
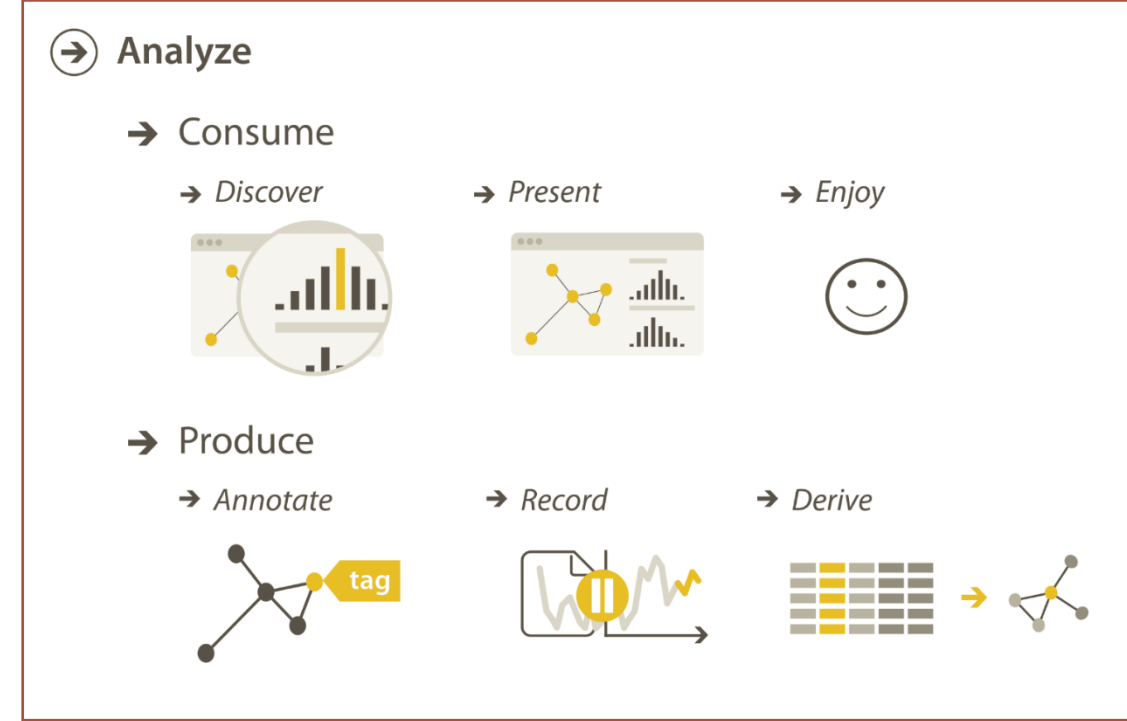


# High-level → Produce → Record

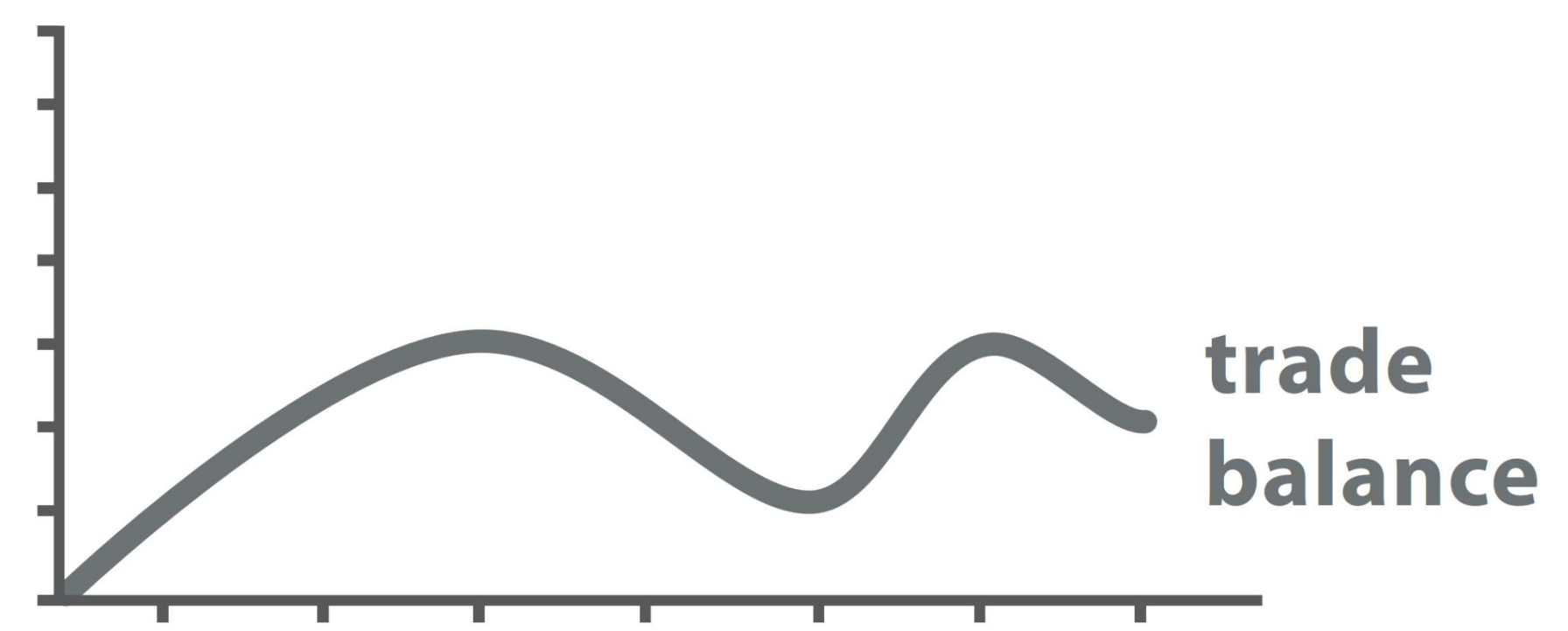




*High-level → Produce → Derive*



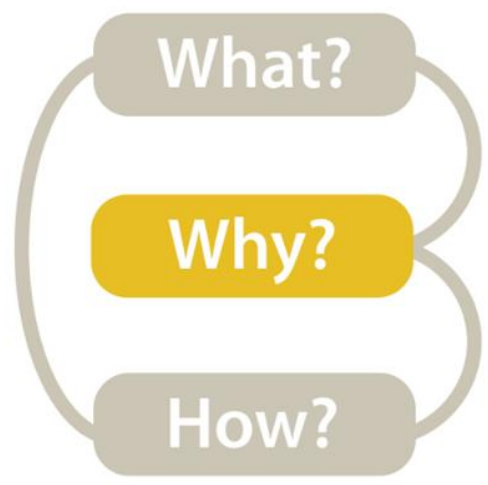
Original Data



*trade balance = exports – imports*

Derived Data





# High-level → How is the vis being used to analyze?

## → Analyze

→ Consume

→ Discover



→ Present



→ Enjoy



→ Produce

→ Annotate

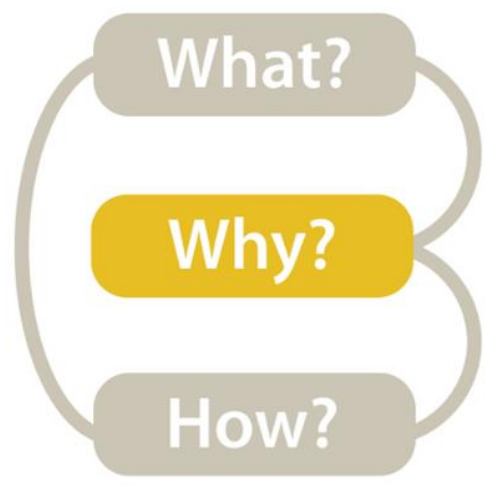


→ Record



→ Derive





# Mid-level → What type of search is required for the high-level action?

## → Analyze

### → Consume

#### → Discover



#### → Present



#### → Enjoy

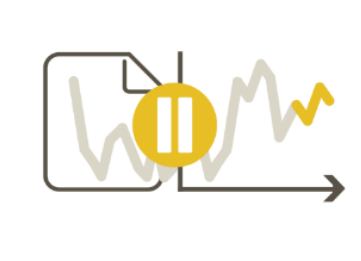


### → Produce

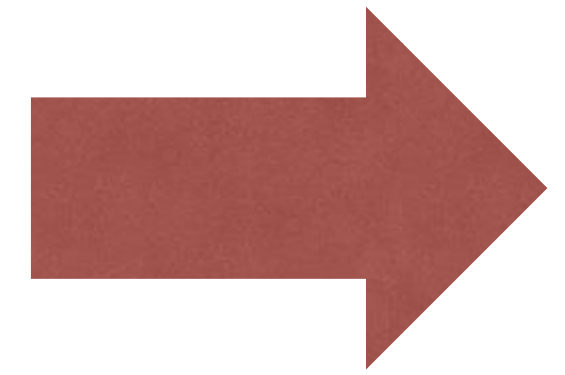
#### → Annotate



#### → Record



#### → Derive



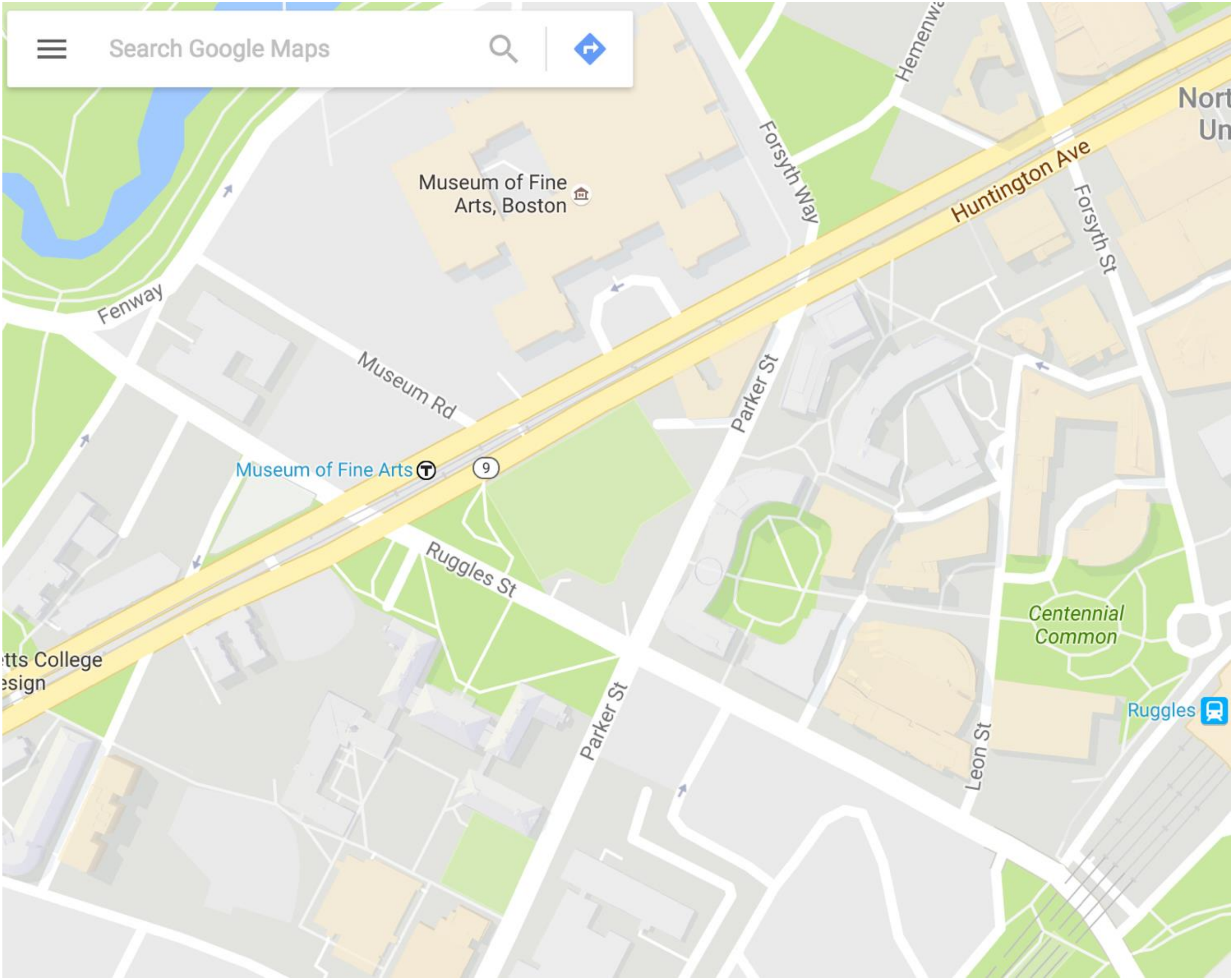
## → Search





	Target known	Target unknown
Location known	<i>Lookup</i>	<i>Browse</i>
Location unknown	<i>Locate</i>	<i>Explore</i>

- What?
- Why?
- How?

# Mid-level/Search

➔ Search

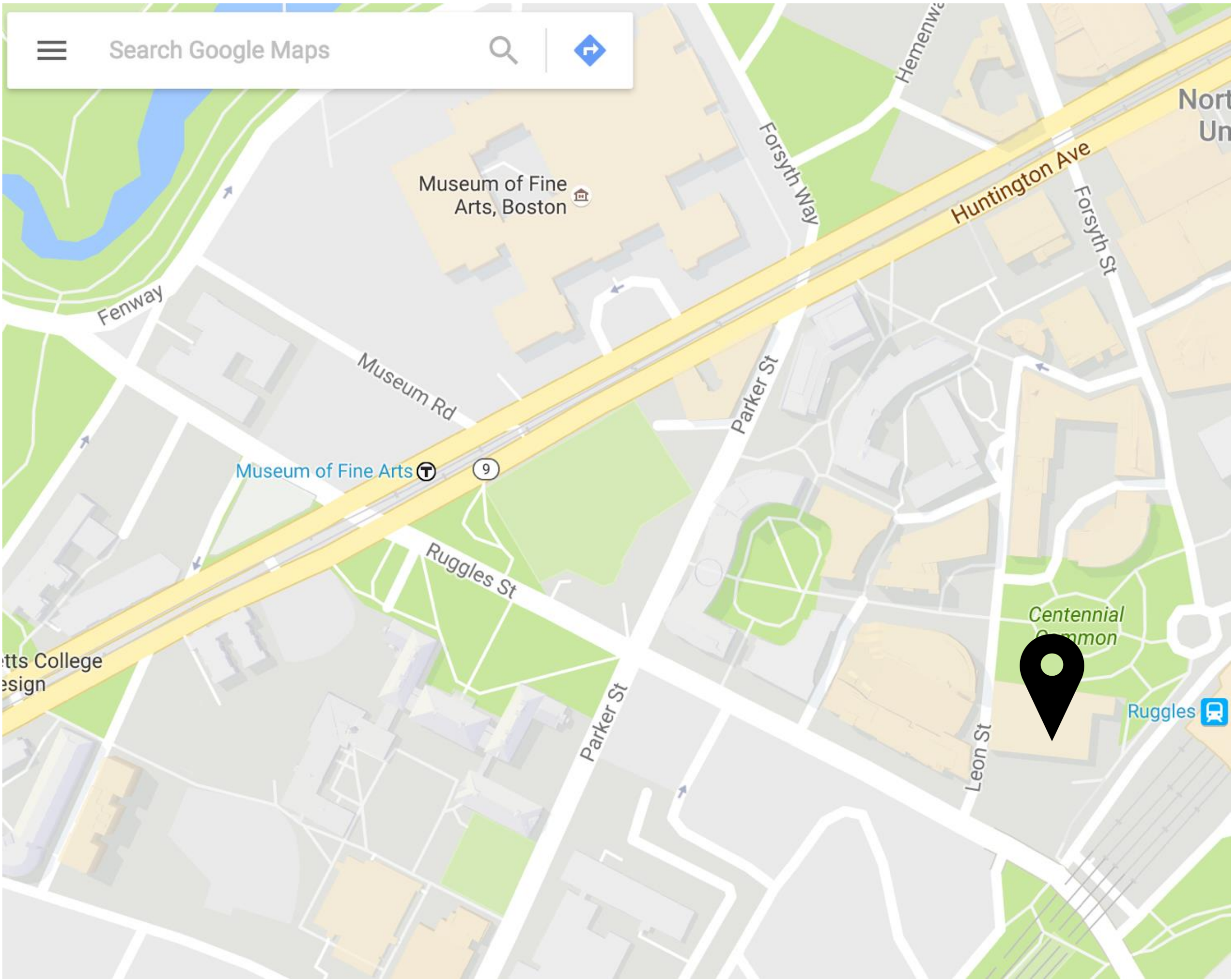






	Target known	Target unknown
Location known	 <i>Lookup</i>	 <i>Browse</i>
Location unknown	 <i>Locate</i>	 <i>Explore</i>

- What?
- Why?
- How?

# Mid-level/Search → Lookup

➔ Search



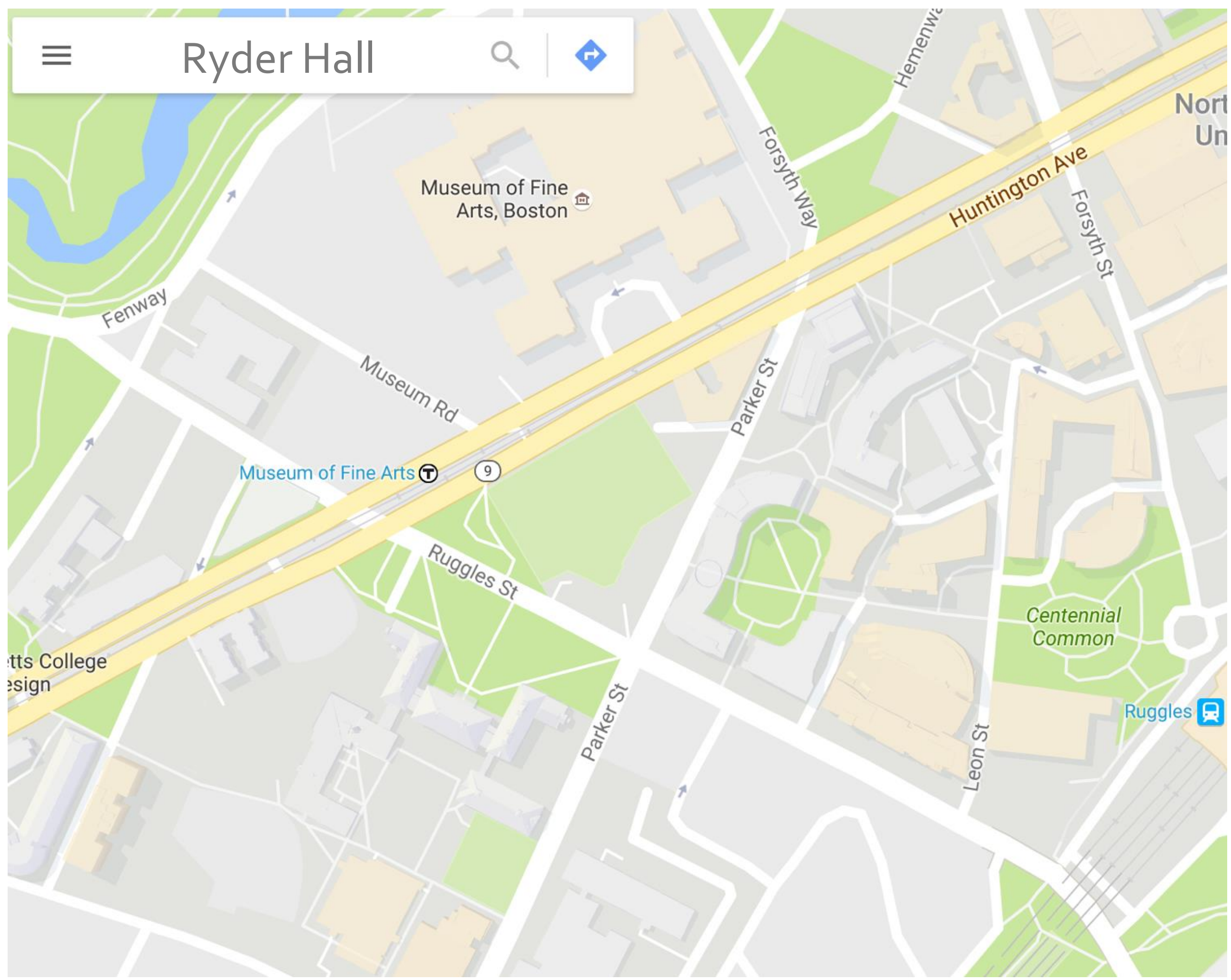
	Target known	Target unknown
Location known	 <i>Lookup</i>	 <i>Browse</i>
Location unknown	 <i>Locate</i>	 <i>Explore</i>

What is the address of Ryder hall?

- What?
- Why?
- How?

# Mid-level/Search → Locate

➔ Search



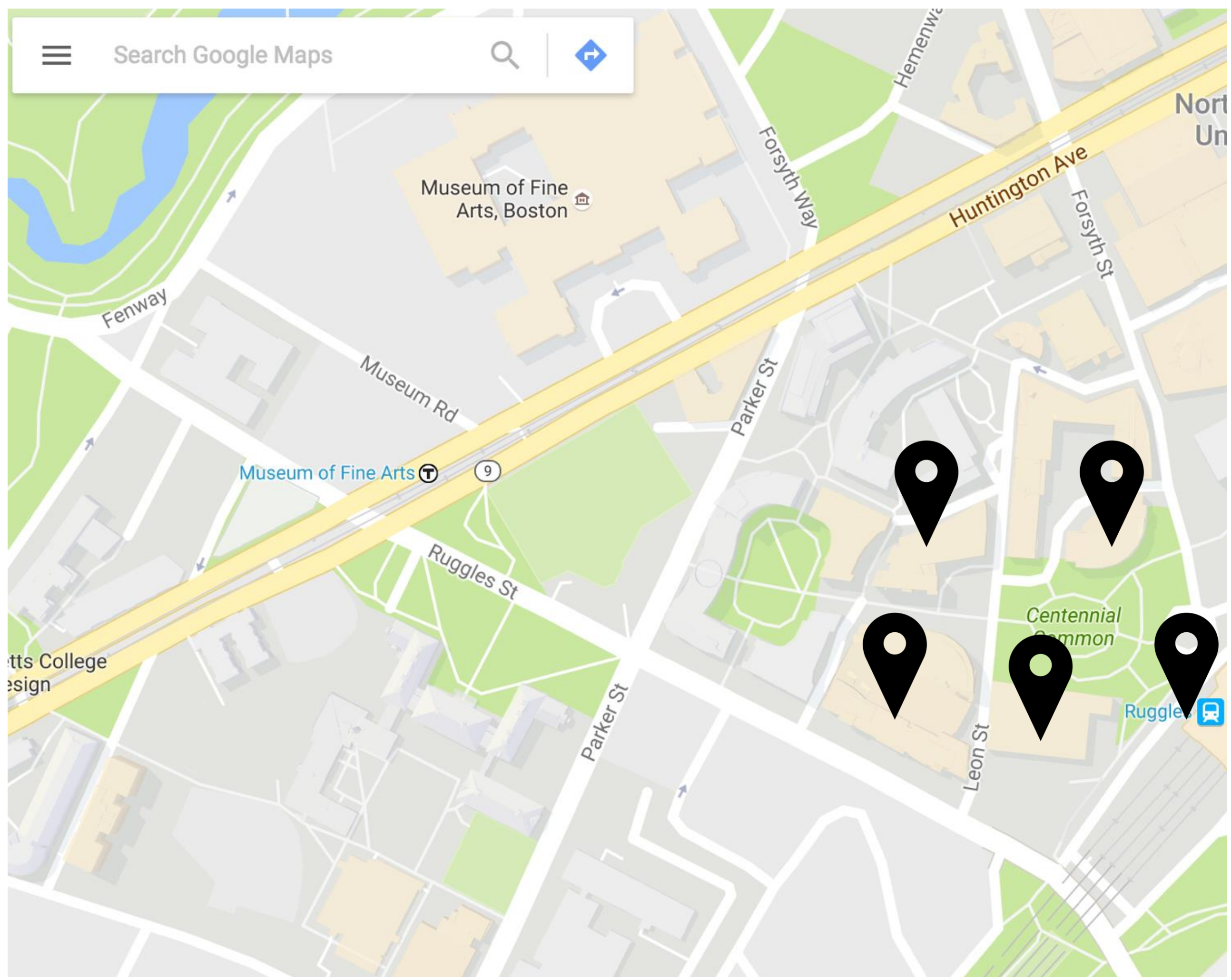
	Target known	Target unknown
Location known	Lookup	Browse
Location unknown	Locate	Explore

Where is Ryder Hall?

- What?
- Why?
- How?

# Mid-level/Search → Browse

→ Search



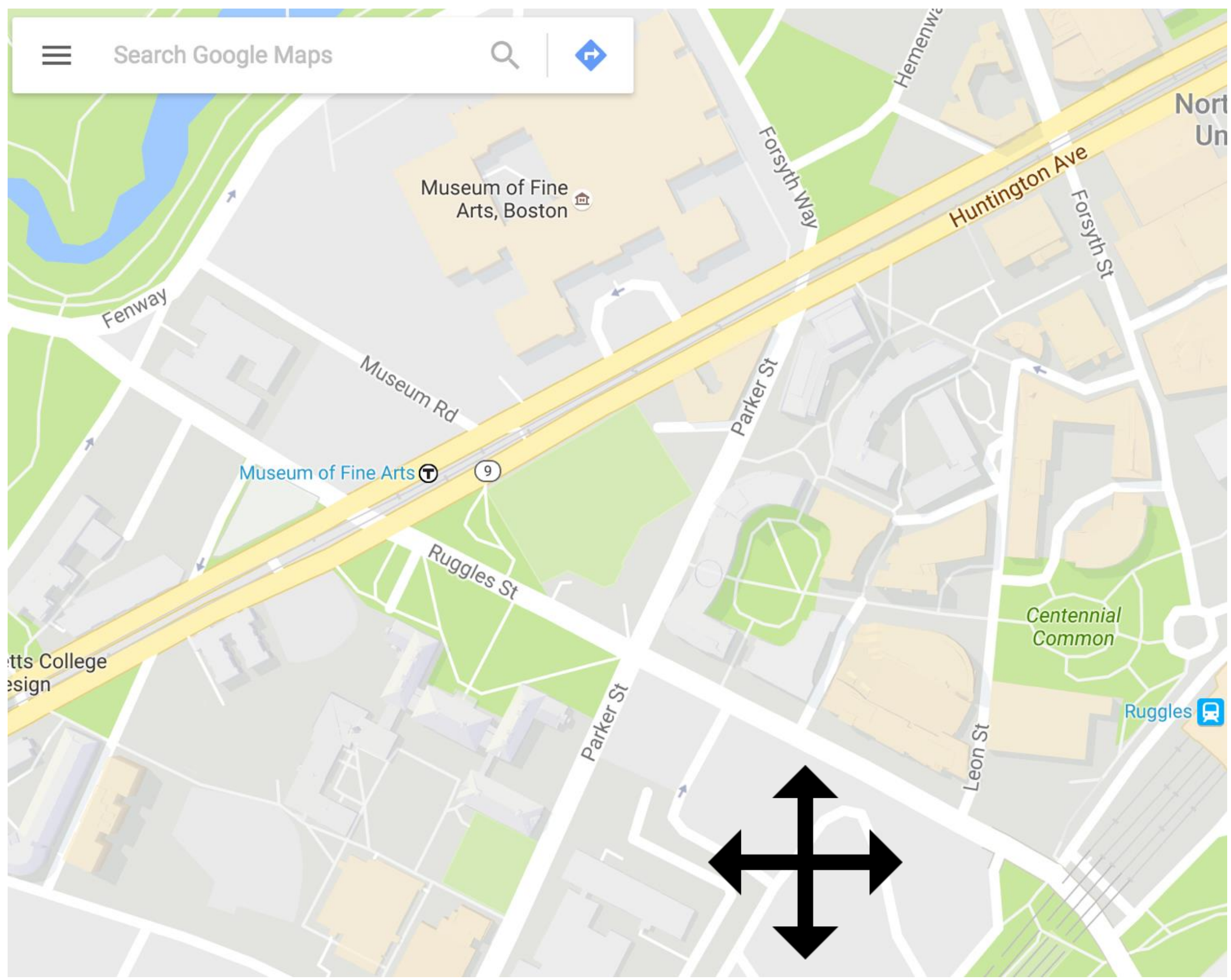
	Target known	Target unknown
Location known	<i>Lookup</i>	<i>Browse</i>
Location unknown	<i>Locate</i>	<i>Explore</i>

What buildings are near Ryder Hall?

- What?
- Why?
- How?

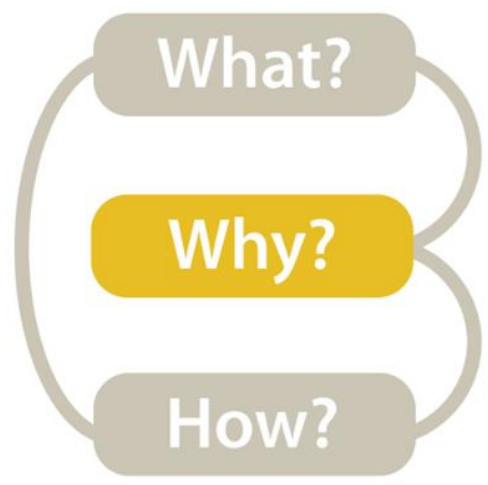
# Mid-level/Search → Explore

➔ Search



	Target known	Target unknown
Location known	<i>Lookup</i>	<i>Browse</i>
Location unknown	<i>Locate</i>	<i>Explore</i>

Where can I study?



*Mid-level → What type of search is required for the high-level action?*

→ Analyze

→ Consume

→ Discover



→ Present

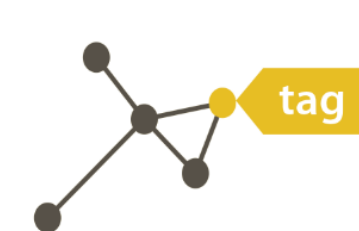


→ Enjoy

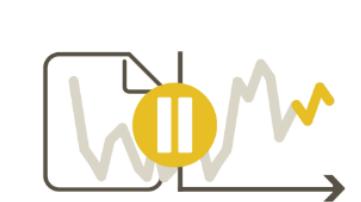


→ Produce

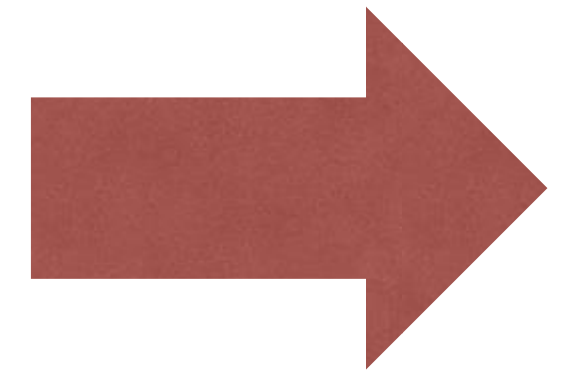
→ Annotate



→ Record



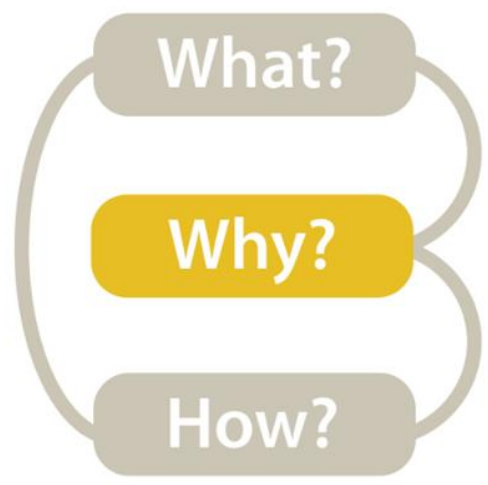
→ Derive



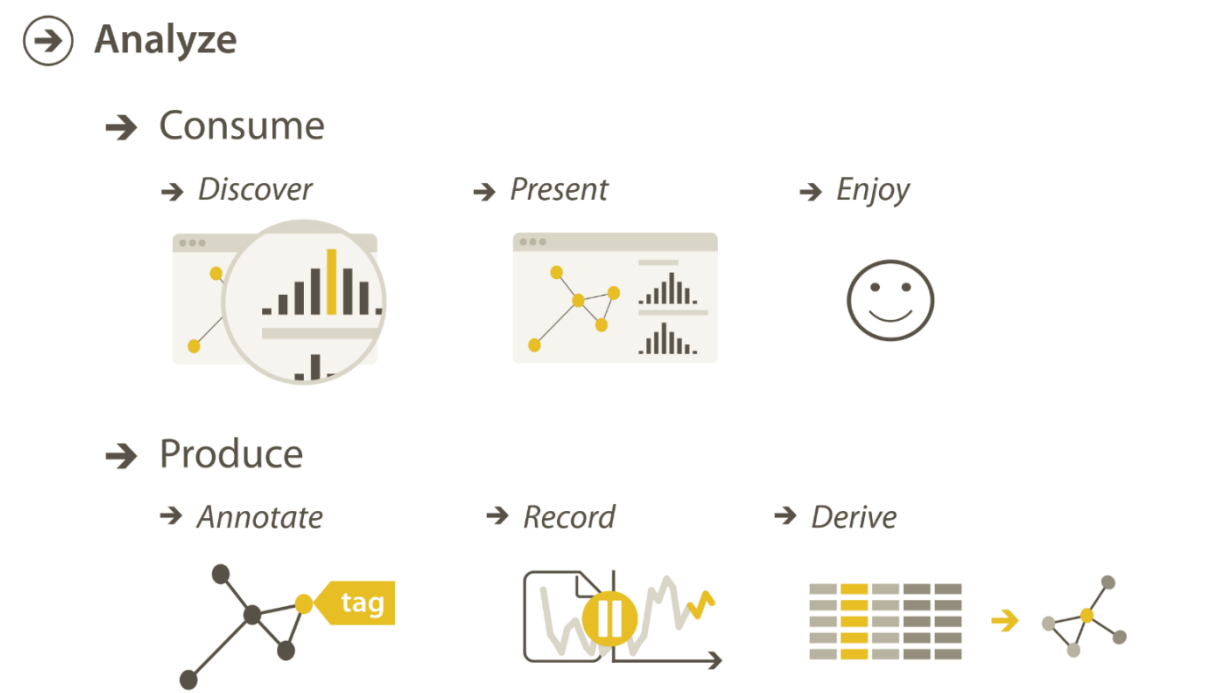
→ Search

	Target known	Target unknown
Location known	<i>Lookup</i>	<i>Browse</i>
Location unknown	<i>Locate</i>	<i>Explore</i>



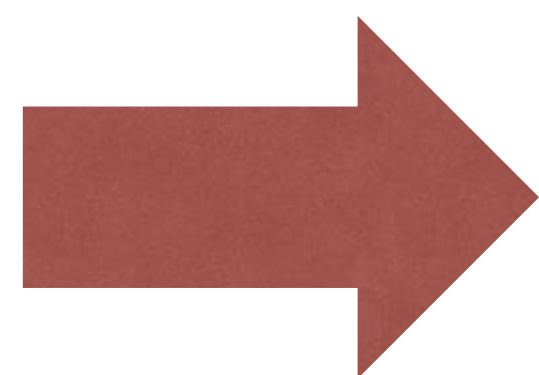


# Low-level/Query → What is the query the vis. needs to support?



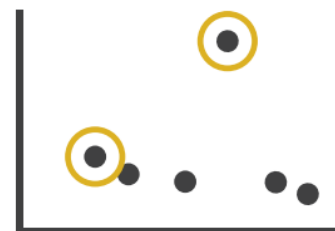
→ Search

	Target known	Target unknown
Location known	Lookup	Browse
Location unknown	Locate	Explore

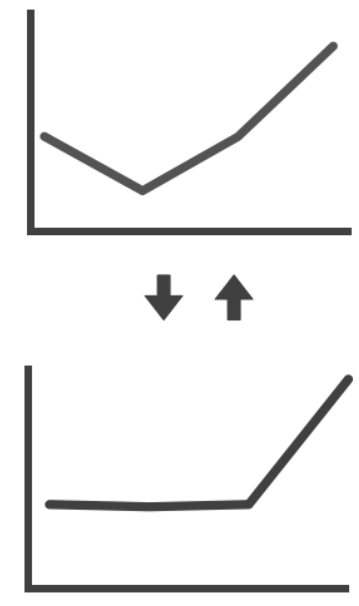


## → Query

### → Identify

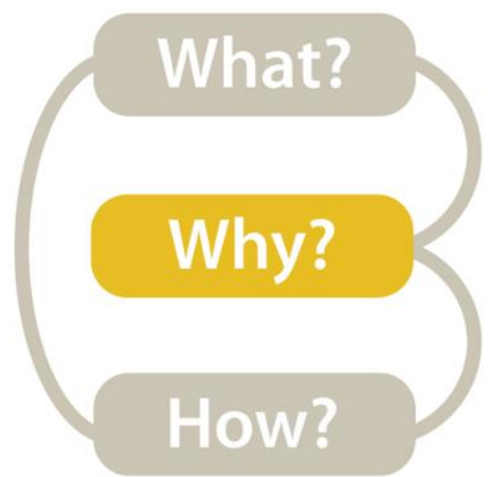


### → Compare

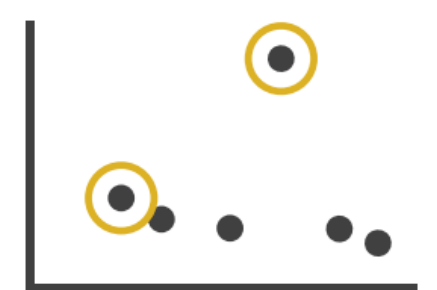
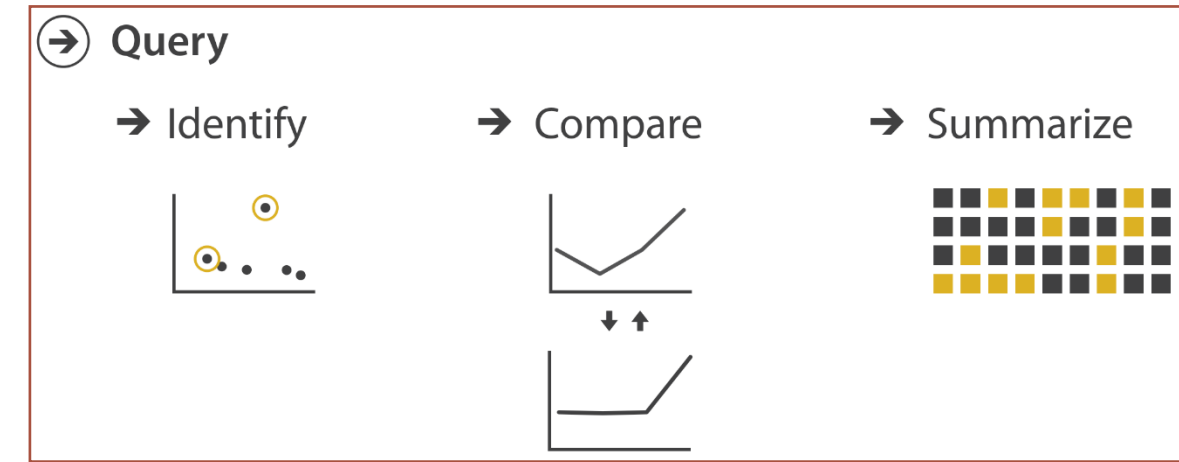


### → Summarize

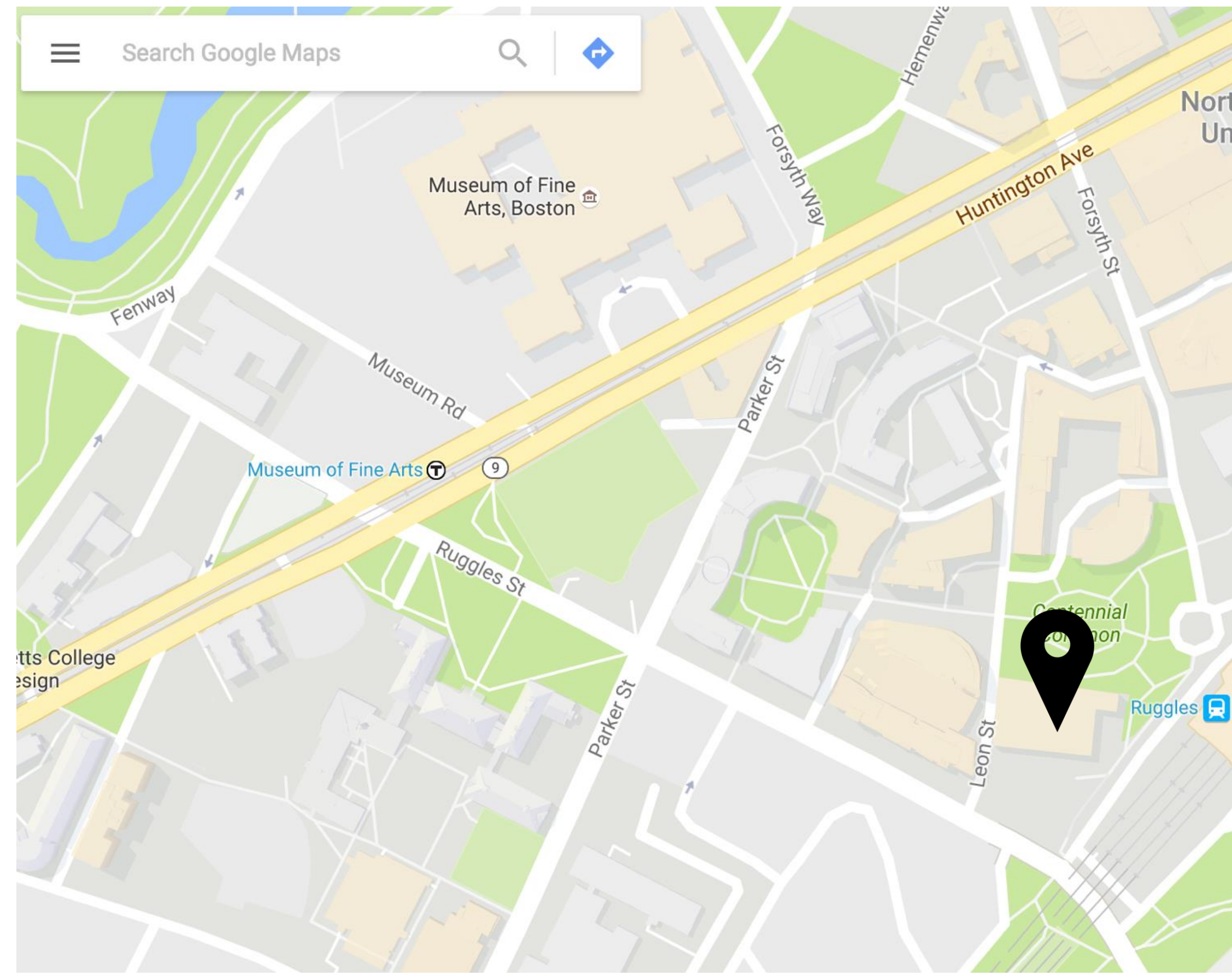


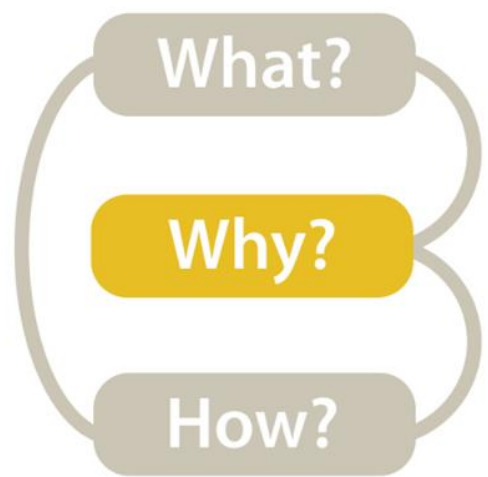


# Low-level → Identify

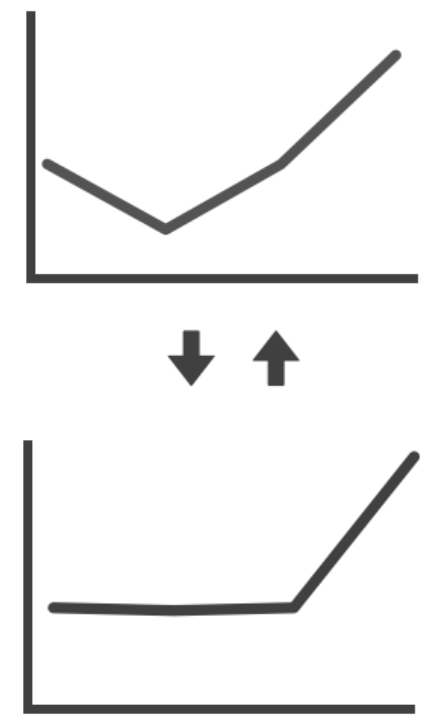
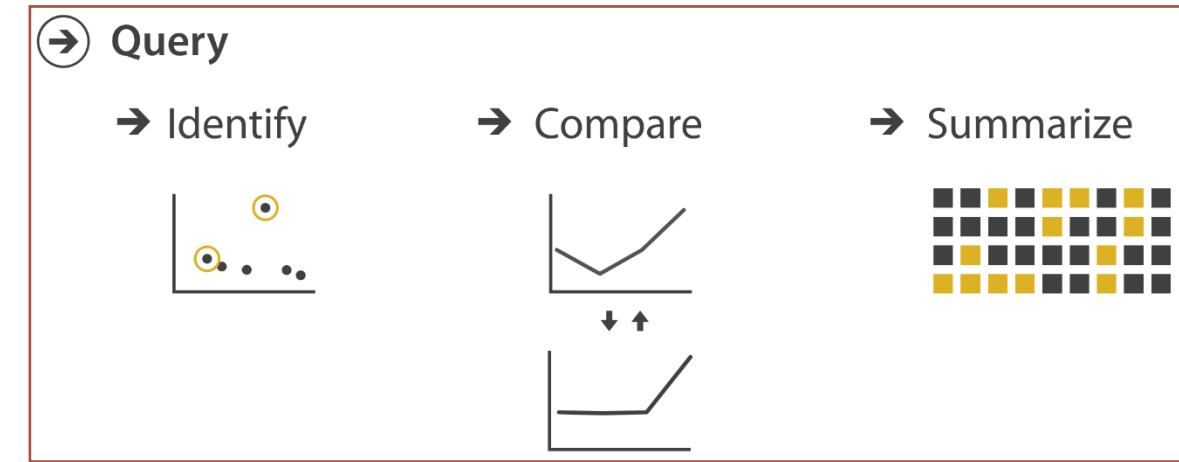


single target





*Low-level → Compare*



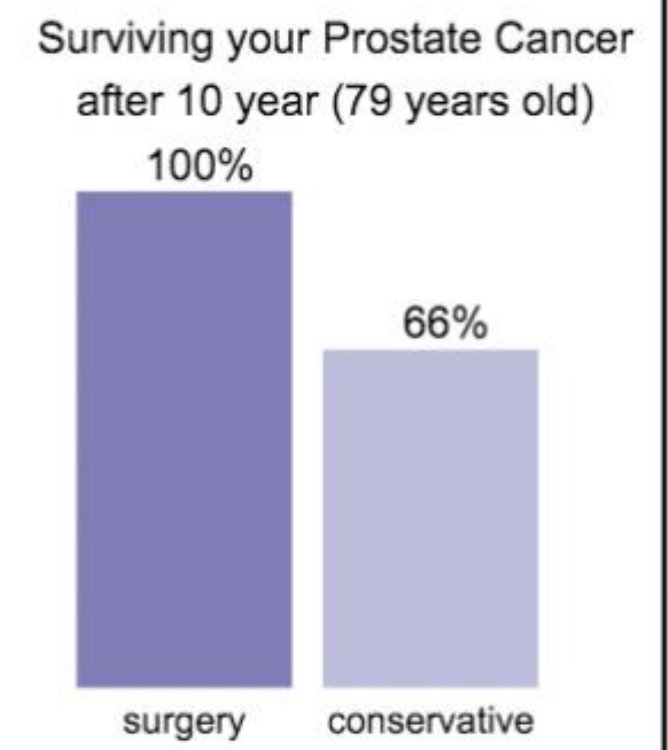
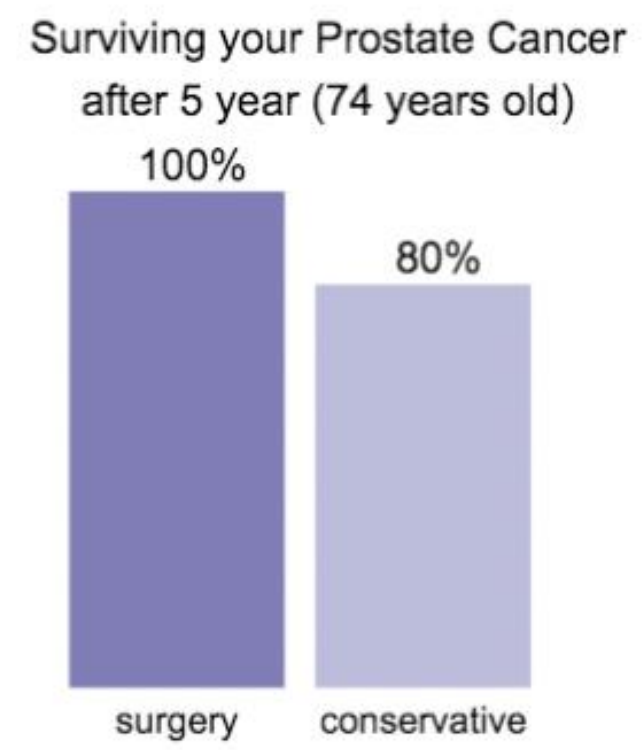
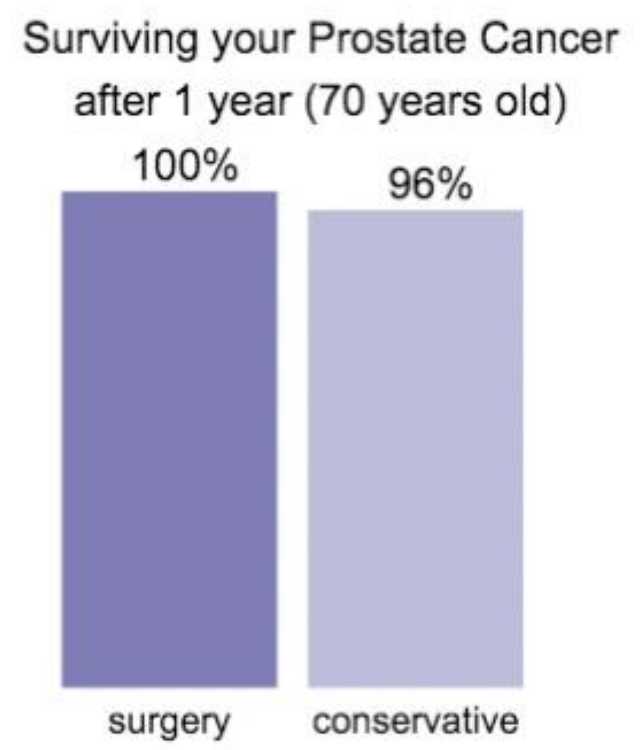
*multiple targets*

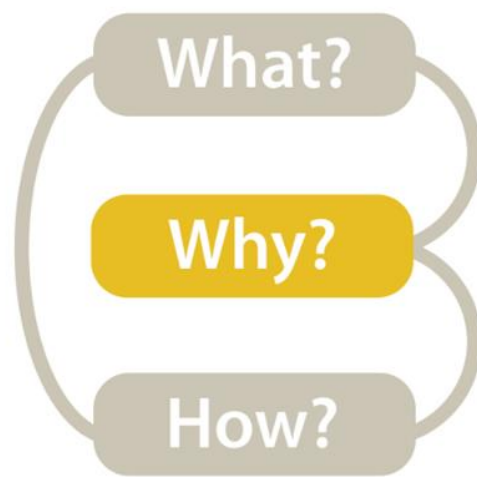
### How effective are different treatments for my prostate cancer?

The expected benefits from **surgery** and **conservative management** are listed below.

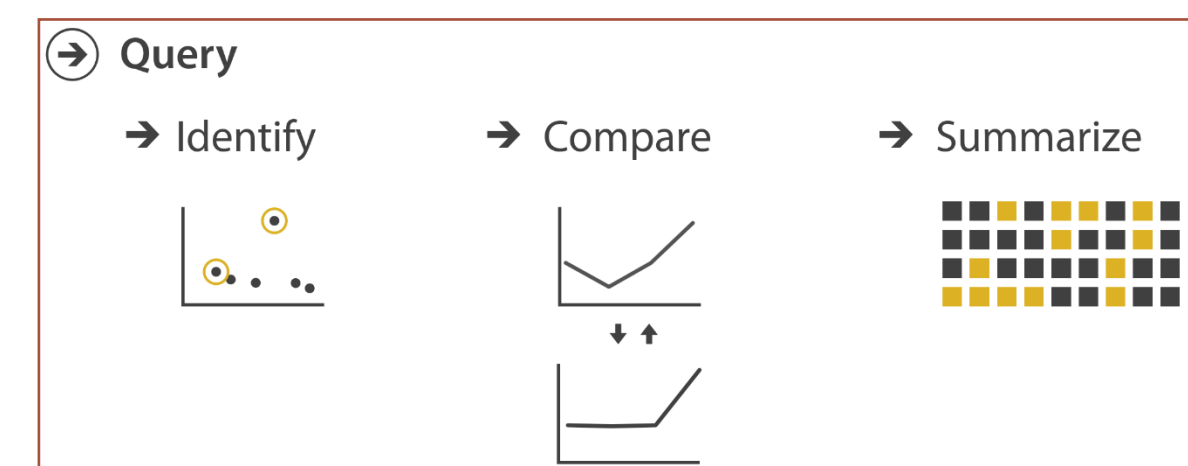
These results show your estimated chances of either surviving or dying **from your prostate cancer** at 1, 5, and 10 years, depending on whether you choose either surgery (**DARK PURPLE BAR**) or conservative treatment (**LIGHT PURPLE BAR**).

You can view these risks in terms of either survival or mortality.





# Low-level → Summarize



*all targets*



Figure 4: The interface used in our experiment. Participants used their mouse to pan and zoom the map. A tooltip displayed information about the crimes on click.

# TASK ABSTRACTION

**TARGETS** are aspects of the data interest that are interest to the user.

## Why?

### Actions

### Targets

→ **Analyze**

- Consume
  - Discover
  - Present
  - Enjoy
- Produce
  - Annotate
  - Record
  - Derive

→ **Search**

	Target known	Target unknown
Location known	Lookup	Browse
Location unknown	Locate	Explore

→ **Query**

- Identify
- Compare
- Summarize

→ **All Data**

- Trends
- Outliers
- Features

→ **Attributes**

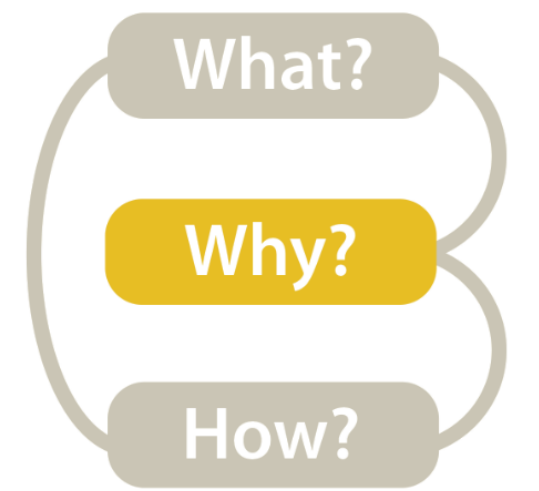
- One
  - Distribution
  - Extremes
- Many
  - Dependency
  - Correlation
  - Similarity

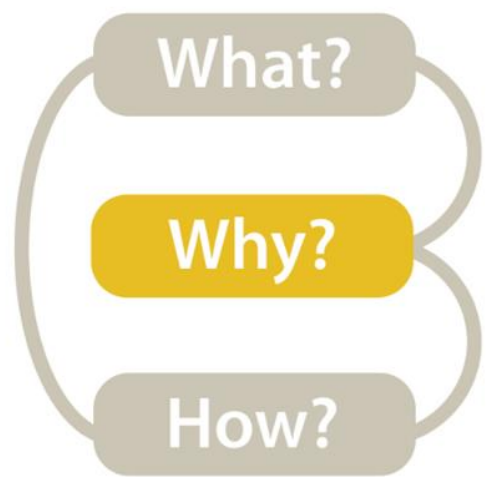
→ **Network Data**

- Topology
- Paths

→ **Spatial Data**

- Shape





# Targets

## → All Data

→ Trends



→ Outliers



→ Features



## → Attributes

→ One

→ *Distribution*



→ *Extremes*

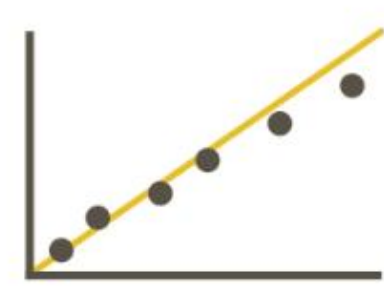


→ Many

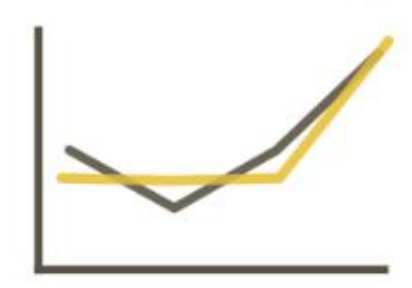
→ *Dependency*



→ *Correlation*

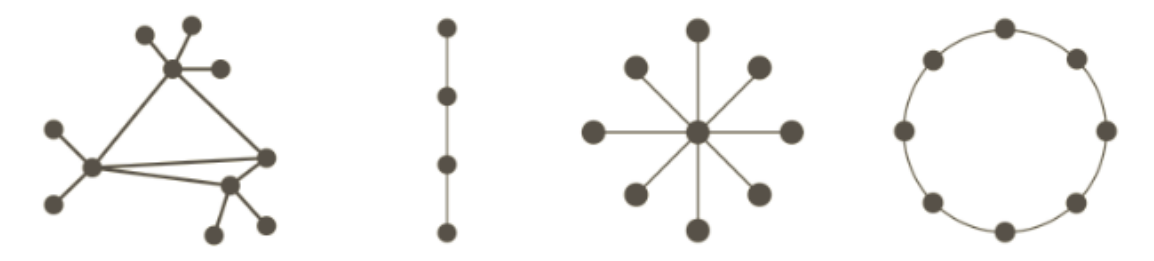


→ *Similarity*



## → Network Data

→ Topology

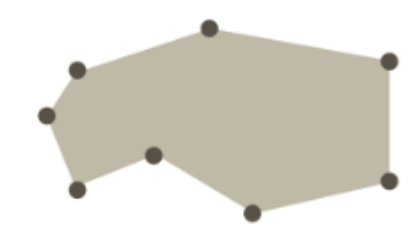


→ *Paths*



## → Spatial Data

→ Shape



# TASK ABSTRACTION

## Why?

### Actions

### Targets

#### → Analyze

→ Consume

→ Discover



→ Present



→ Enjoy



→ Produce

→ Annotate



→ Record



→ Derive

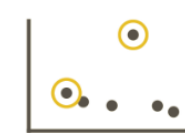


#### → Search

	Target known	Target unknown
Location known	Lookup	Browse
Location unknown	Locate	Explore

#### → Query

→ Identify



→ Compare



→ Summarize



#### → All Data

→ Trends



→ Outliers



→ Features



#### → Attributes

→ One

→ Distribution



→ Extremes

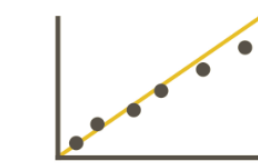


→ Many

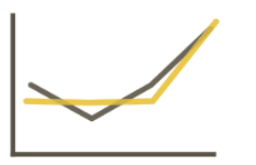
→ Dependency



→ Correlation



→ Similarity



#### → Network Data

→ Topology



→ Paths

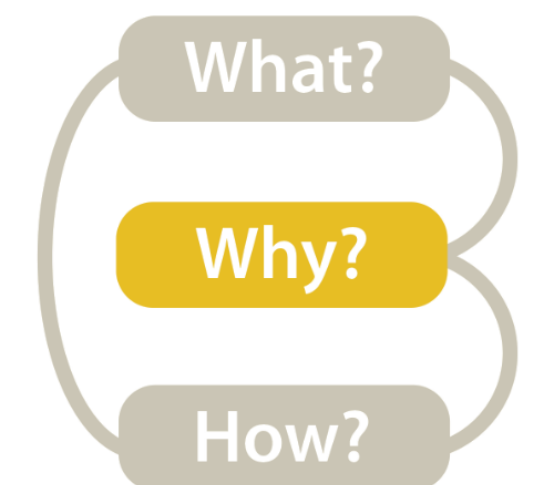


#### → Spatial Data

→ Shape



*Lots of other task taxonomies, esp. low-level...!*



# Analytic Task Taxonomy *Low-level*

**Retrieve Value** *How long is the movie Gone with the Wind?*

**Filter** *What comedies have won awards?*

**Compute Derived Value** *How many awards have MGM studio won in total?*

**Find Extremum** *What director/film has won the most awards?*

**Sort** *Rank movies by most number of awards.*

**Determine Range** *What is the range of film lengths?*

**Characterize Distribution** *What is the age distribution of actors?*

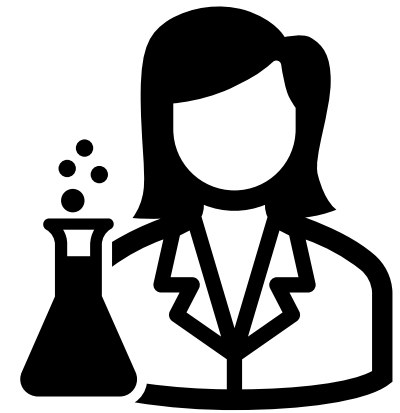
**Find Anomalies** *Are there exceptions to the relationship between number of awards won and total movies made by an actor?*

**Cluster** *Is there a cluster of typical film lengths?*

**Correlate** *Is there a trend of increasing film length over the years?*



# An example task analysis



I need a visualization for performing **cellular analysis!**

**High-level →  
Derive**

**Medium-level/Search →  
Lookup or Locate**



I need to **compare** measure A to B over time.

**Low-level/Query →  
Compare**

**Target(s) → All data → trends; Attributes → similarity**

# Analysis

What?

What data is shown?

DATA ABSTRACTION

Why?

Why is the user analyzing / viewing it?

TASK ABSTRACTION

How?

How is the data presented?

VISUAL ENCODING

What?

Why?

How?

# How?

## Encode

### ➔ Arrange

➔ Express



➔ Separate



➔ Order



➔ Align



➔ Use



### ➔ Map

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

➔ Color

➔ Hue



➔ Saturation



➔ Luminance



➔ Size, Angle, Curvature, ...



➔ Shape



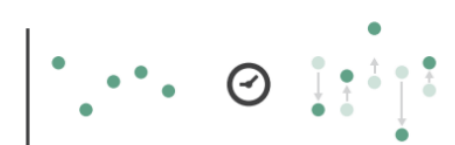
➔ Motion

Direction, Rate, Frequency, ...



## Manipulate

### ➔ Change



### ➔ Select



### ➔ Navigate

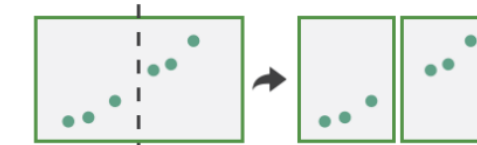


## Facet

### ➔ Juxtapose



### ➔ Partition



### ➔ Superimpose



## Reduce

### ➔ Filter



### ➔ Aggregate



### ➔ Embed



Now...

Later this semester...

# Arrange Tables

## ② Separate, Order, Align Regions

→ Separate



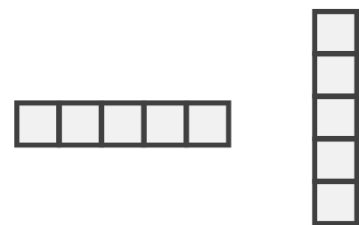
→ Order



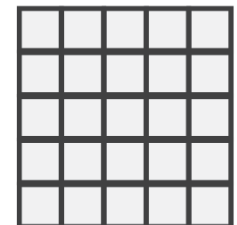
→ Align



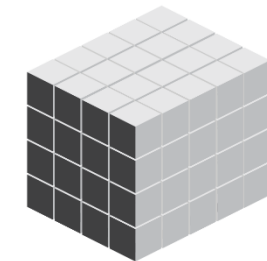
→ 1 Key  
*List*



→ 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*

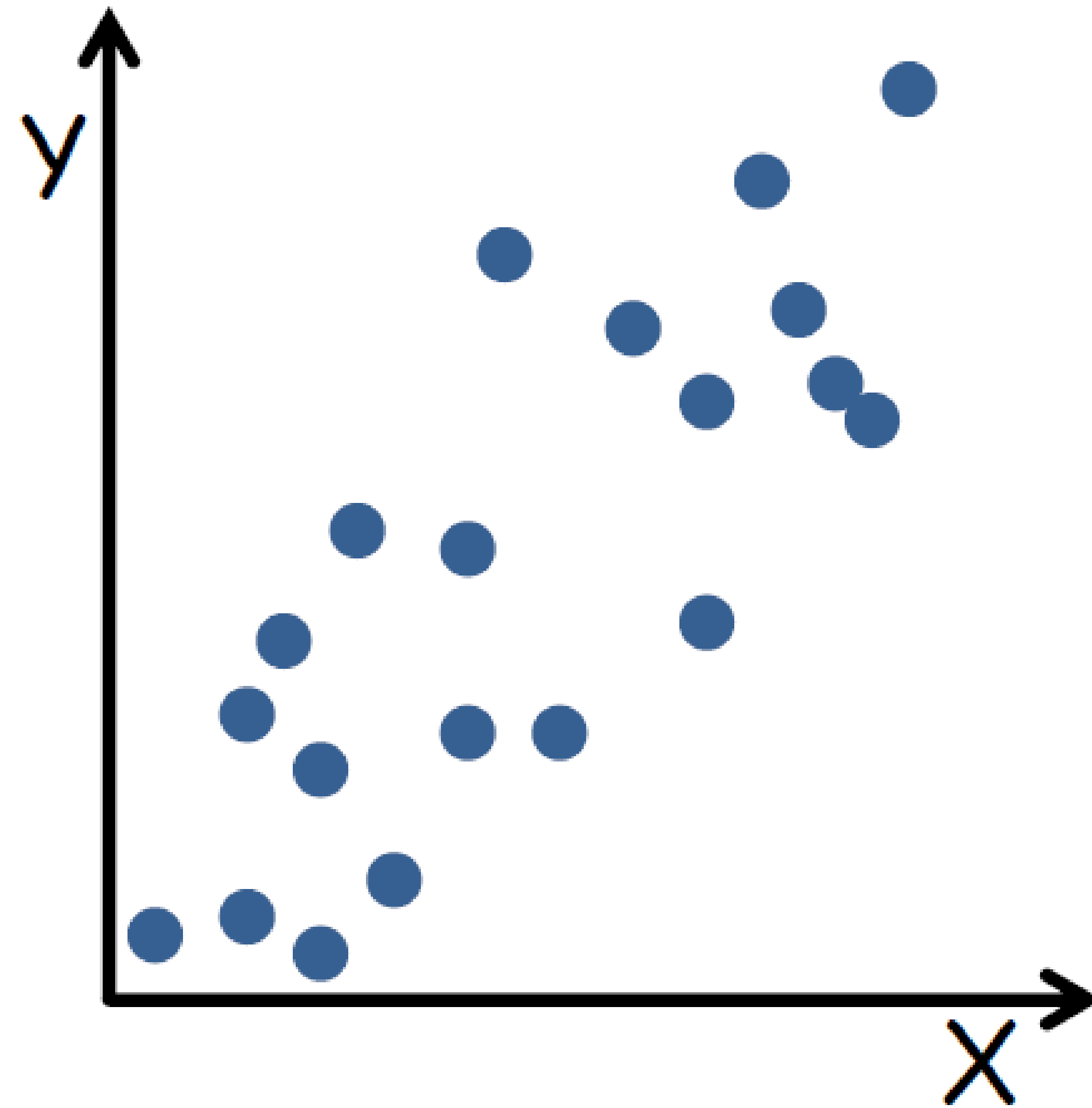
# Example Keys

*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

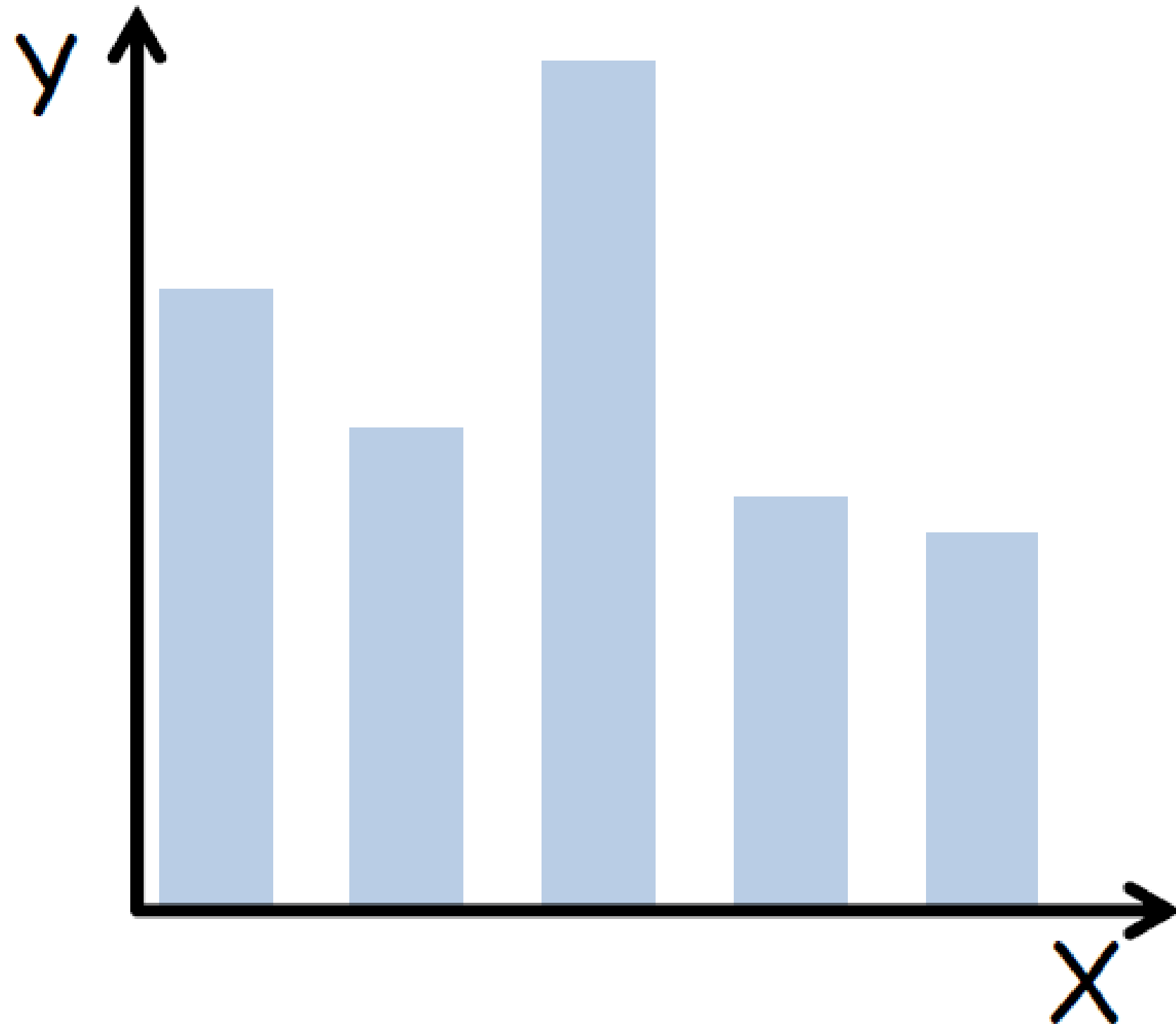
# Arrange Tables — No Key



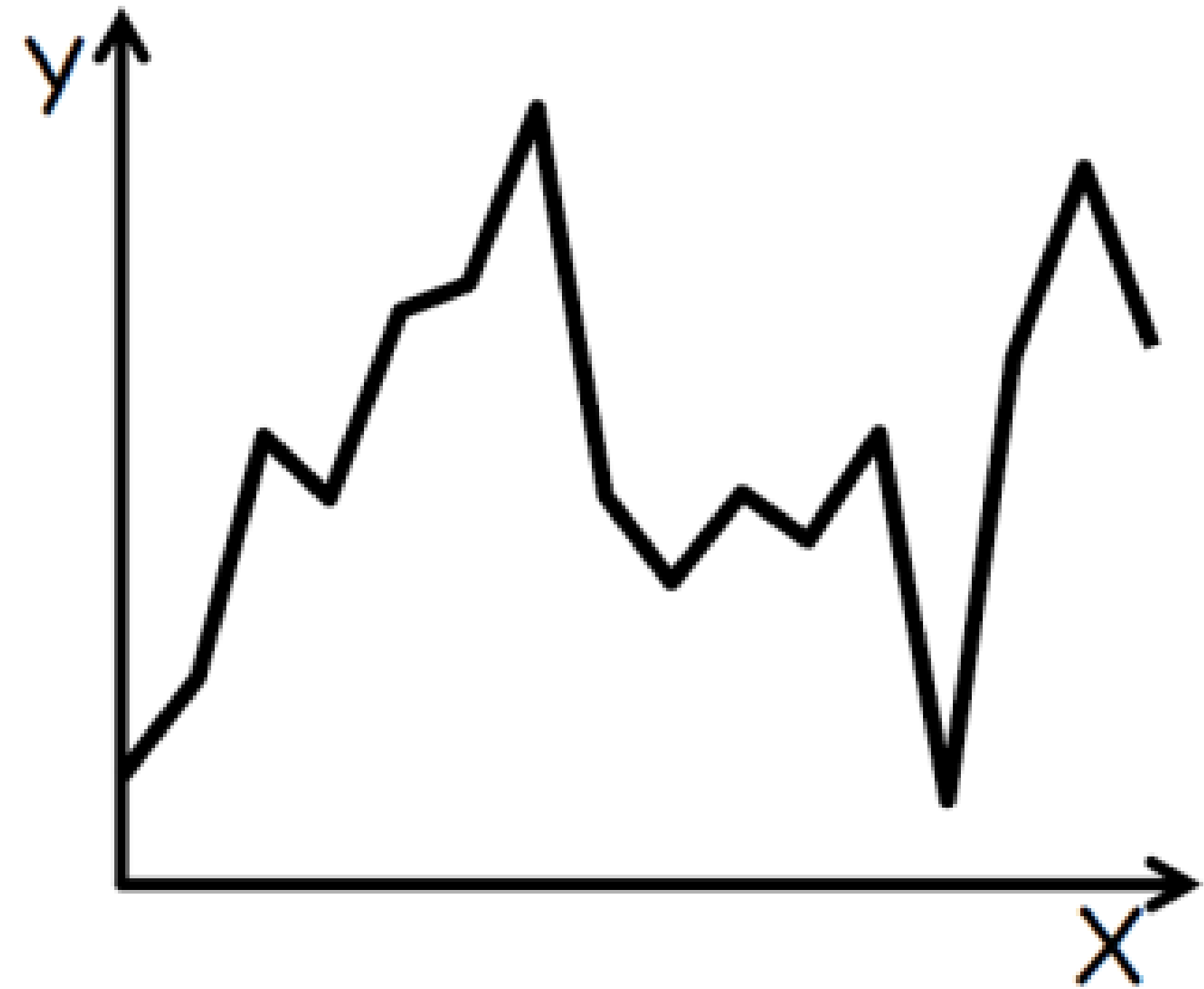
SCATTER PLOT

# Arrange Tables — One Key

→ 1 Key  
List



BAR CHART

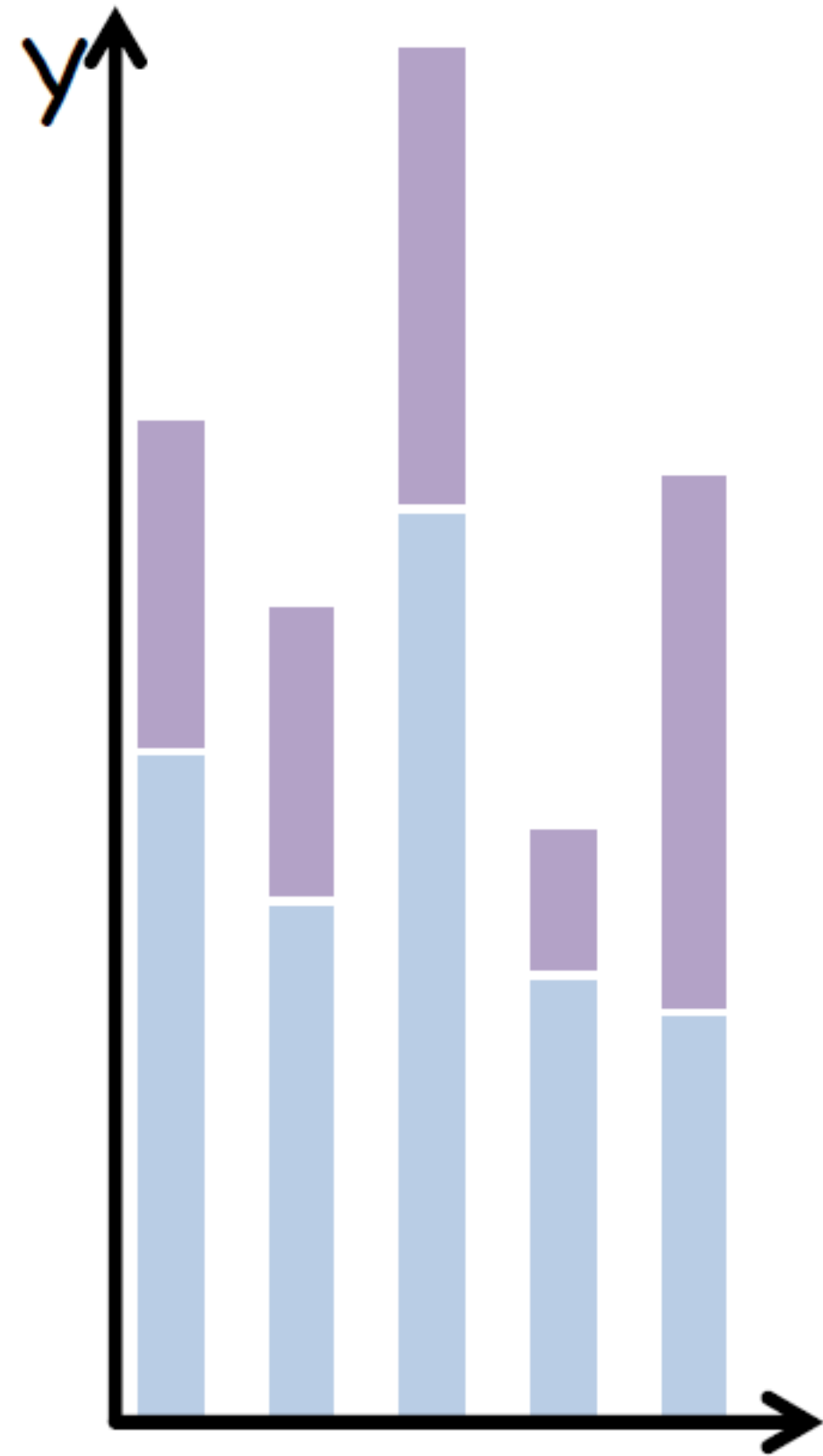
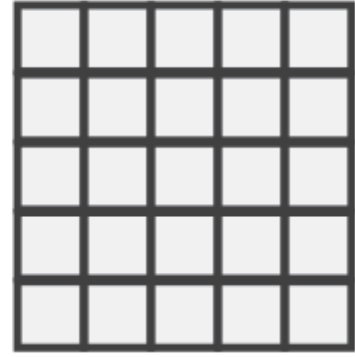


LINE GRAPH

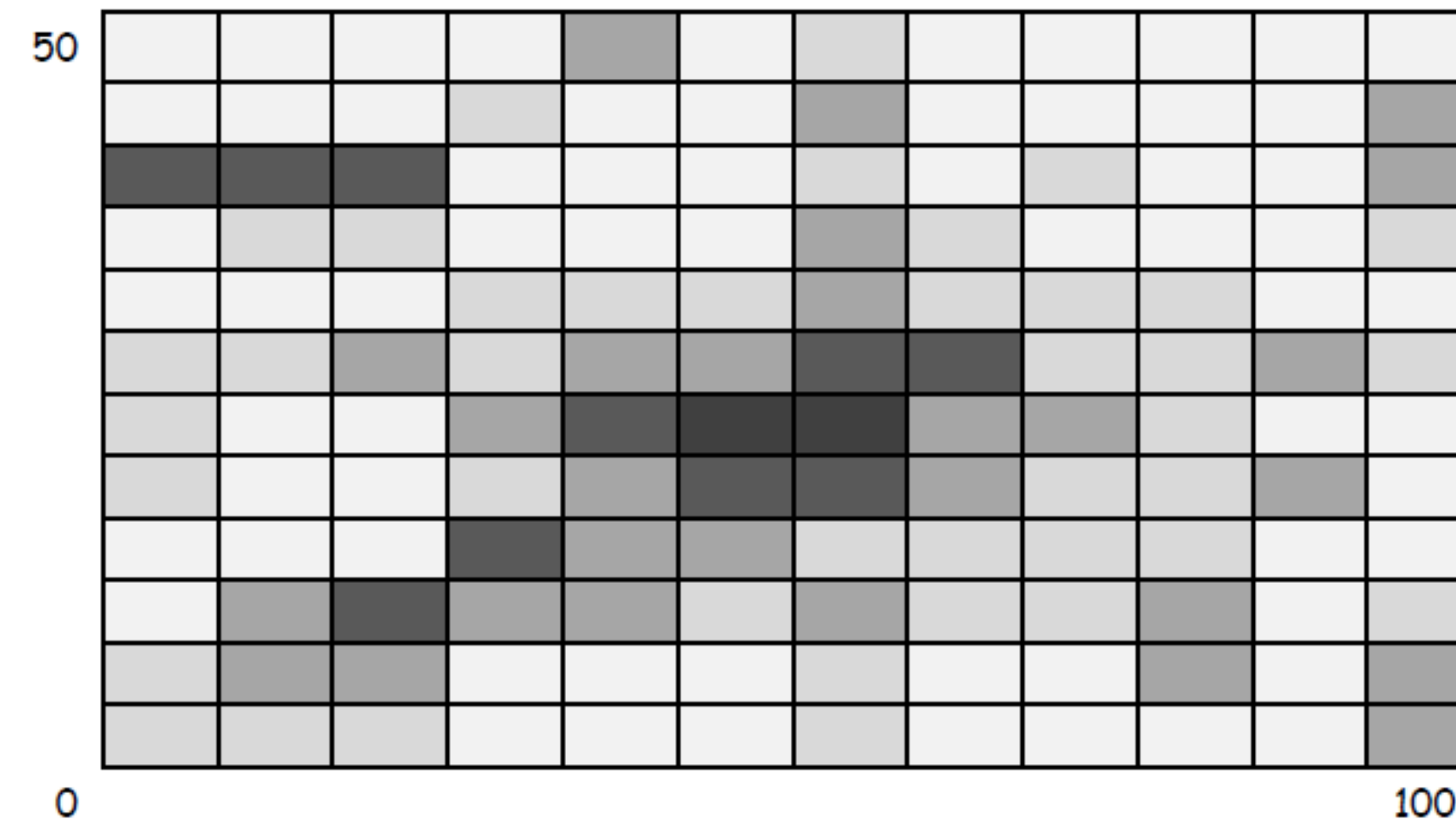
# Arrange Tables — Two Keys

→ 2 Keys

Matrix



STACKED BAR CHART



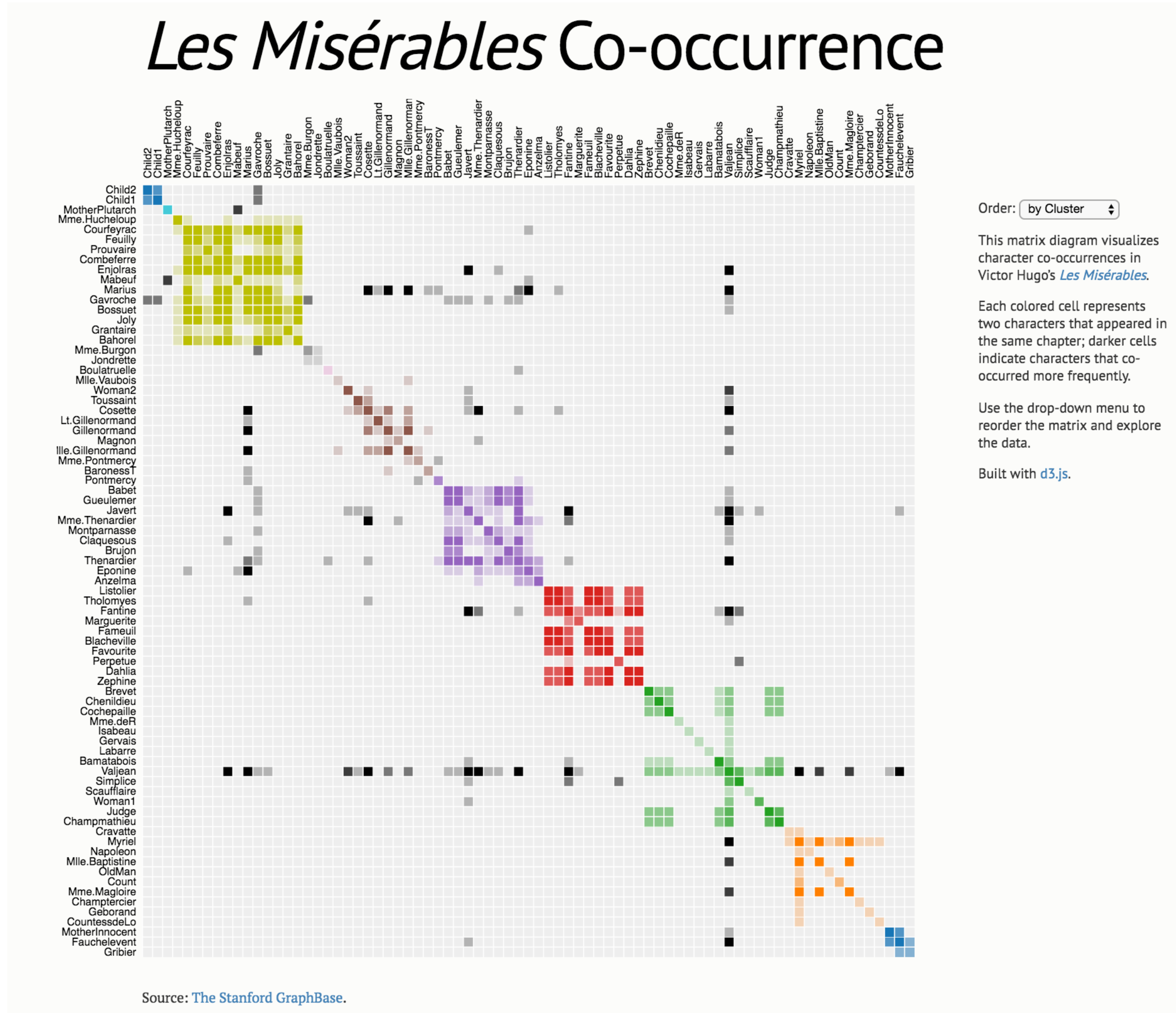
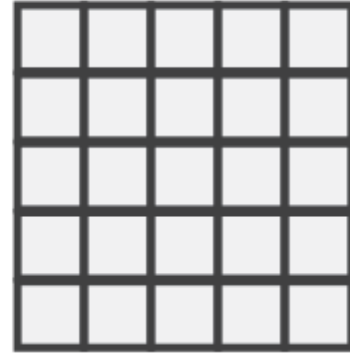
HEATMAP



# Arrange Tables — Two Keys (Network)

→ 2 Keys

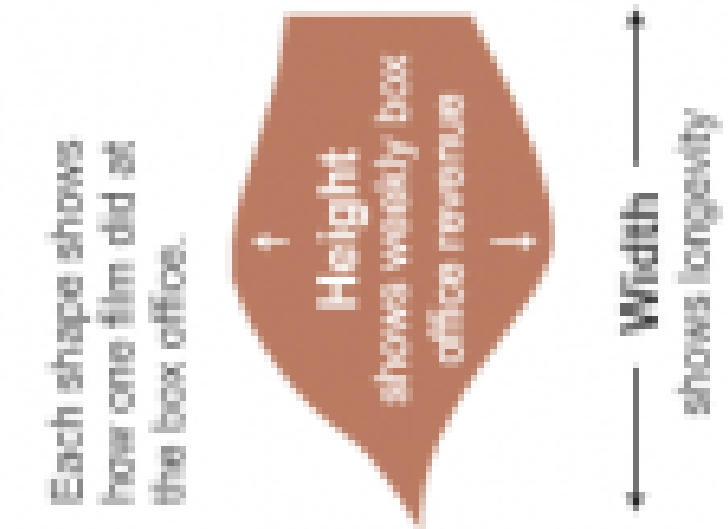
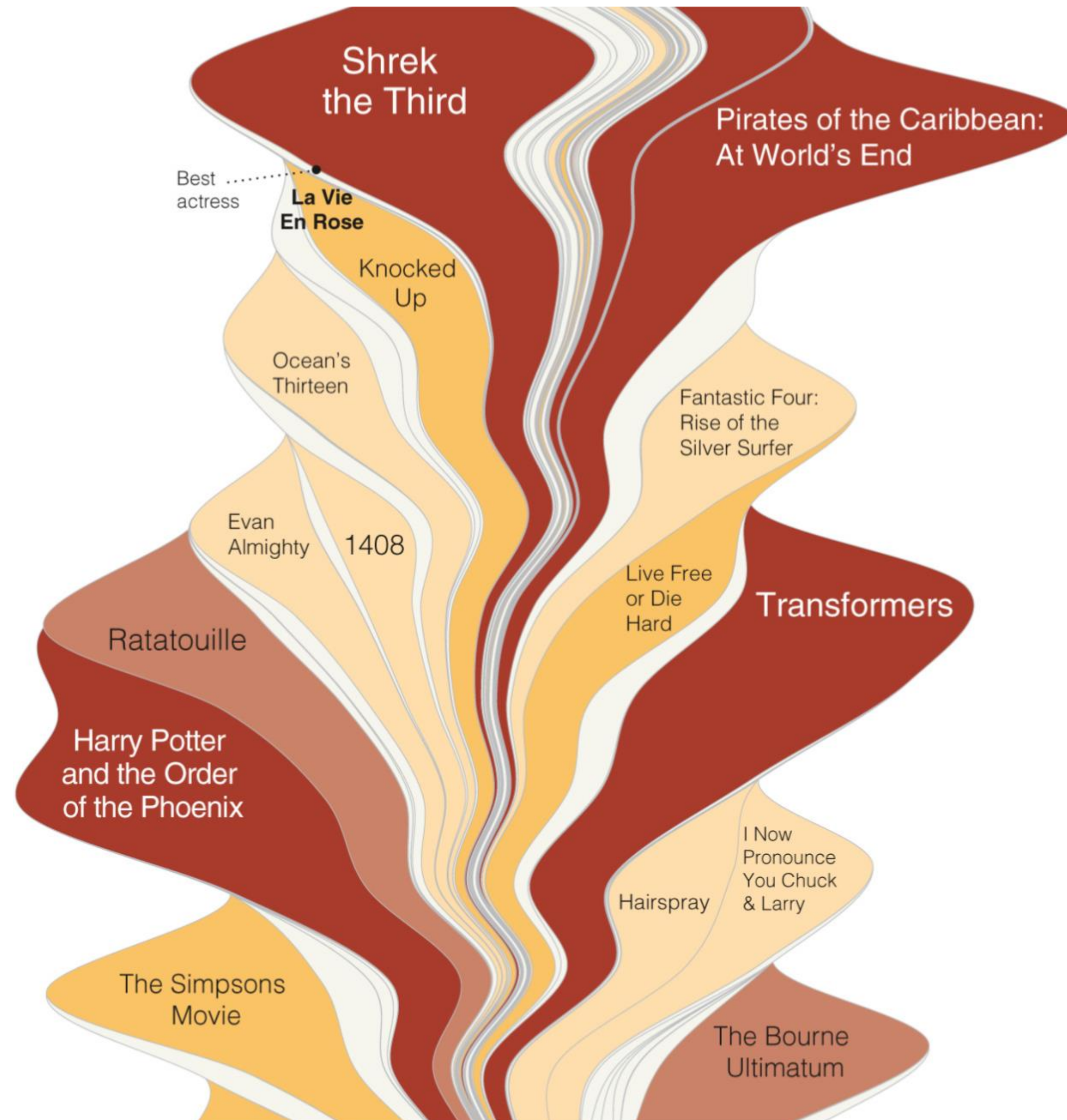
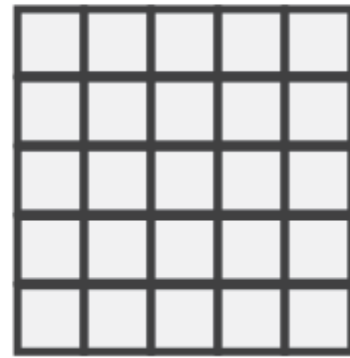
Matrix



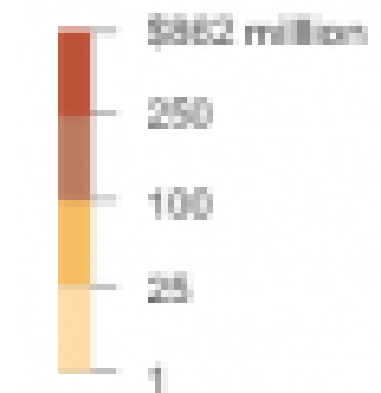
# Arrange Tables — Two Keys

→ 2 Keys

*Matrix*



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

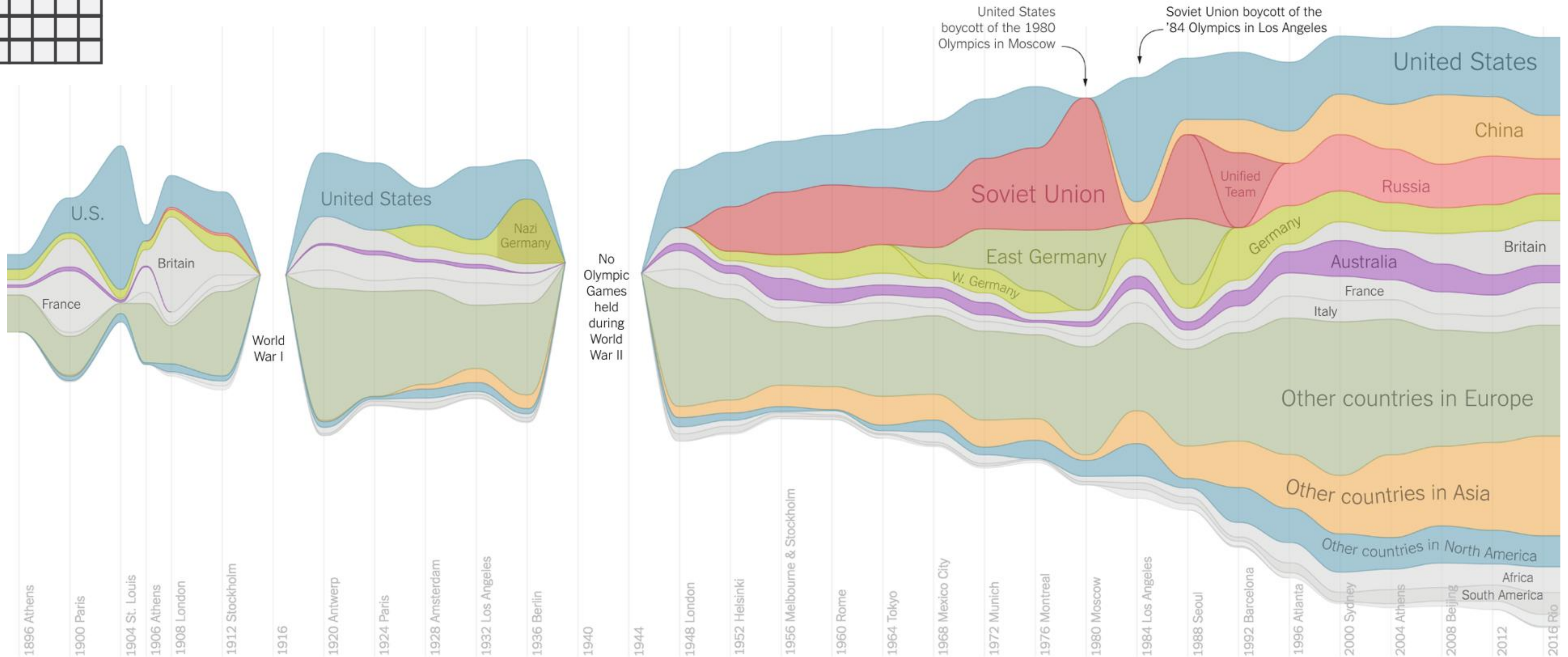
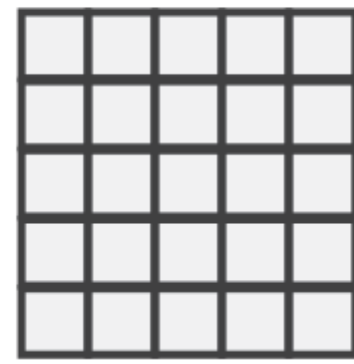


# Arrange Tables — Two Keys

→ 2 Keys  
Matrix

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

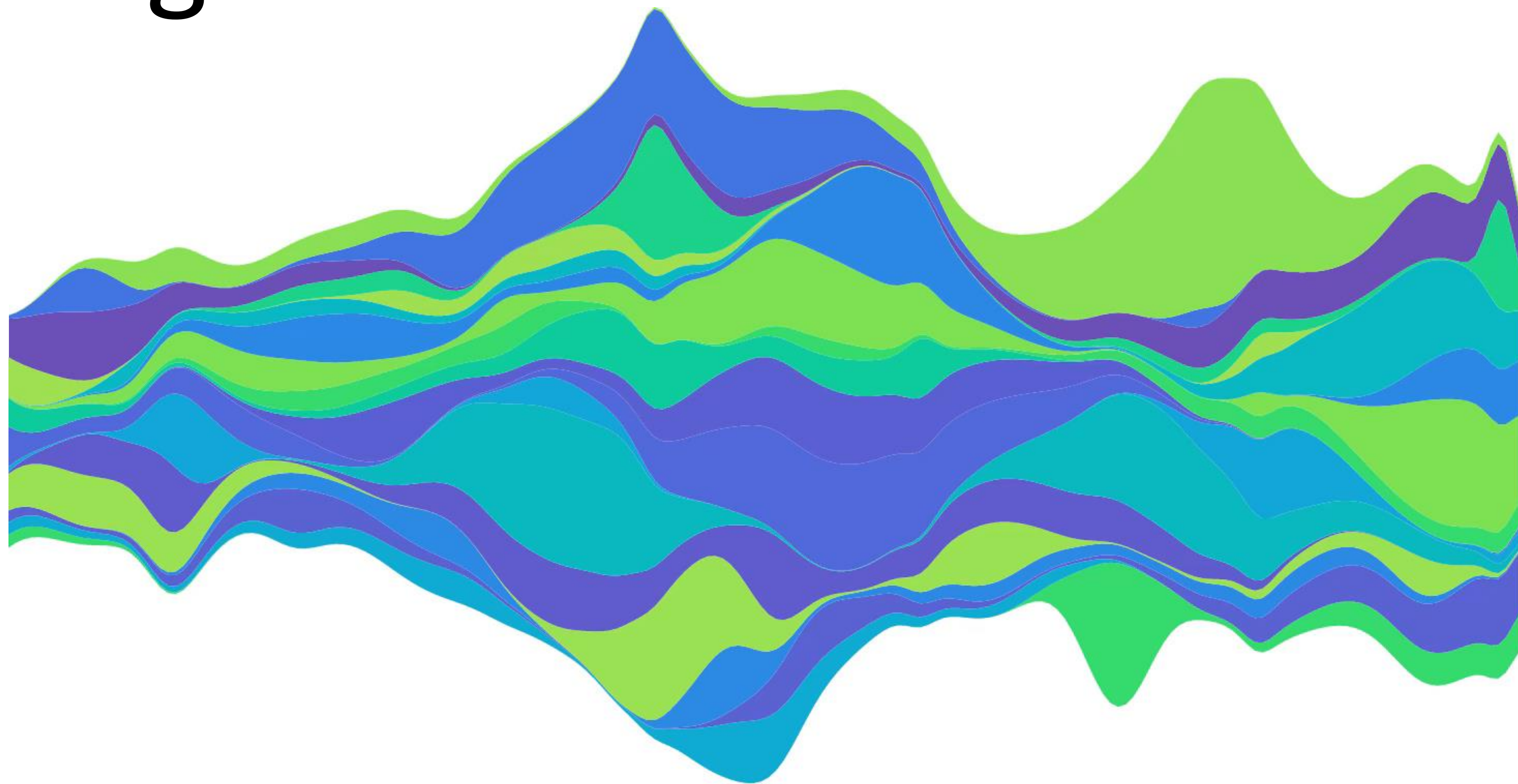
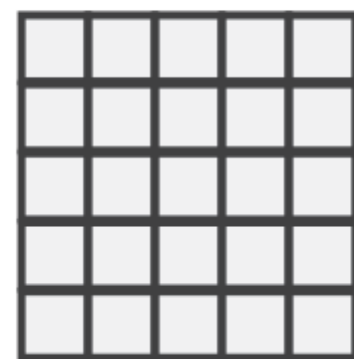
By GREGOR AISCH and LARRY BUCHANAN **UPDATED** August 22, 2016



# Arrange Tables — ~~Two~~ Three Keys

→ 2 Keys

*Matrix*



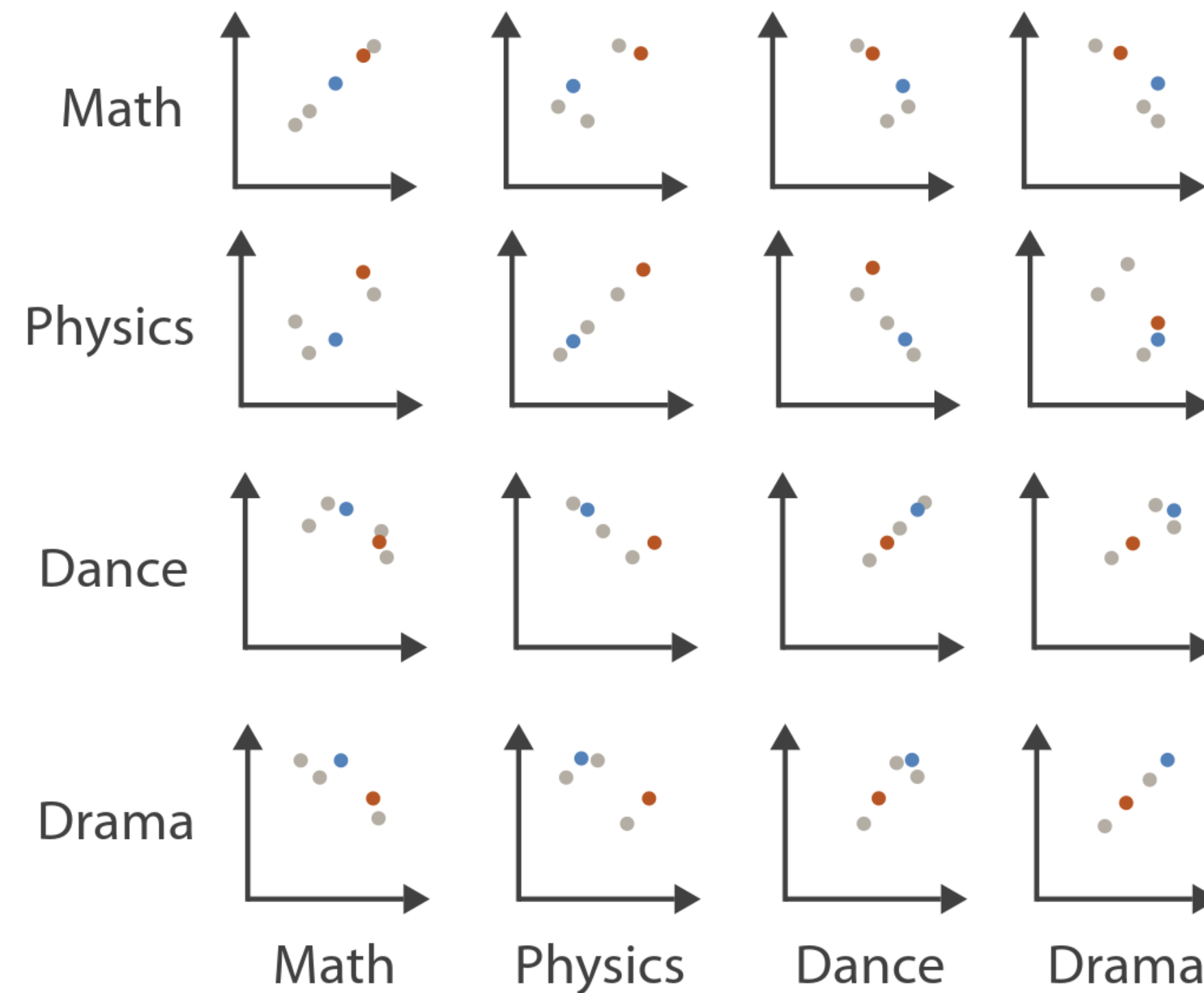
STREAMGRAPH

# Arrange Tables — Axes

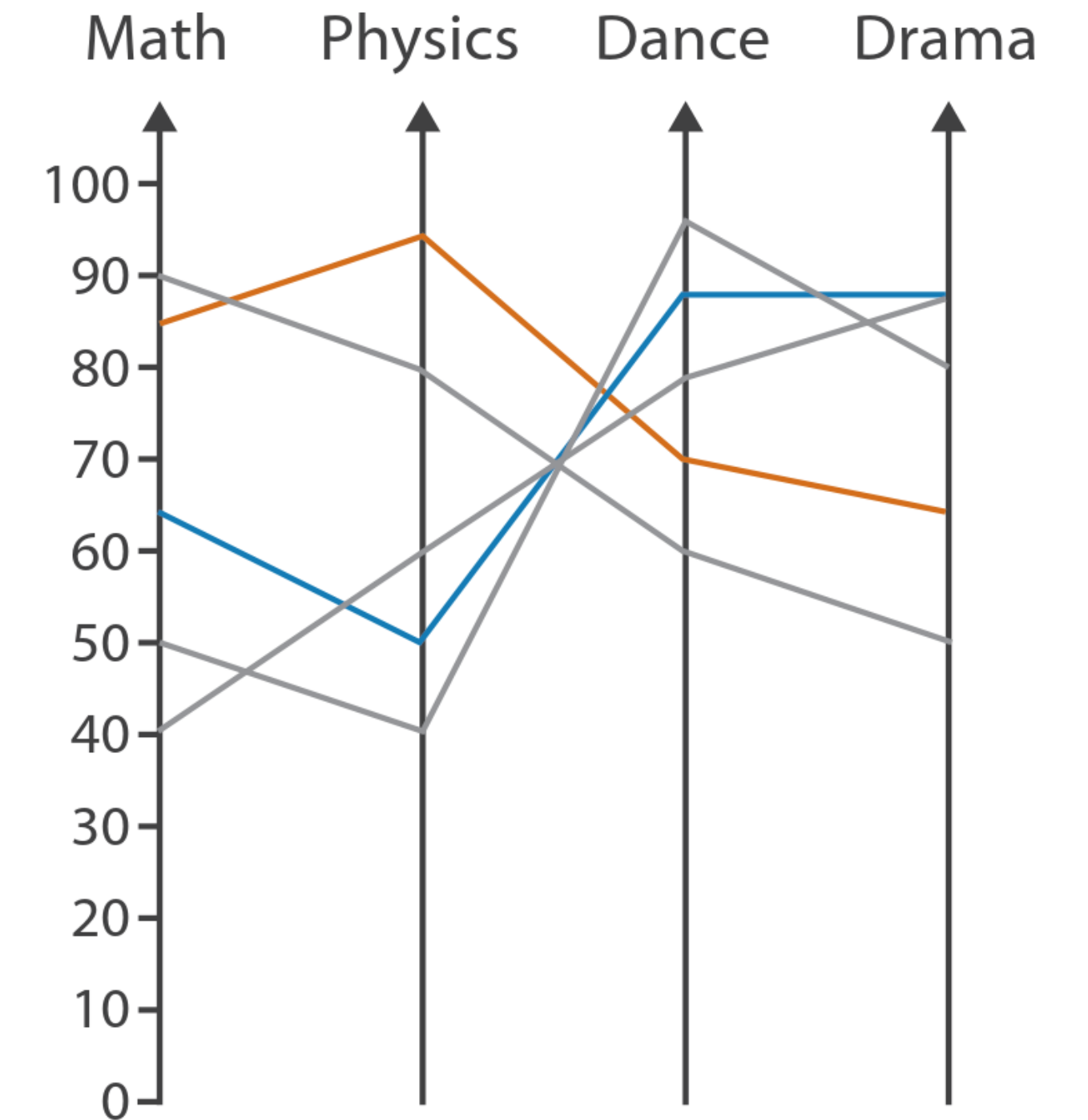
Table

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



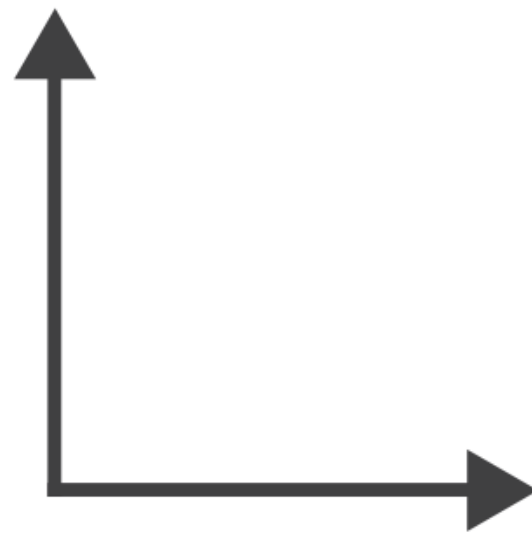
Parallel Coordinates



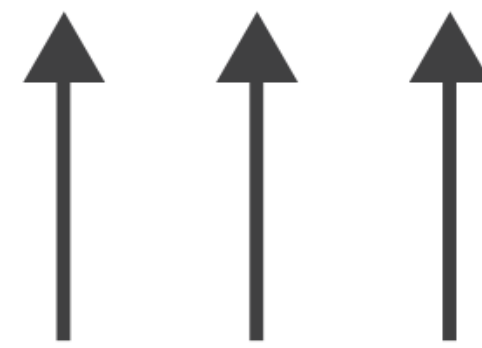
# Arrange Tables — Axes

## ➔ Axis Orientation

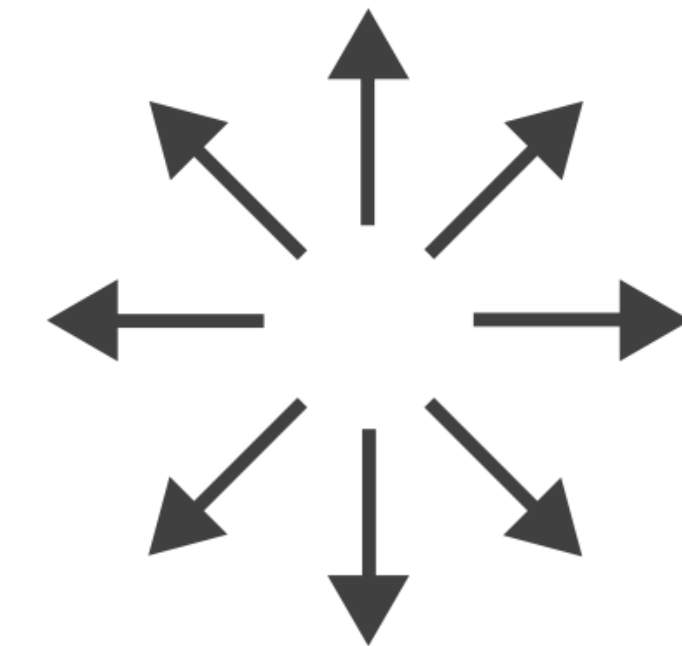
➔ Rectilinear



➔ Parallel

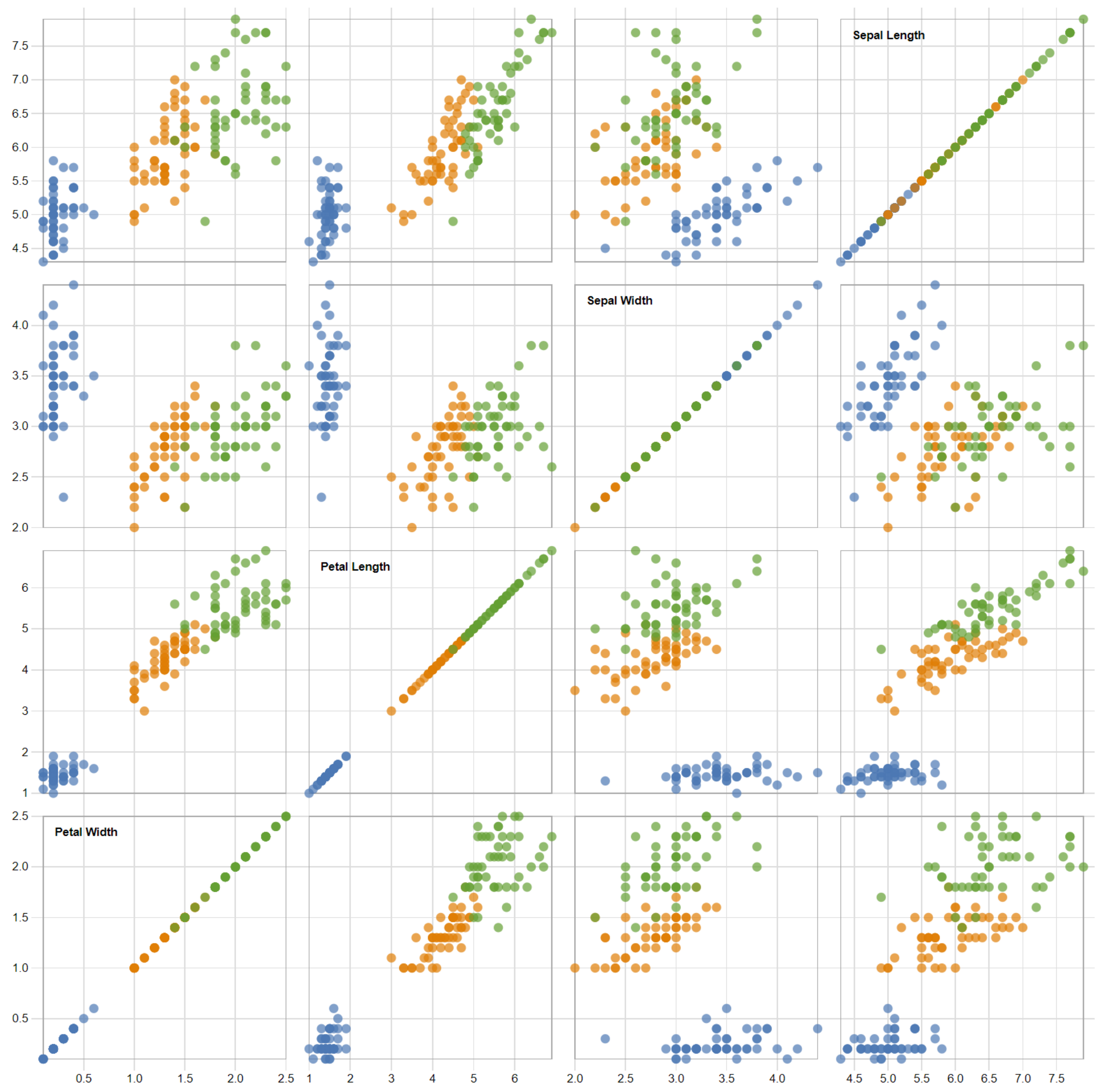
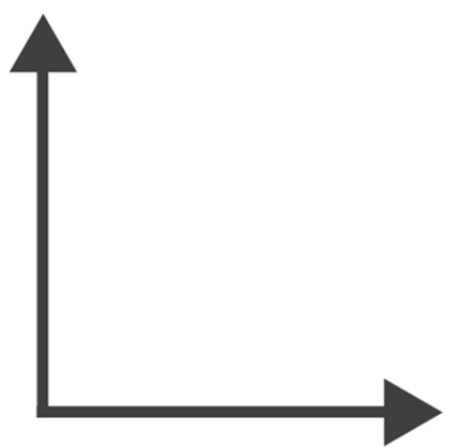


➔ Radial

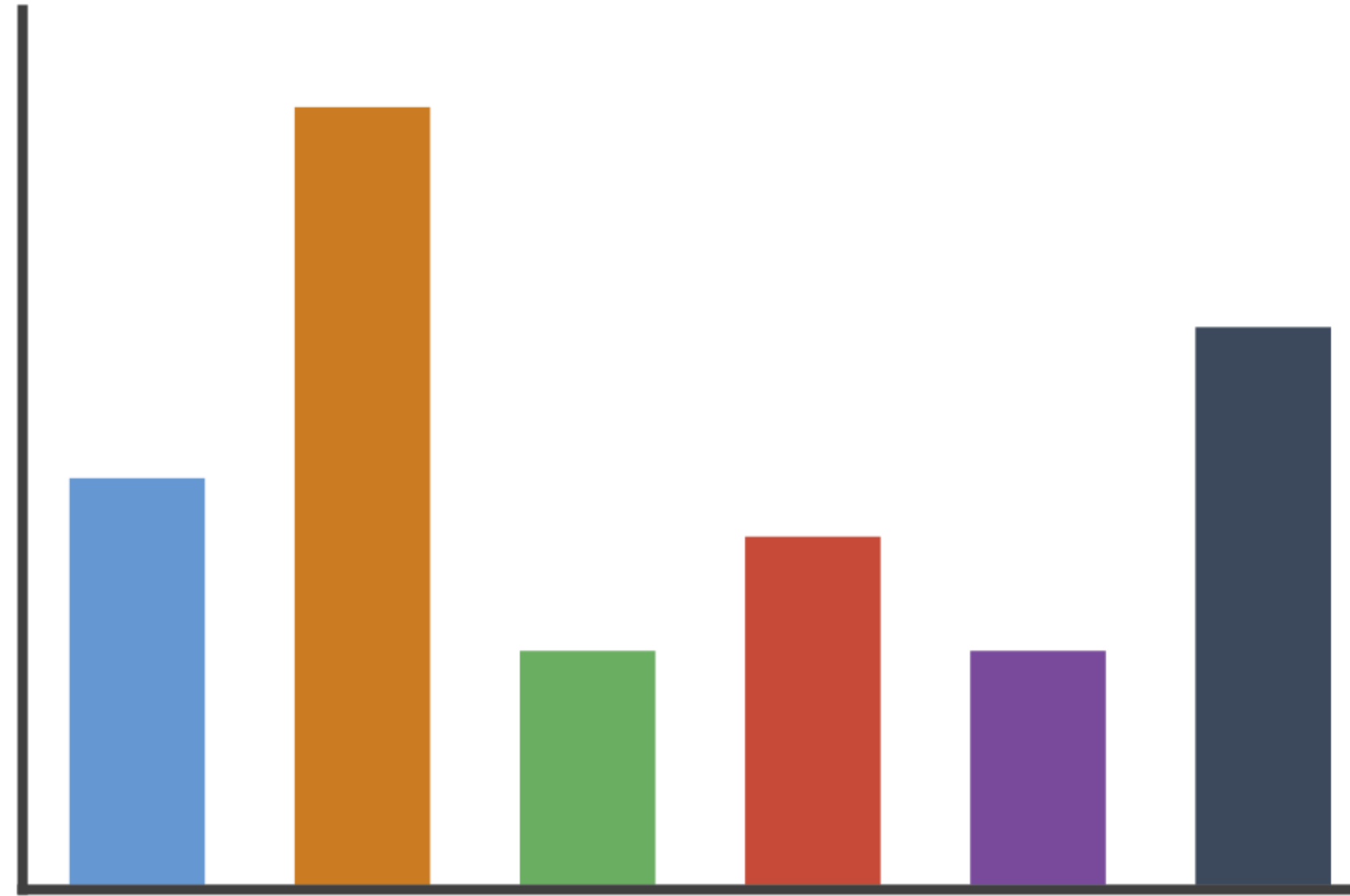


# Scatterplot Matrix Brushing

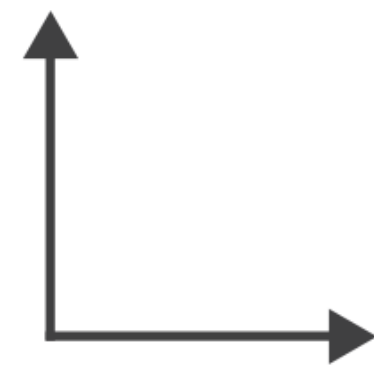
→ Rectilinear



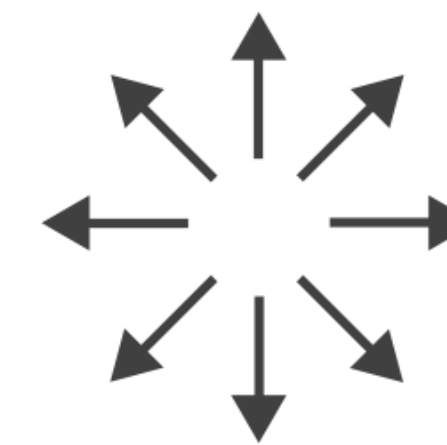
# Arrange Tables



→ Rectilinear

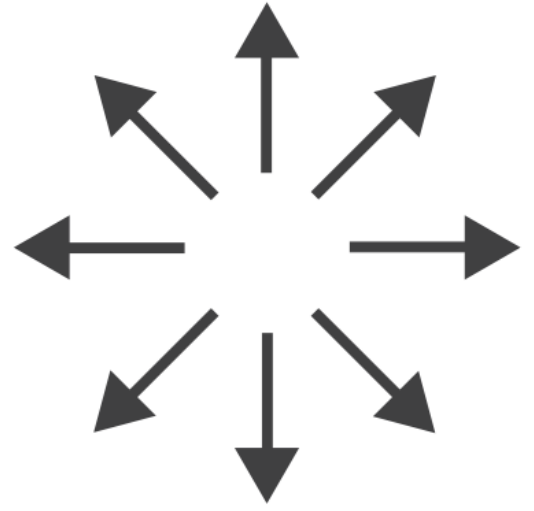


→ Radial



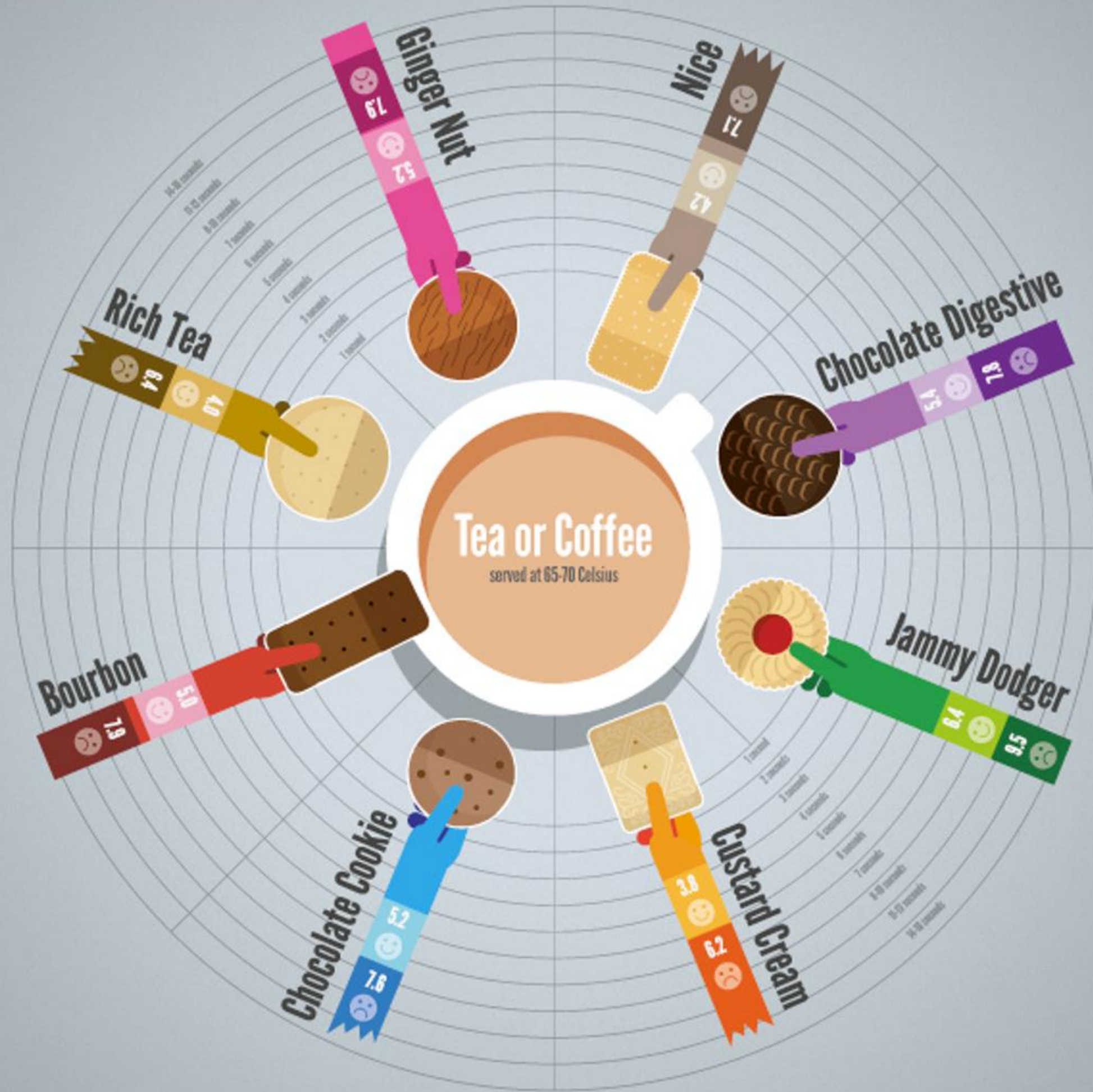


→ Radial



Key

- ☺ Perfection!
- ☹ Risk of extreme sogginess!
- 🚩 Floppage likely

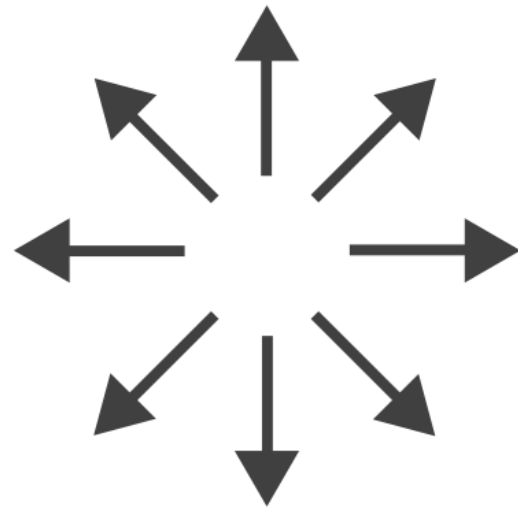


Through extensive research at the Green Hat office we have produced this helpful guide for those who like to dunk their biscuits, without fear of floppage!

[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.

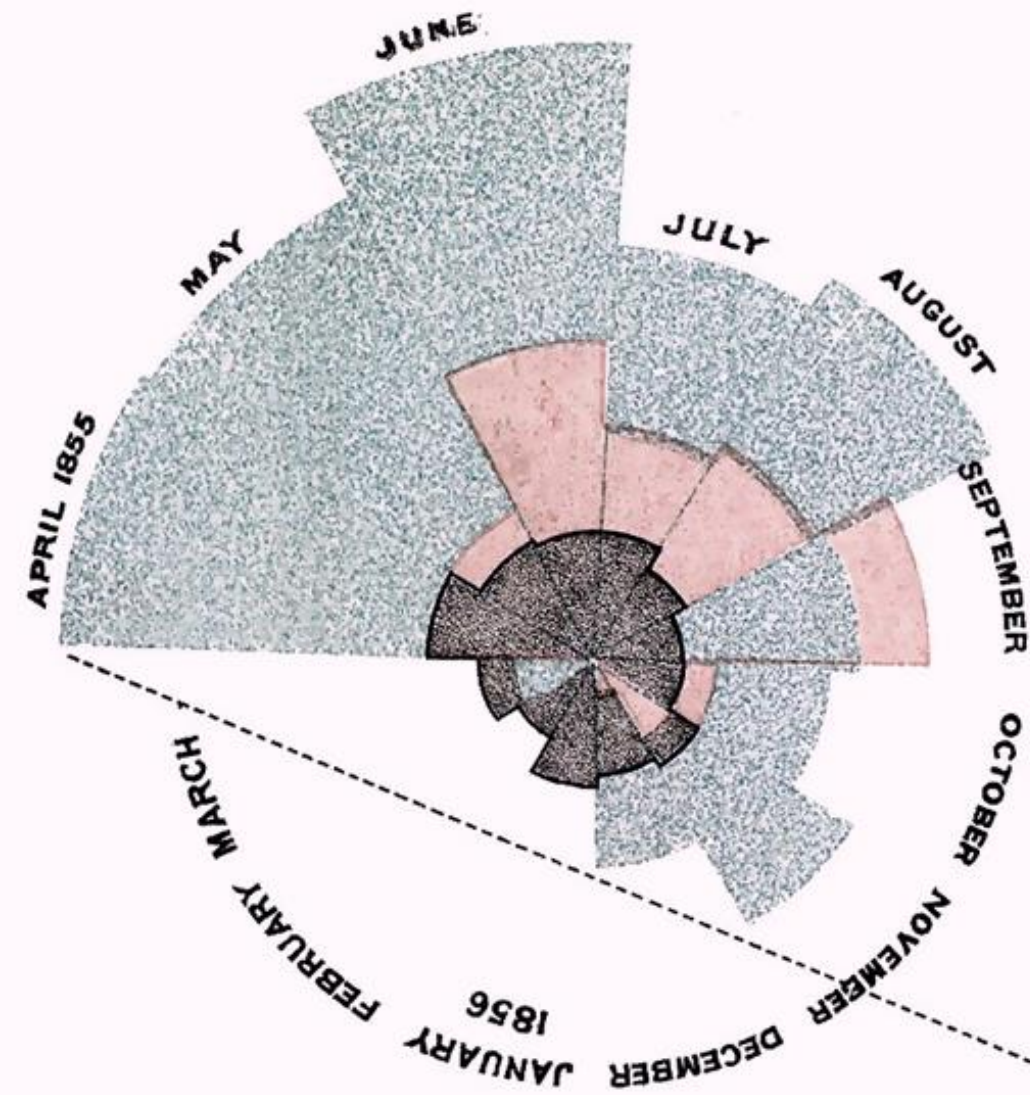
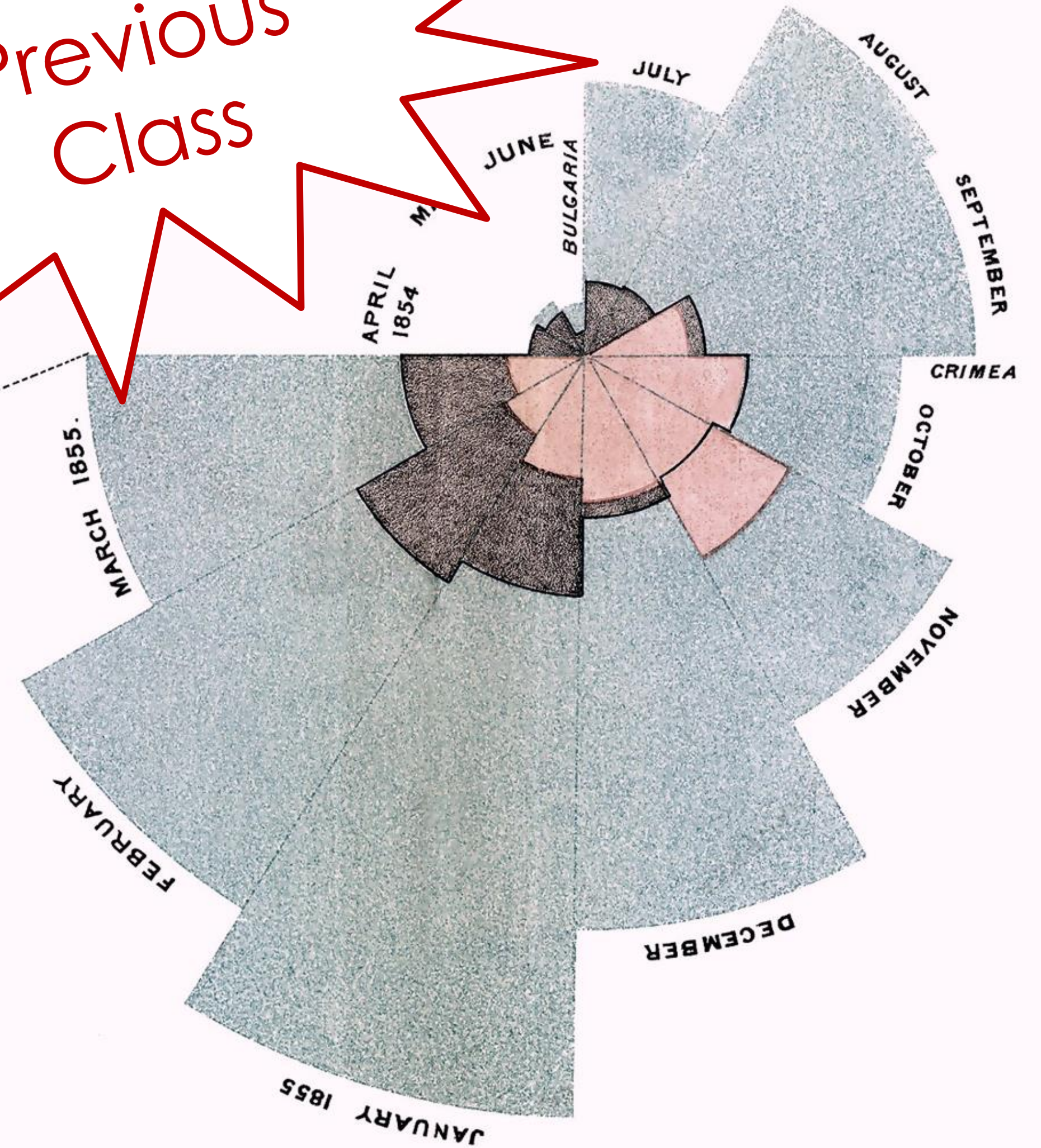


DIAGRAM OF THE CAUSES OF DEATH  
IN THE ARMY

1.  
APRIL 1854 to MARCH 1855.

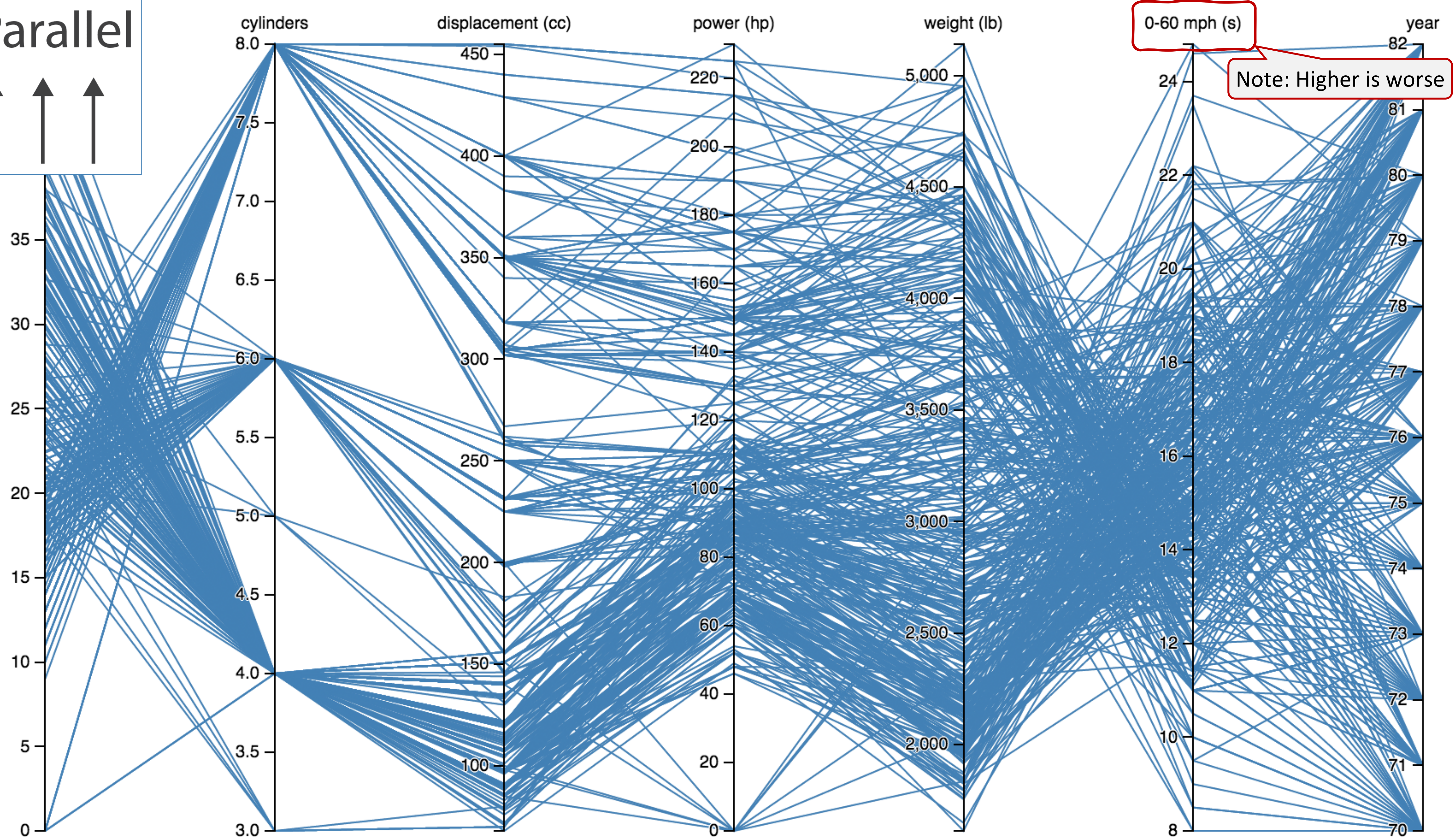
Previous Class



*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

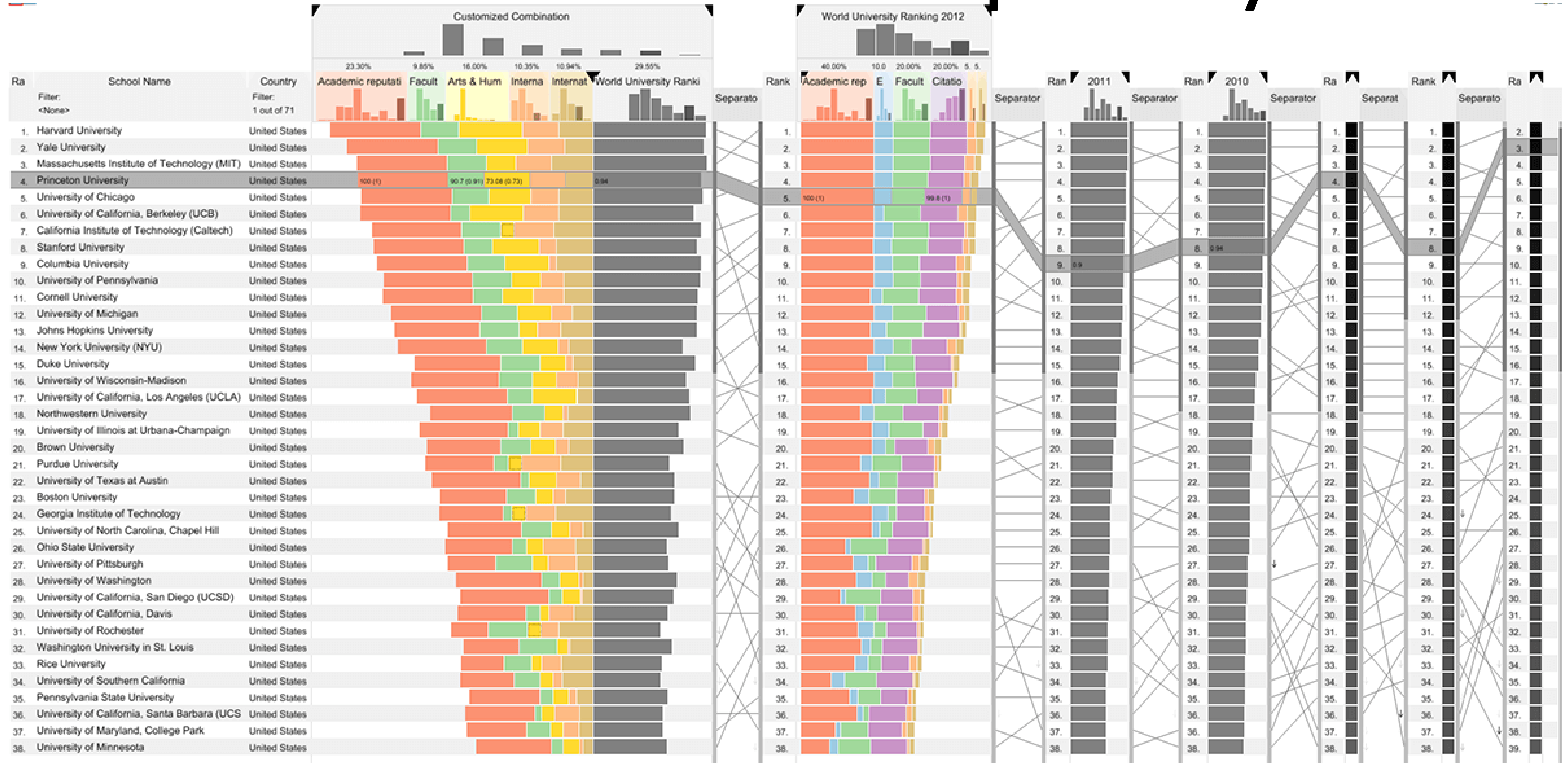


# How to handle multiple keys...?

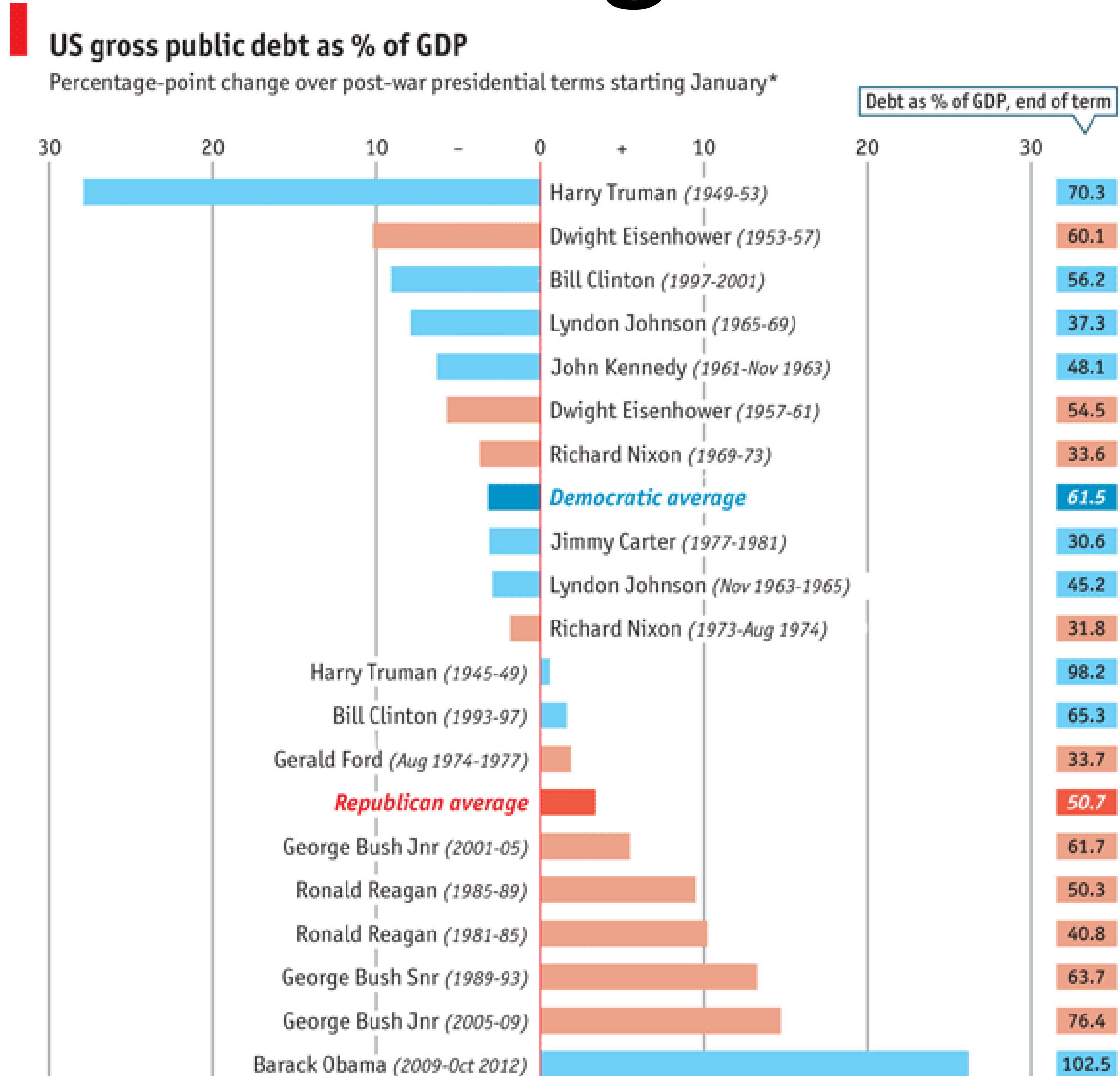
The background of the image is a collage of several newspaper pages, tilted at various angles. The pages contain various text columns, some with small images and some with highlighted sections in orange and pink. A central blue rounded rectangle contains the text.

Rankings are  
omnipresent

# How to handle multiple keys...?



# Divergent

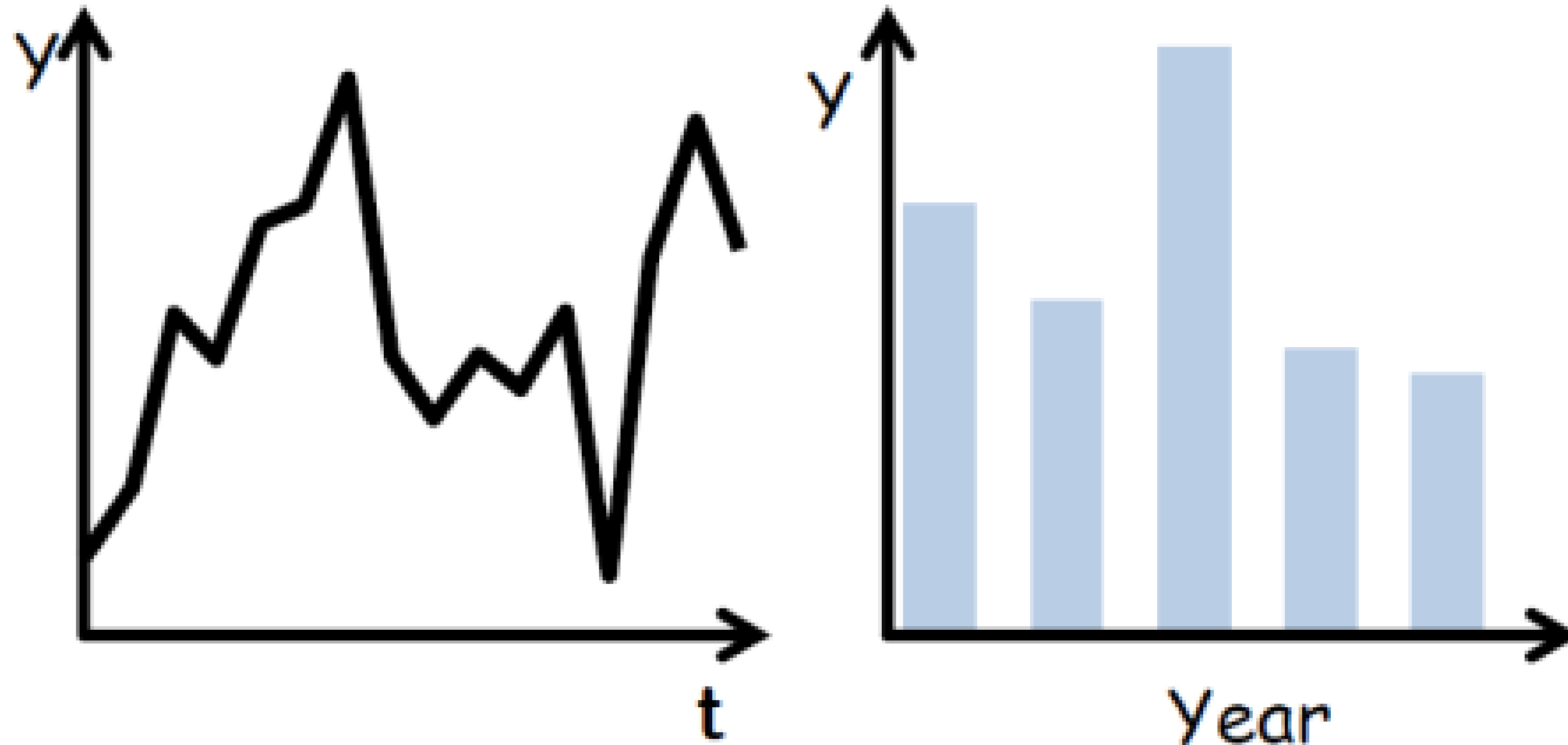


Sources: Bureau of Economic Analysis; Thomson Reuters; White House; *The Economist*

\*Unless otherwise stated

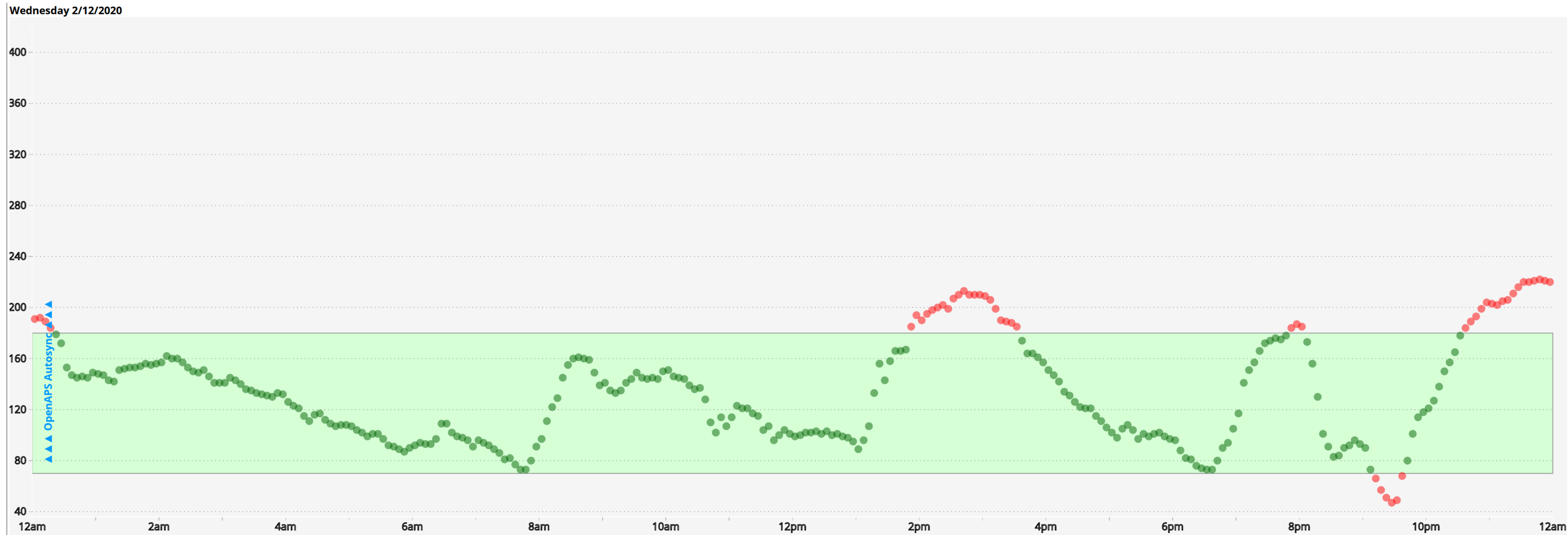


# Time Series



(Quantitative data over time)

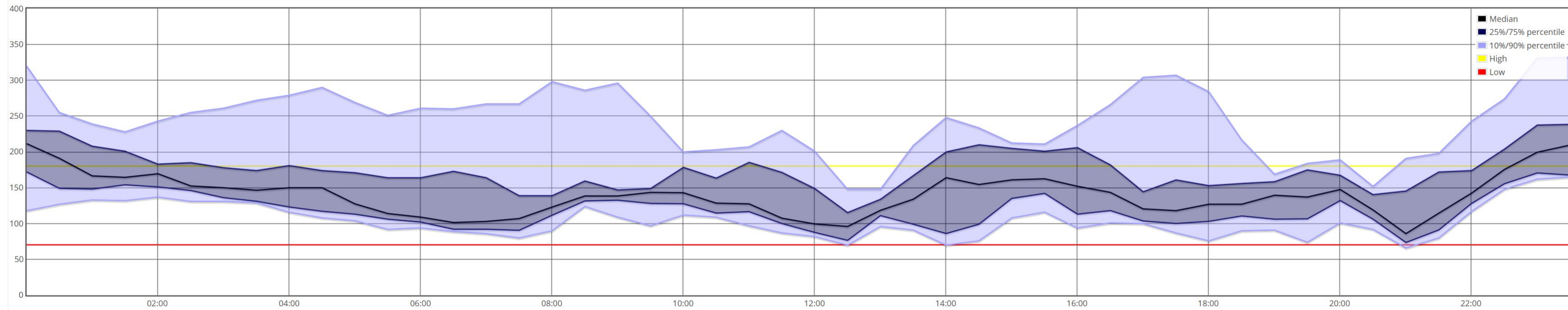
# Time Series



(Quantitative data over time)

# Time Series Distributions

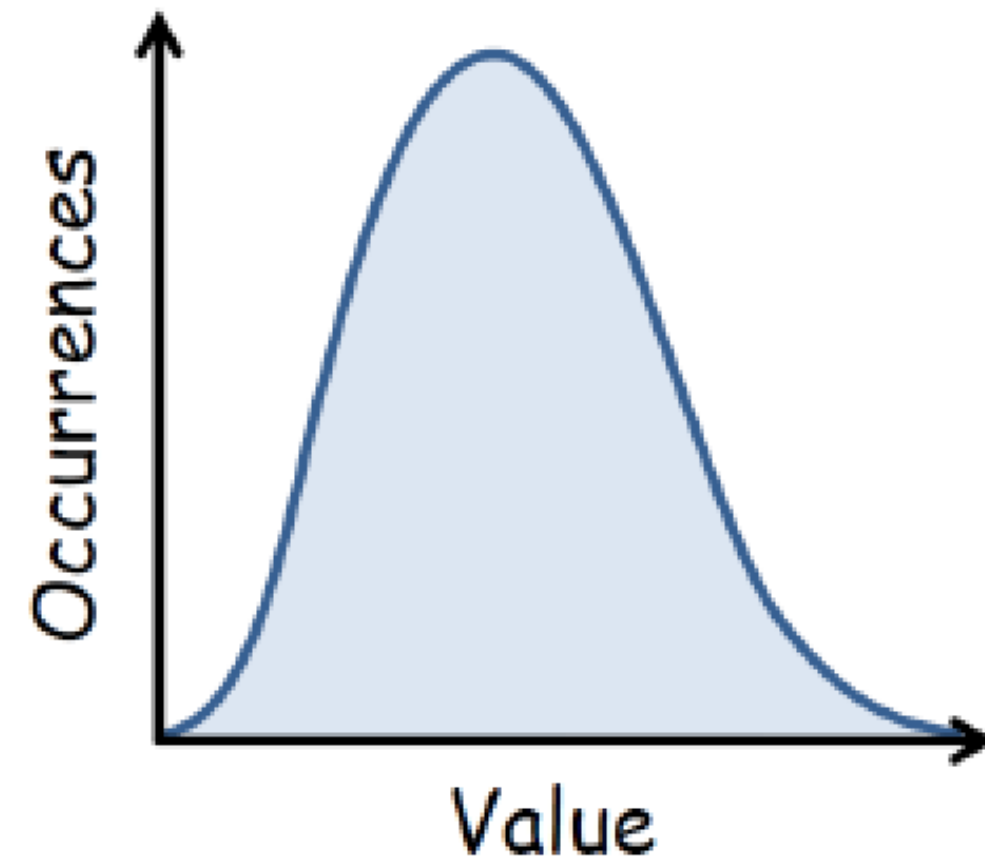
Glucose Percentile report



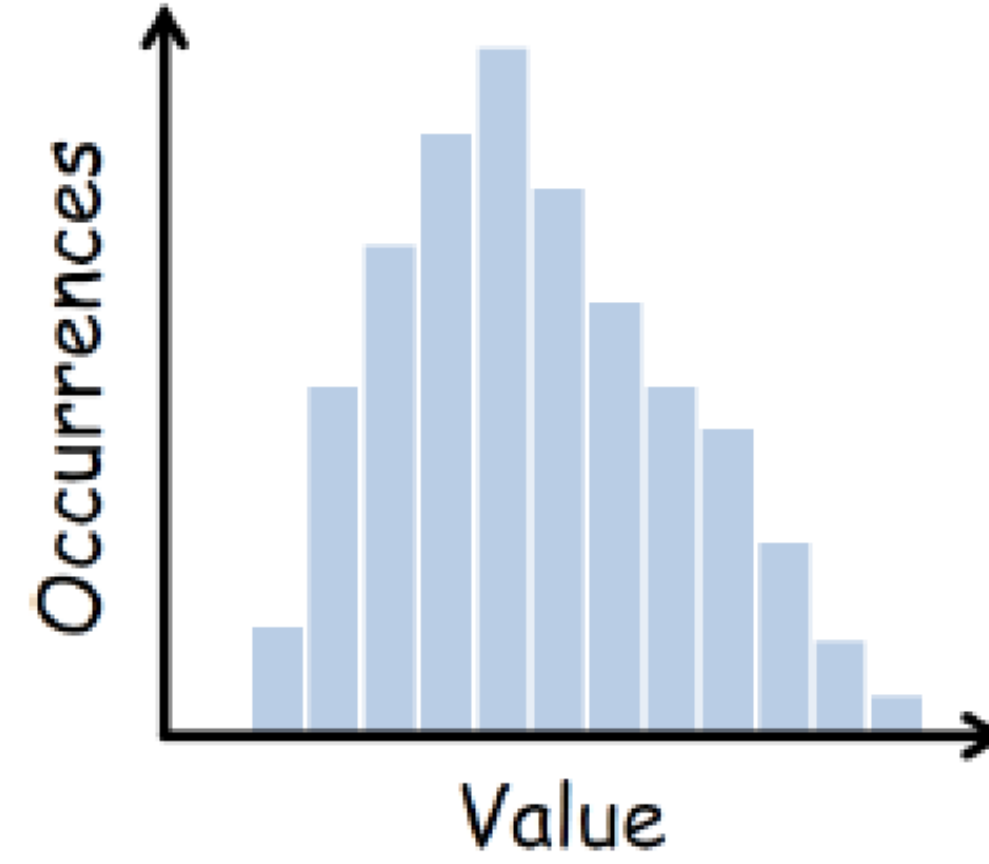
(Quantitative data over time)

# Distributions & Correlations

Distribution Curve



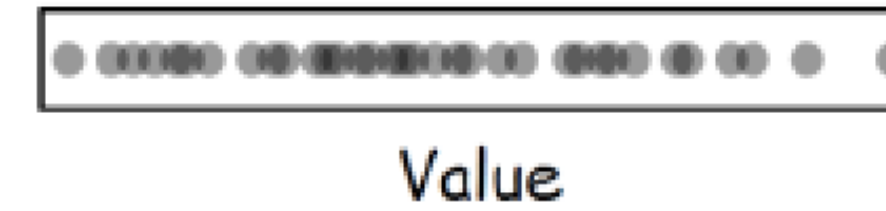
Histogram



Box-And-Whisker Plot



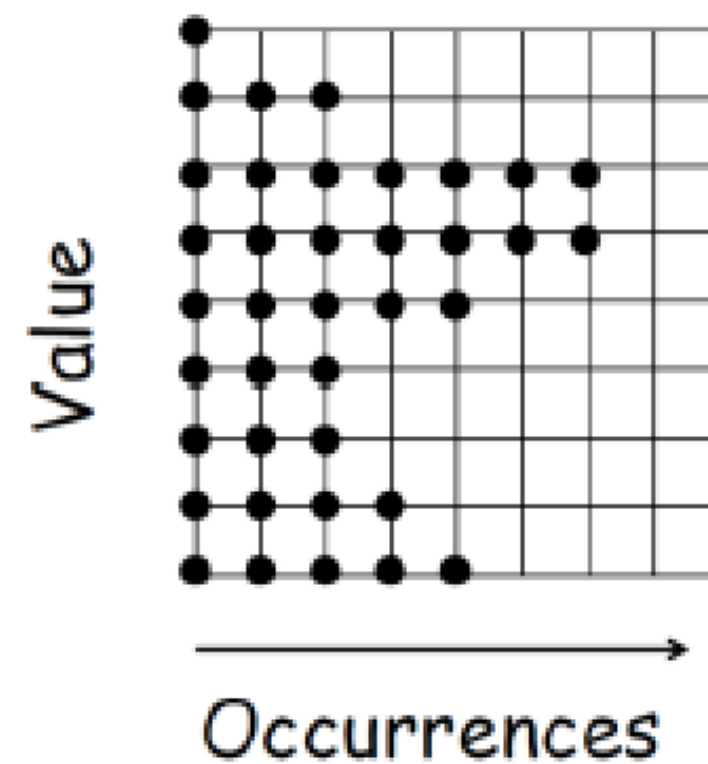
Point Graph



Stripe Graph



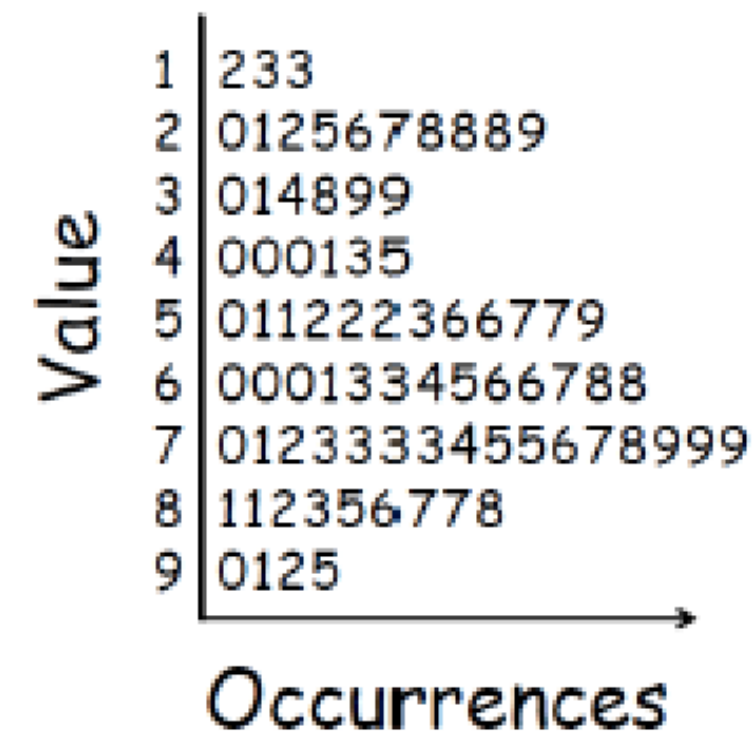
Dot Array



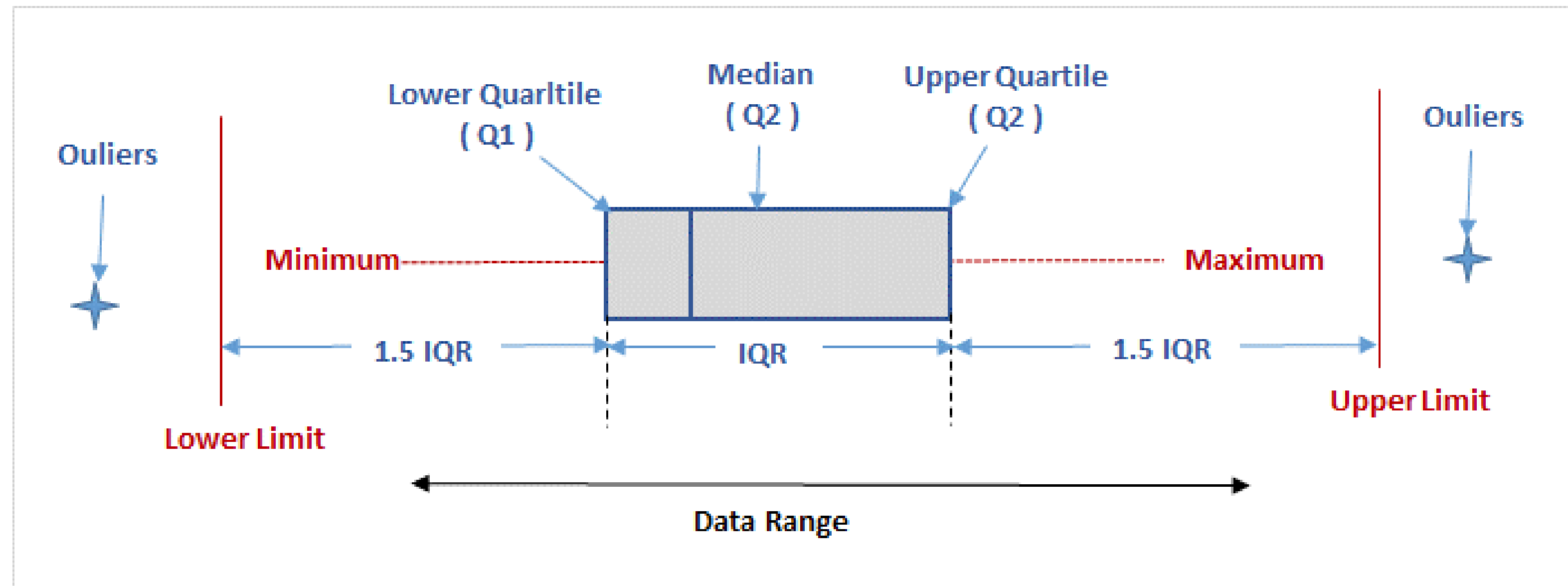
Tally Chart



Stem-And-Leaf Plot

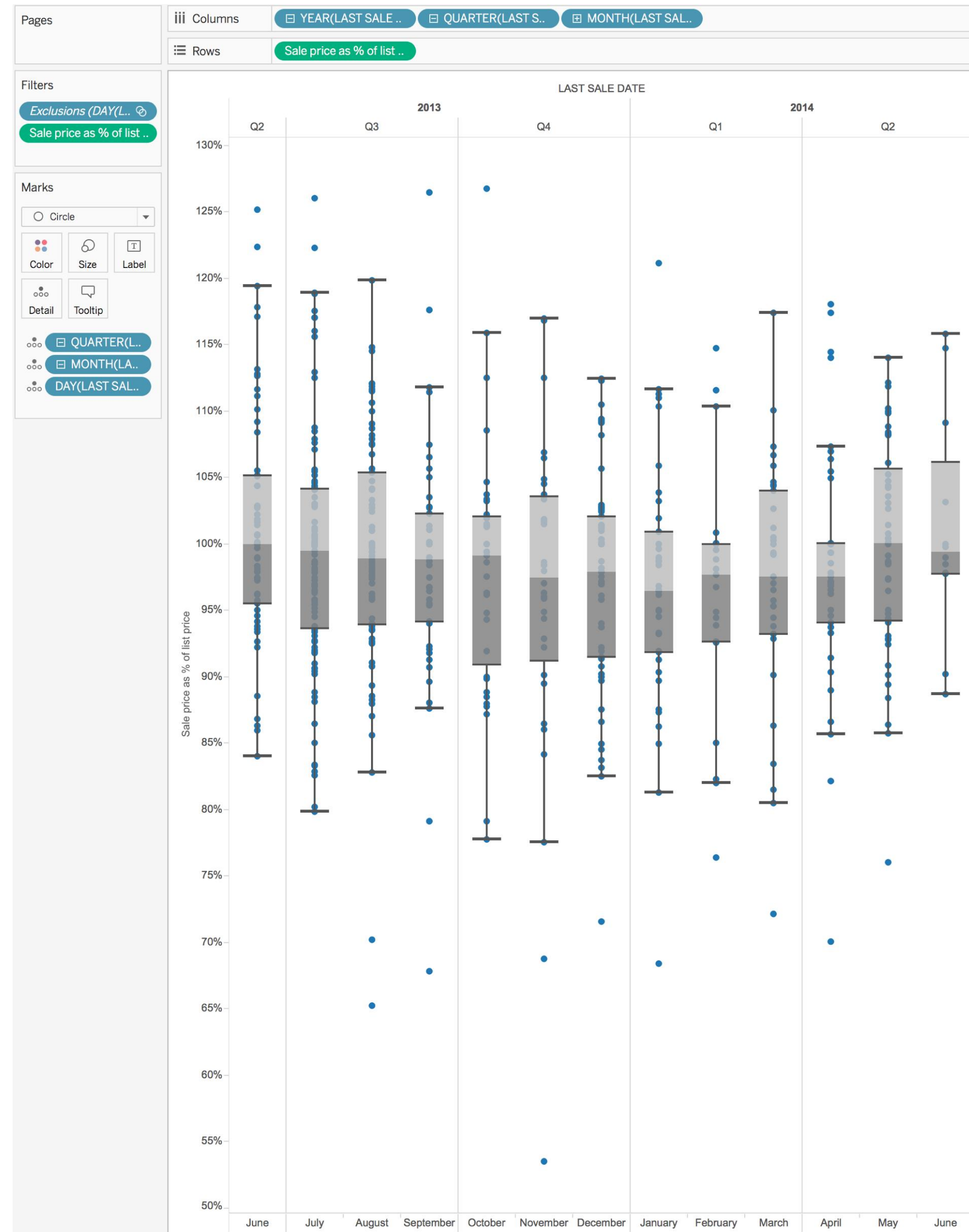


# Distributions & Correlations



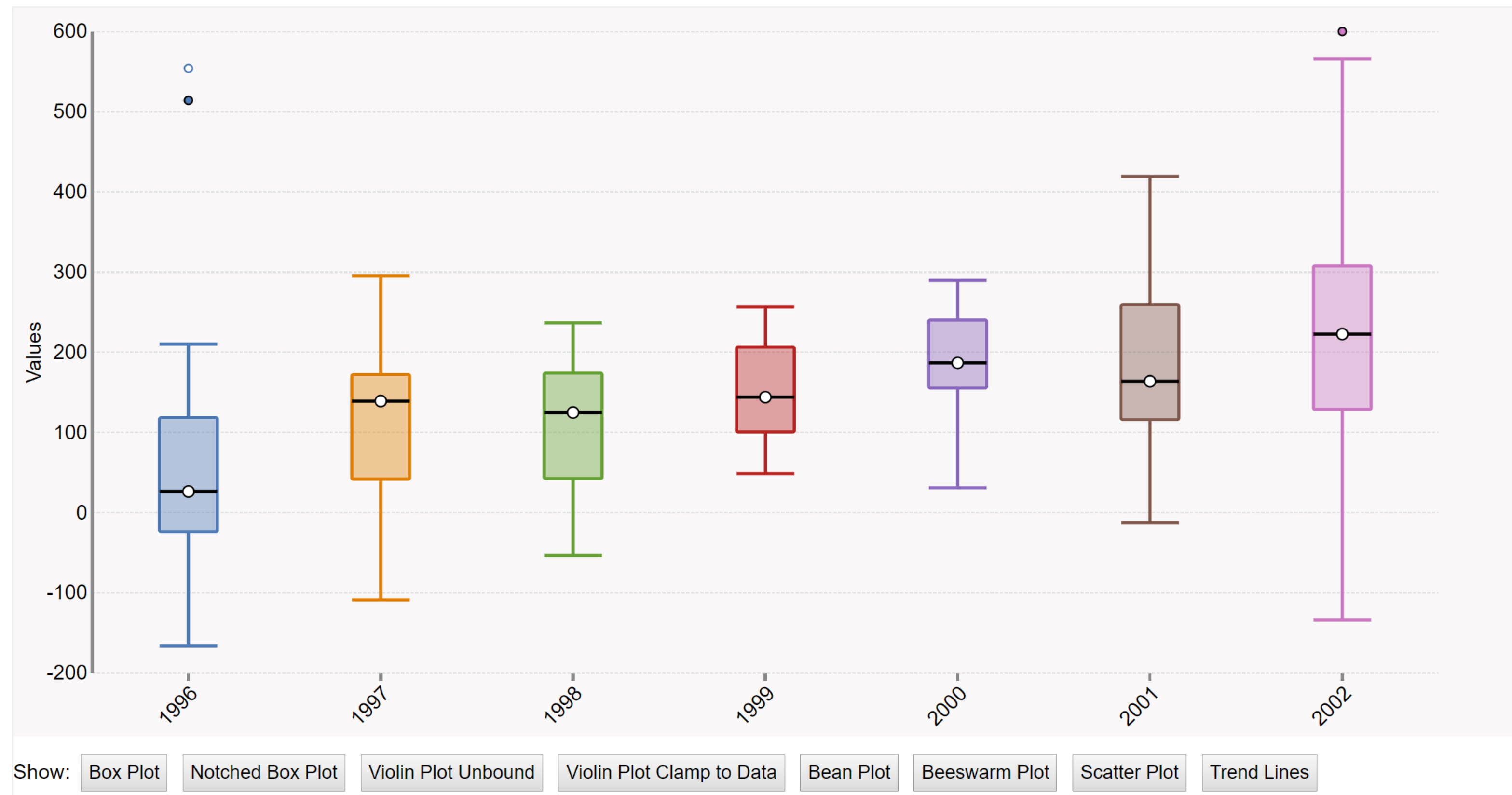
BOX AND WHISKER PLOT

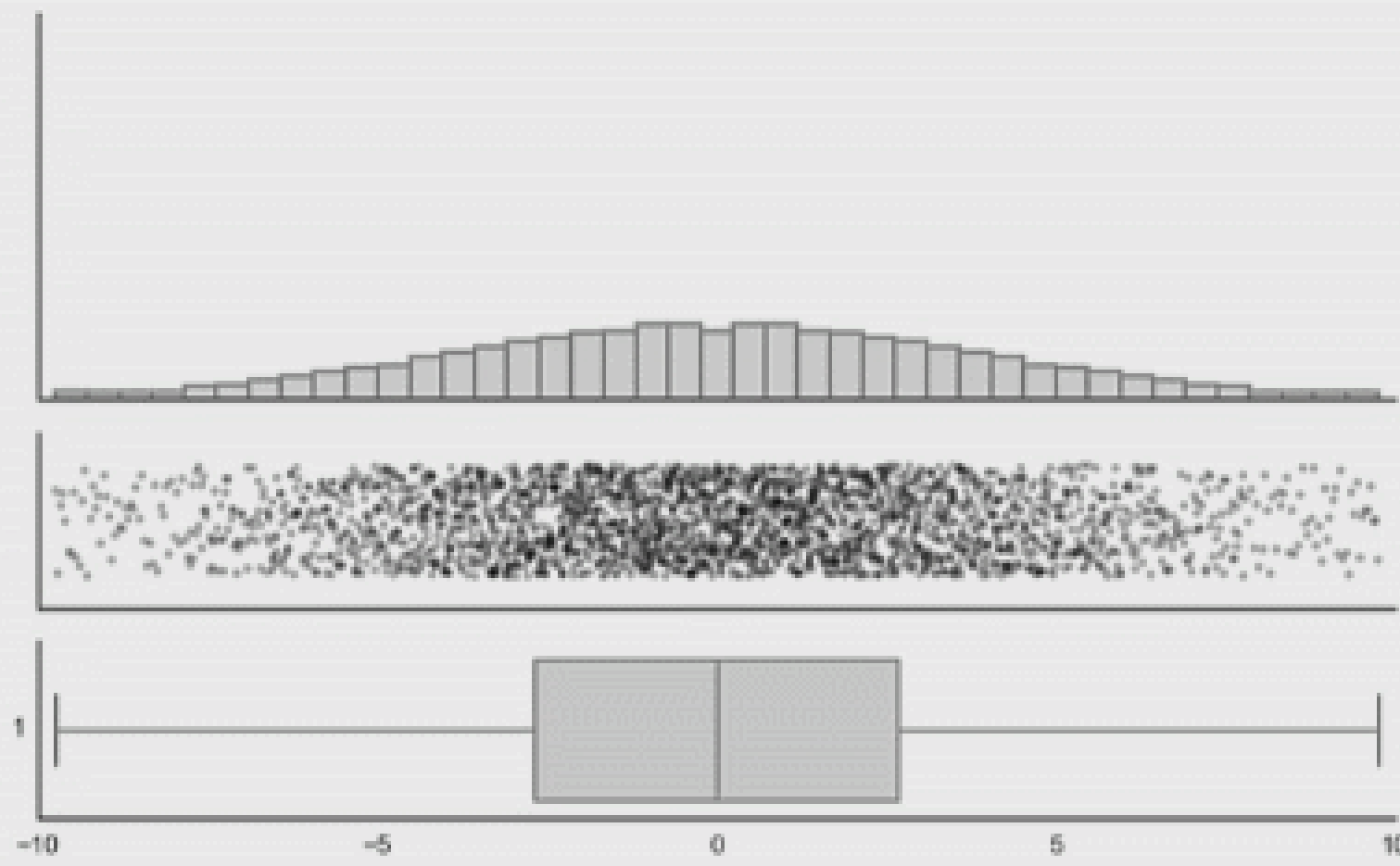
# Distributions & Correlations



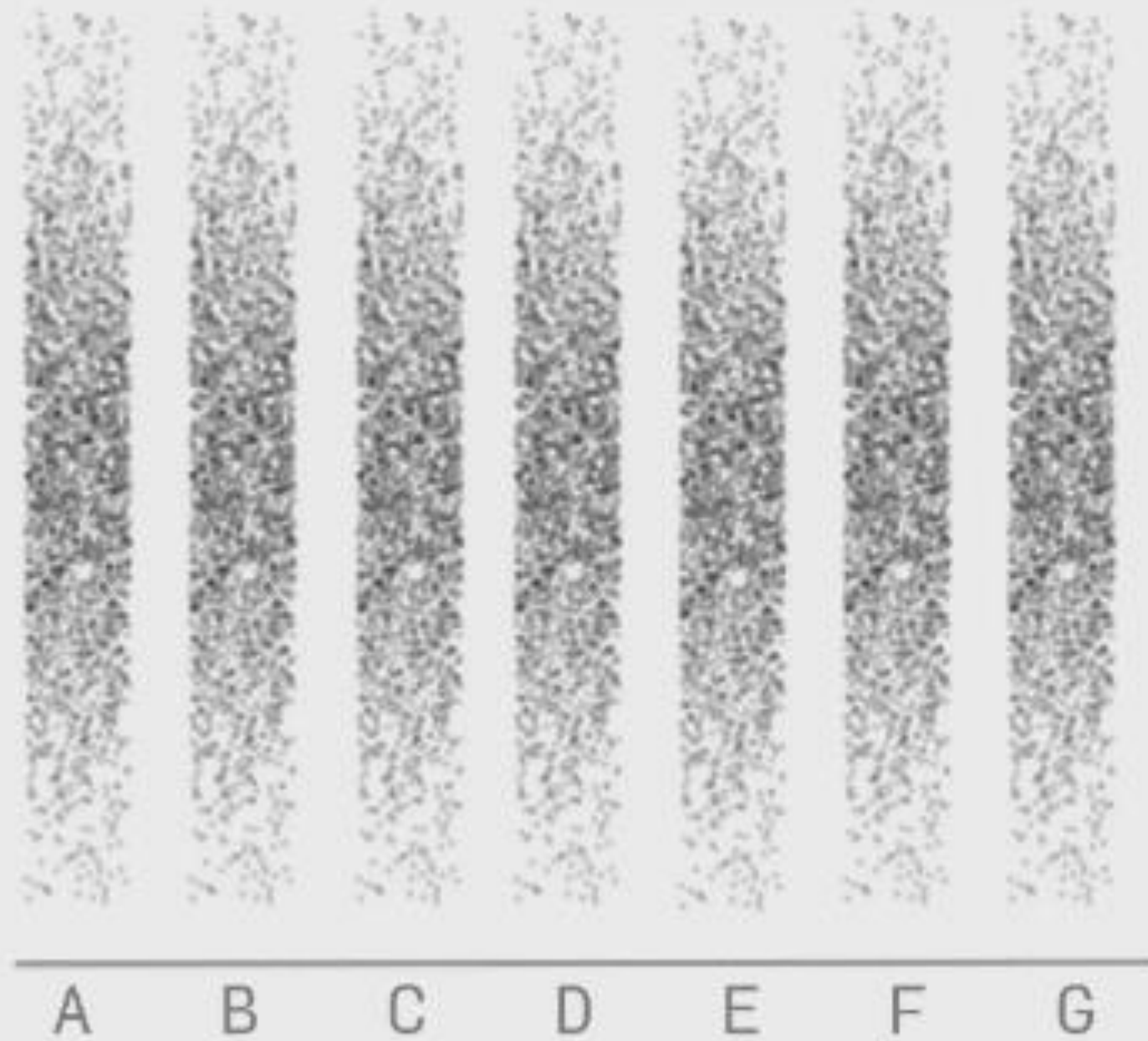
# Distributions & Correlations

## Violin Plot + Box Plot v3

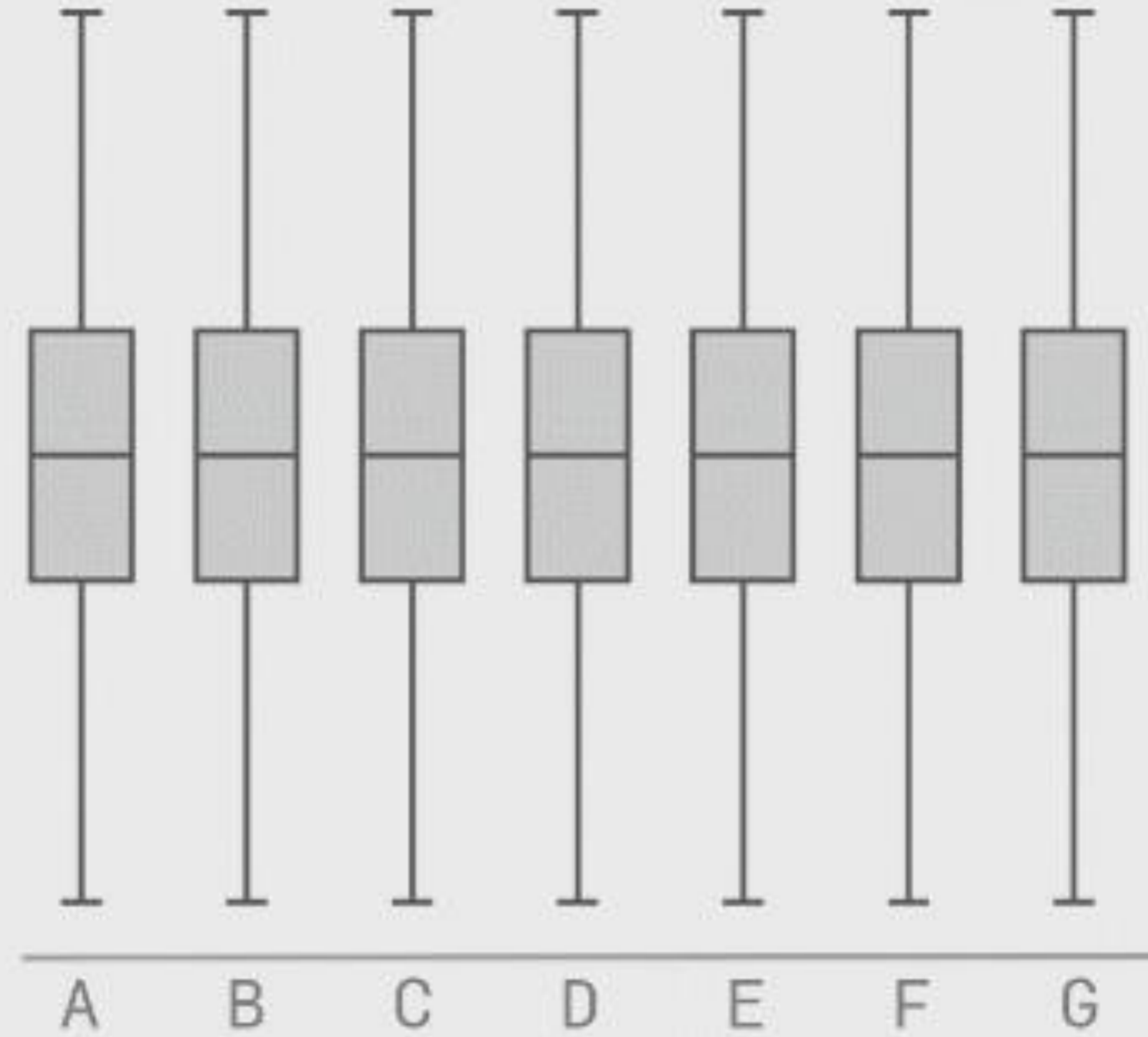




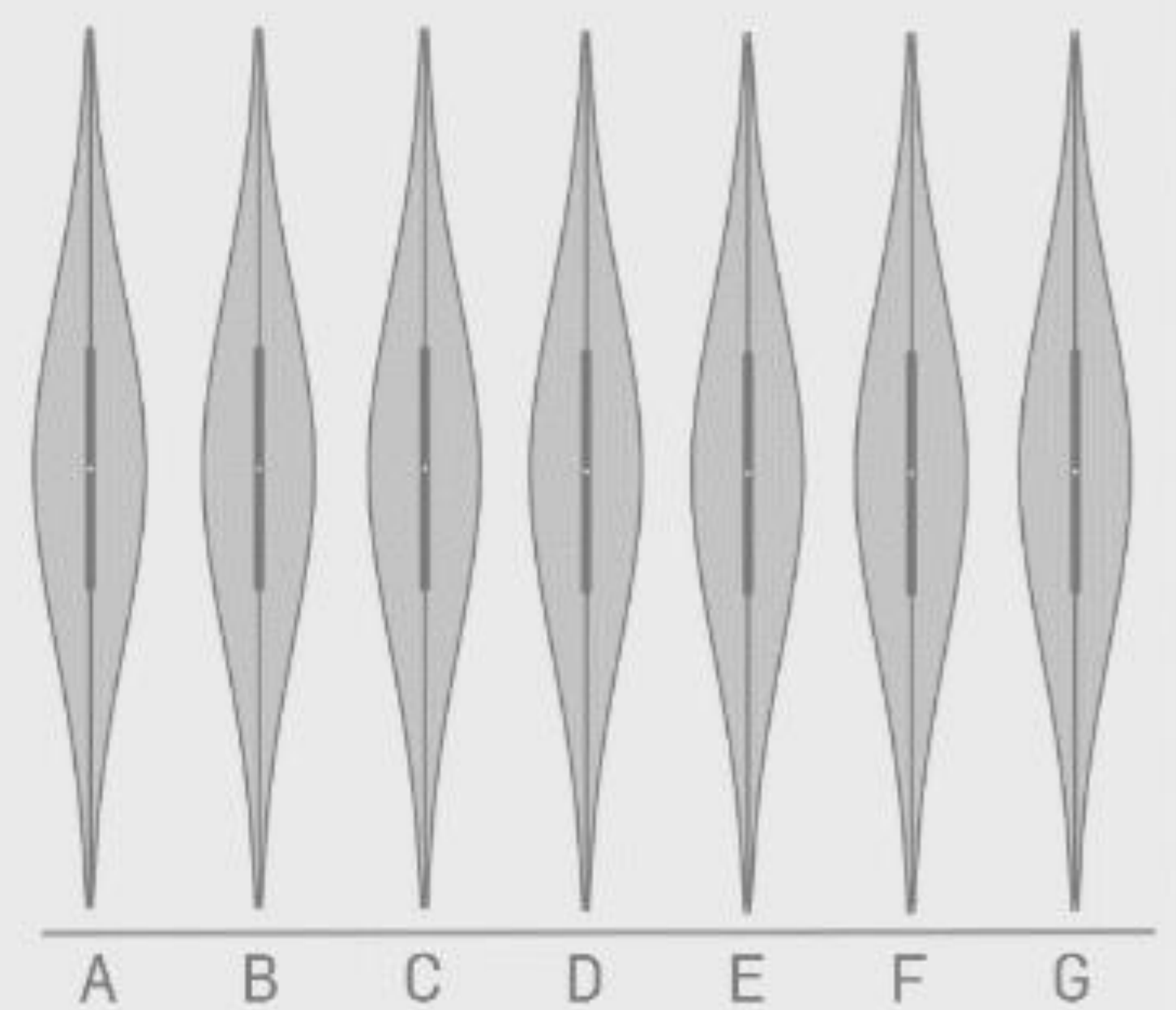
**Raw Data**



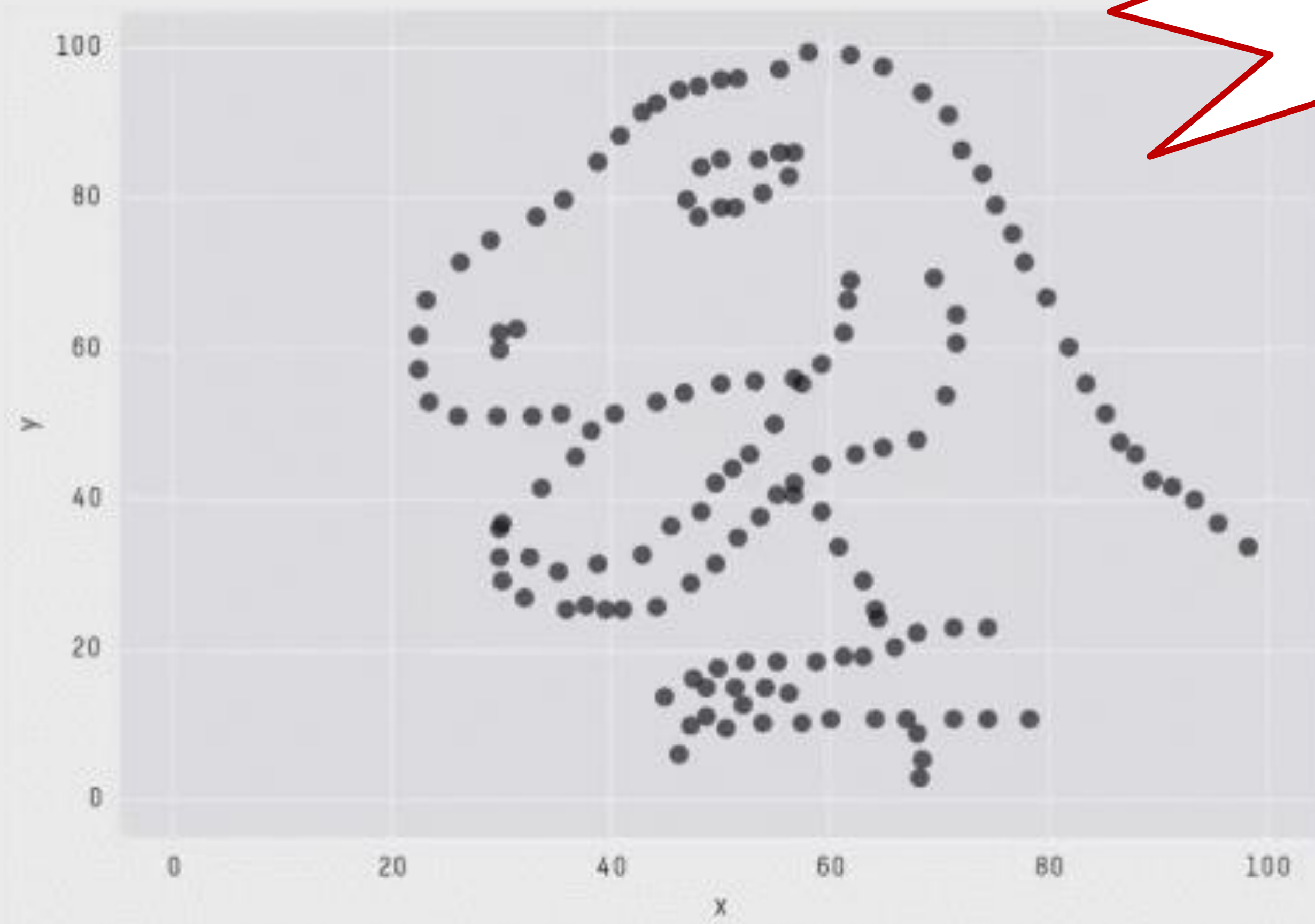
**Box-plot of the Data**



**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

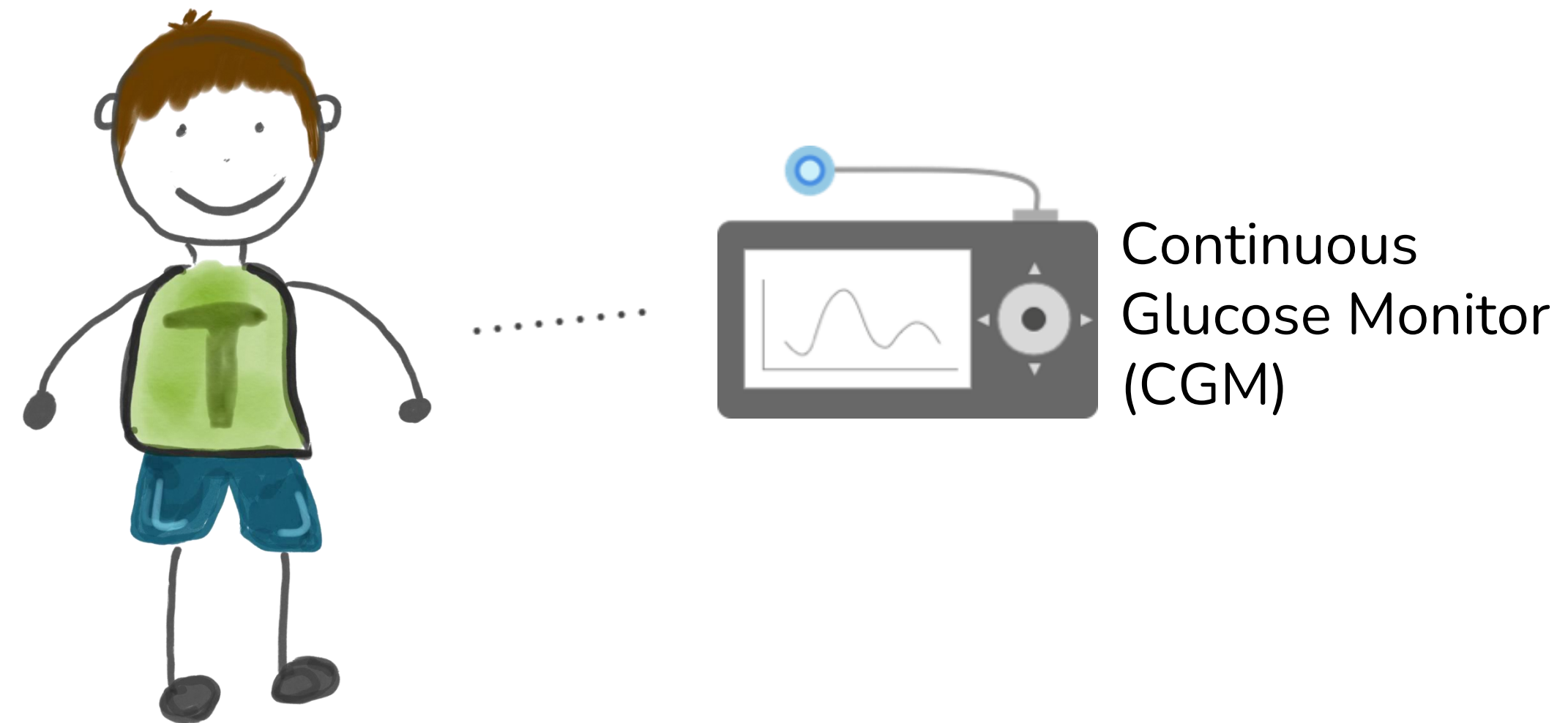
AN EXAMPLE OF TASK ANALYSIS

→ VISUALIZATION DESIGN

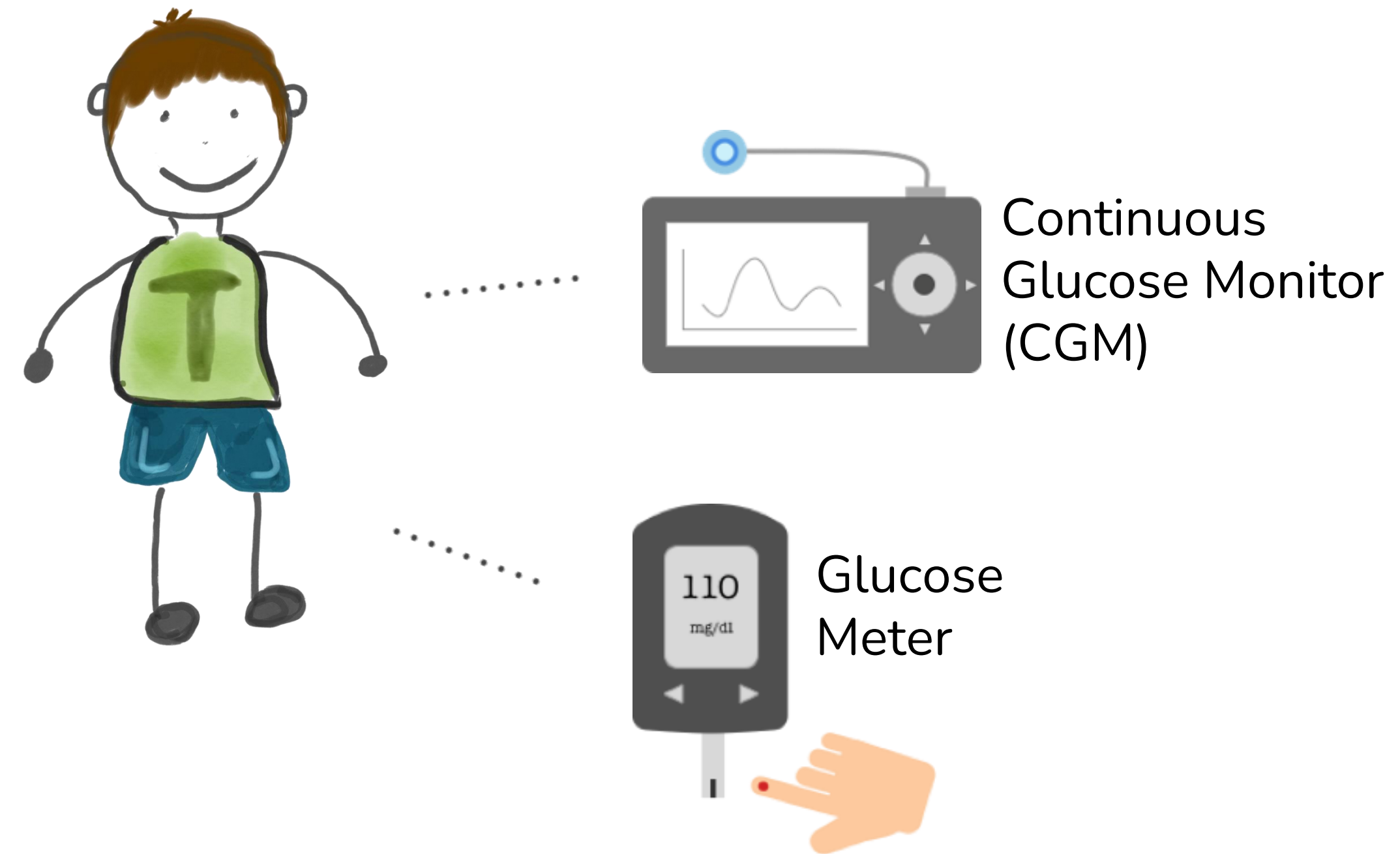
Imagine a 10-year-old kid, who has been diagnosed with type 1 diabetes...



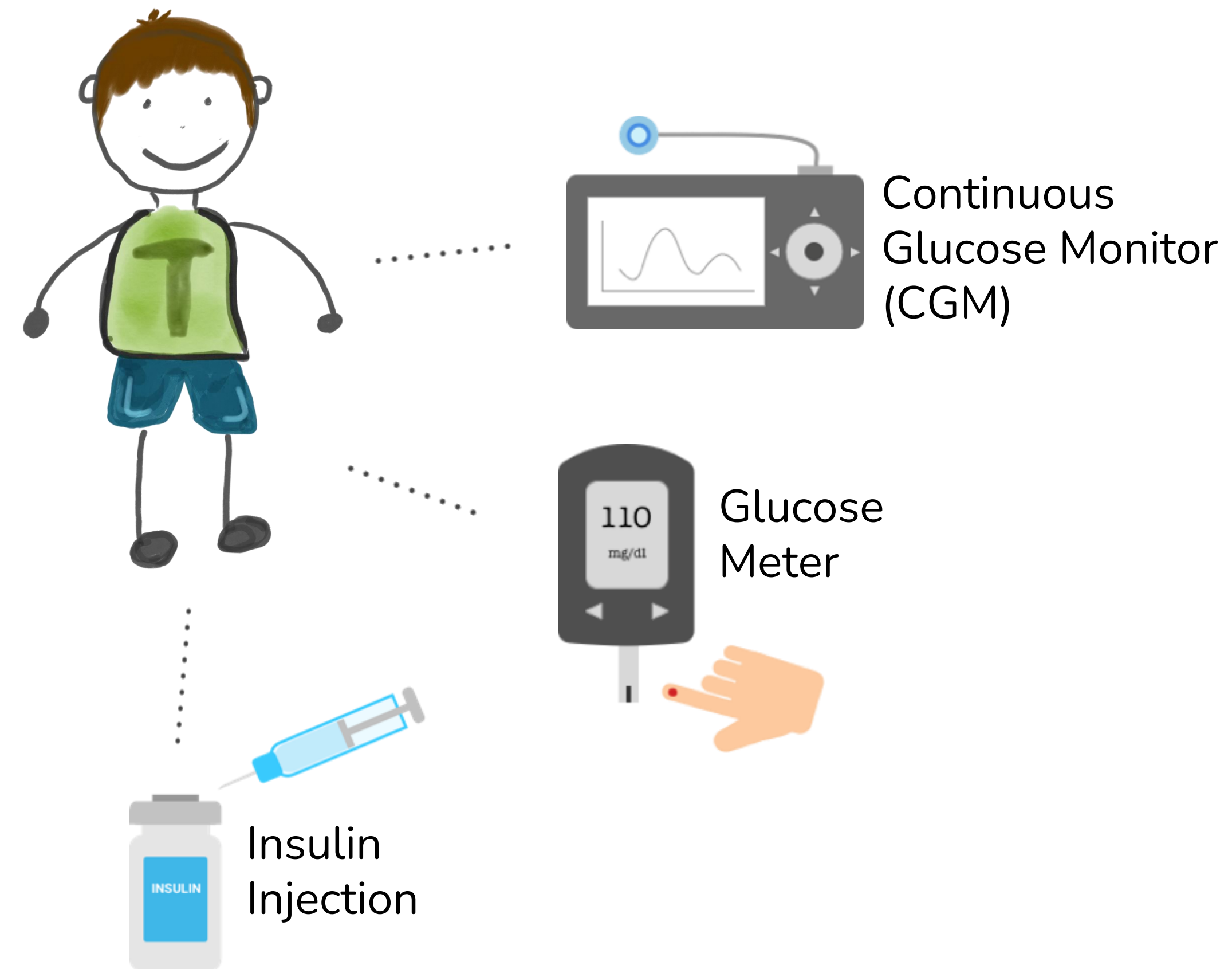
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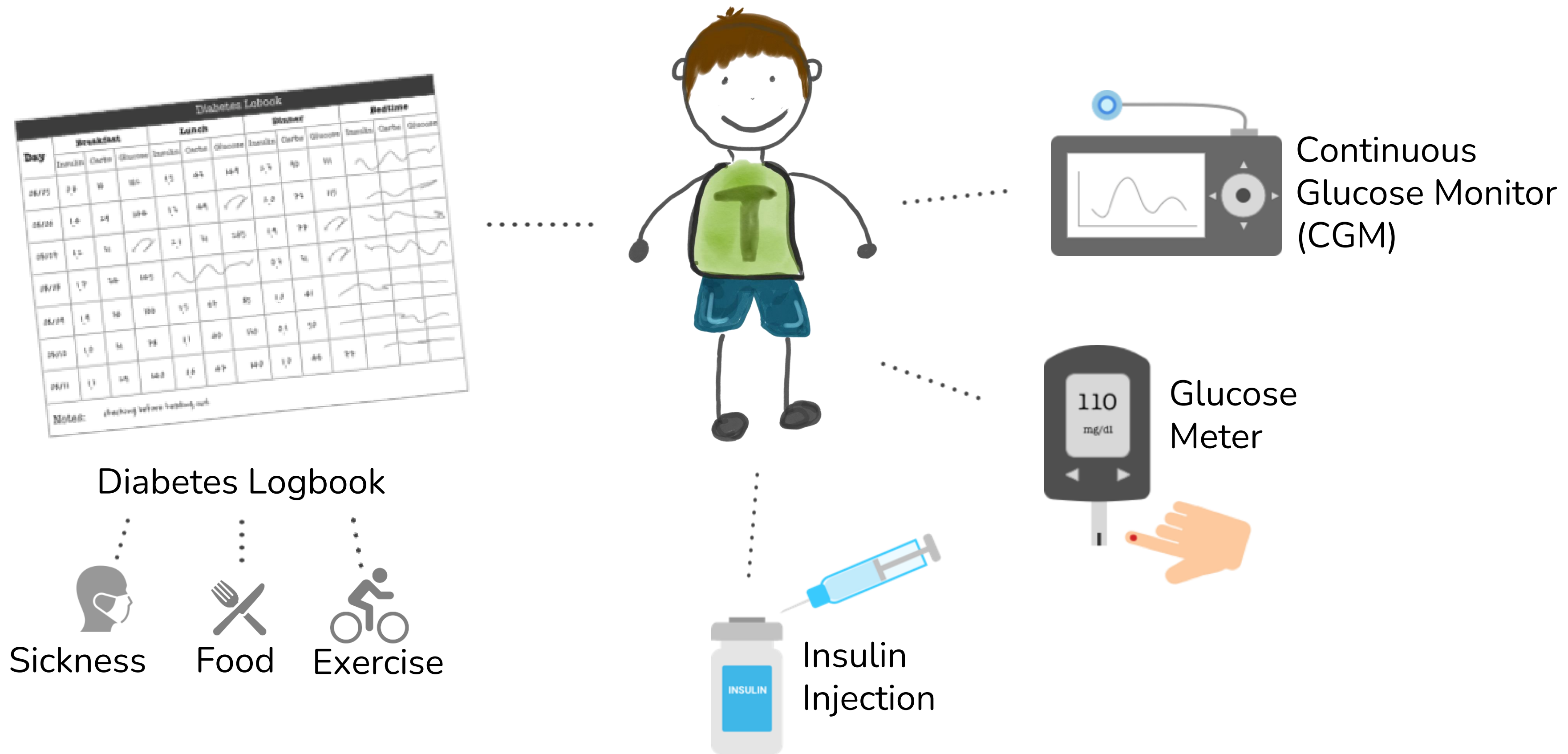
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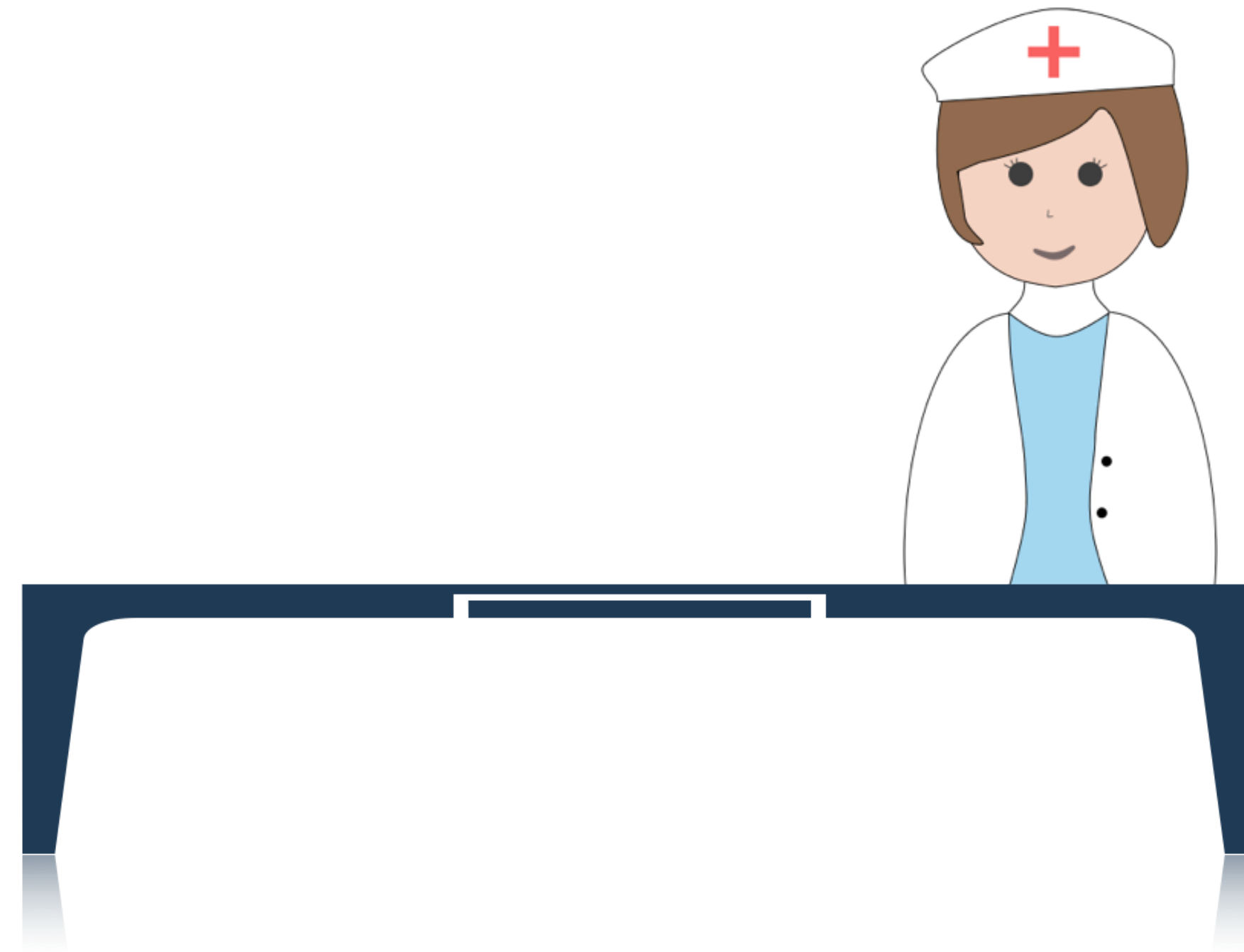
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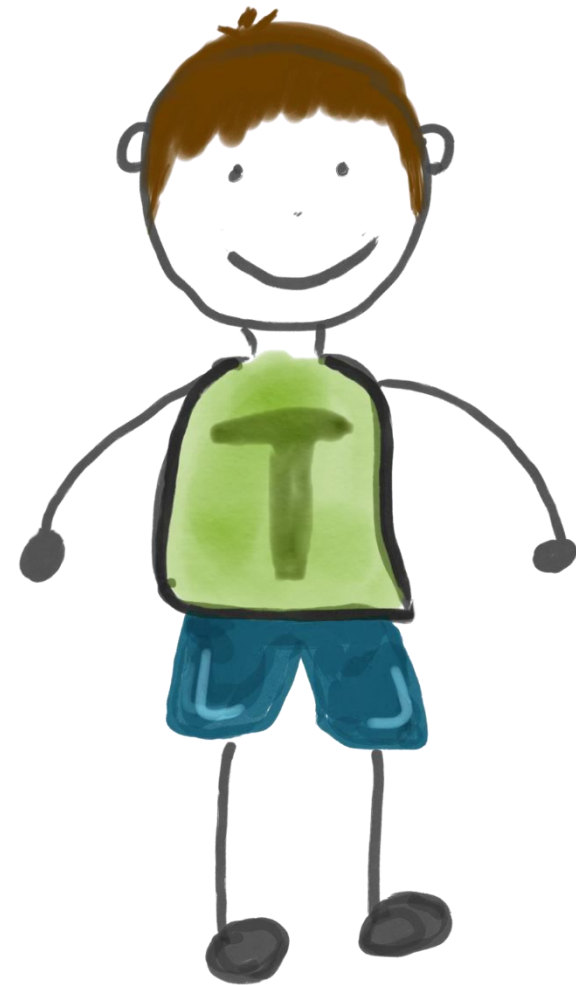


During a clinical visit ...





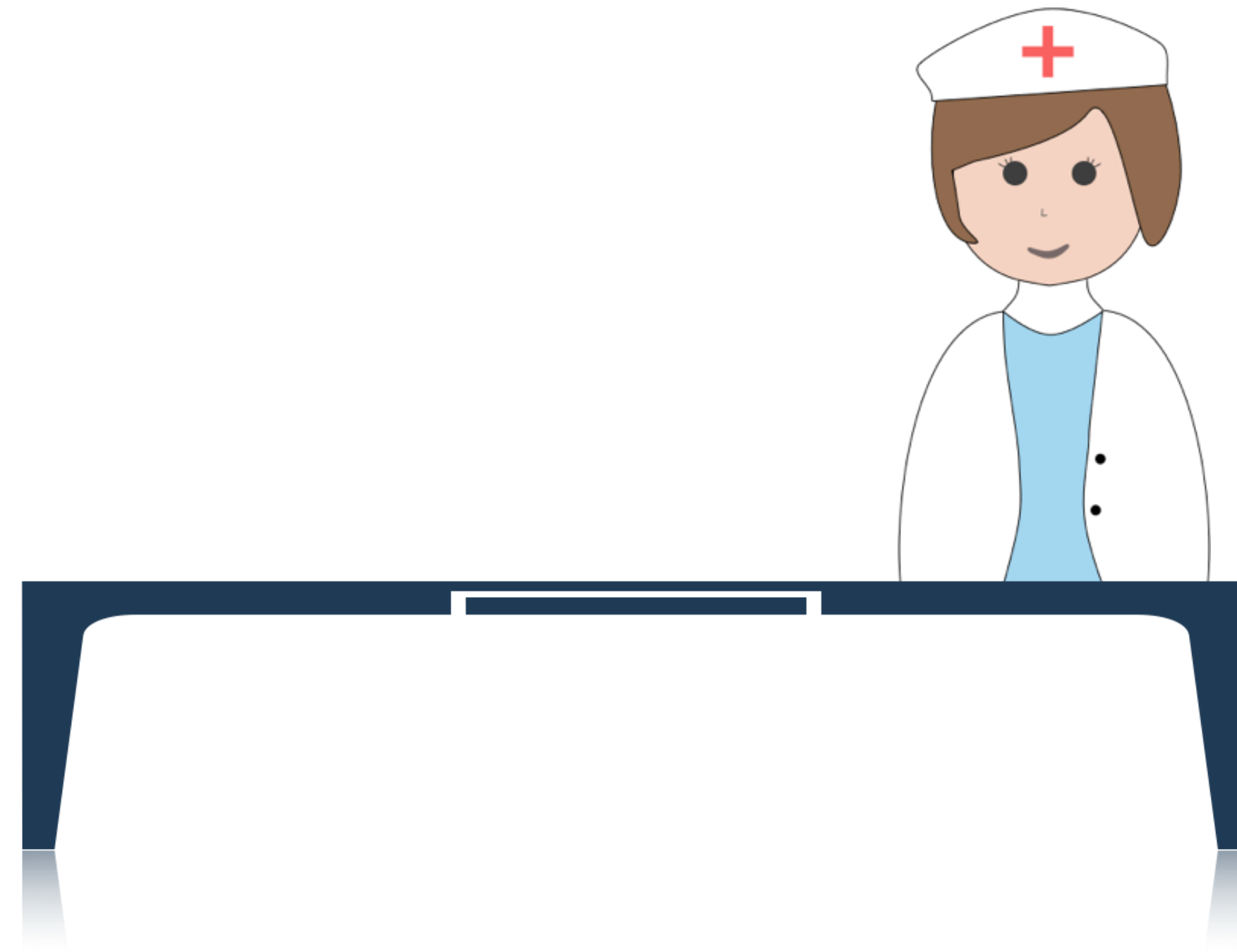
During a clinical visit ...



Diabetes Logbook

Day	Breakfast			Lunch			Dinner			Bedtime		
	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose
08/25	2.0	30	165	1.5	45	180	1.5	30	150	1.0	20	140
08/26	1.8	25	150	1.2	40	170	1.2	25	160	0.8	15	130
08/27	1.5	20	140	1.0	35	160	1.0	20	150	0.7	10	120
08/28	1.7	28	155	1.1	38	175	1.1	22	155	0.9	12	135
08/29	1.6	26	150	1.0	36	170	1.0	21	150	0.8	11	130
08/30	1.8	27	152	1.1	37	172	1.1	23	152	0.9	13	132
08/31	1.4	24	145	0.9	34	165	0.9	19	145	0.7	9	125

Note: checking before testing out.



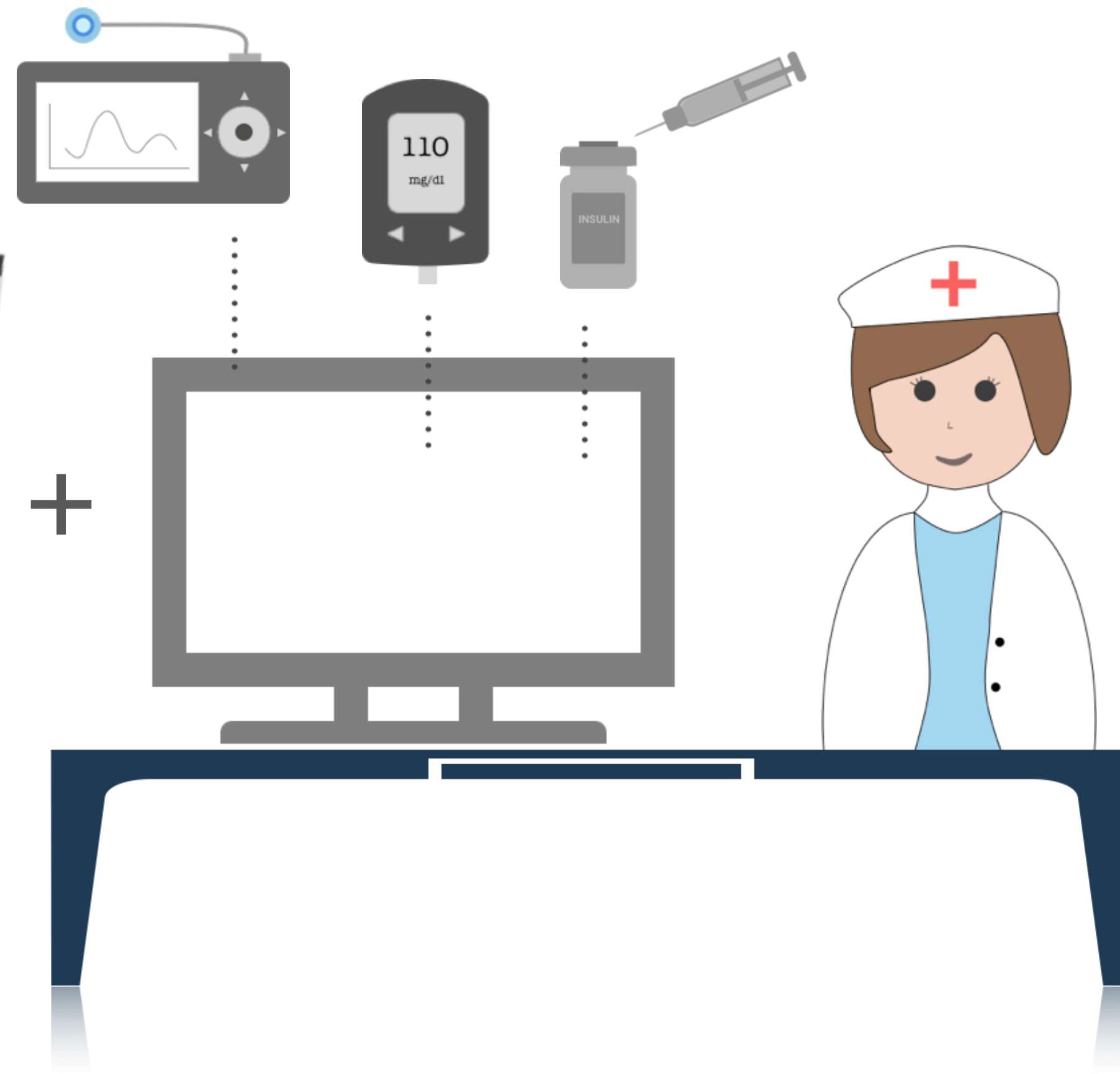
During a clinical visit ...



Diabetes Logbook

Day	Breakfast			Lunch			Dinner			Bedtime		
	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose
08/25	2.0	30	160	1.5	45	140	1.5	30	110			
08/26	1.4	25	100	1.2	35	100	1.0	25	100			
08/27	1.5	30	110	1.1	30	100	1.5	35	110			
08/28	1.7	35	120			120	1.5	35	110			
08/29	1.8	30	100	1.5	35	100	1.5	35	110			
08/30	1.0	20	90	1.1	30	100	1.0	25	100			
08/31	1.1	25	100	1.0	30	100	1.0	25	100			

Note: checking before heading out.



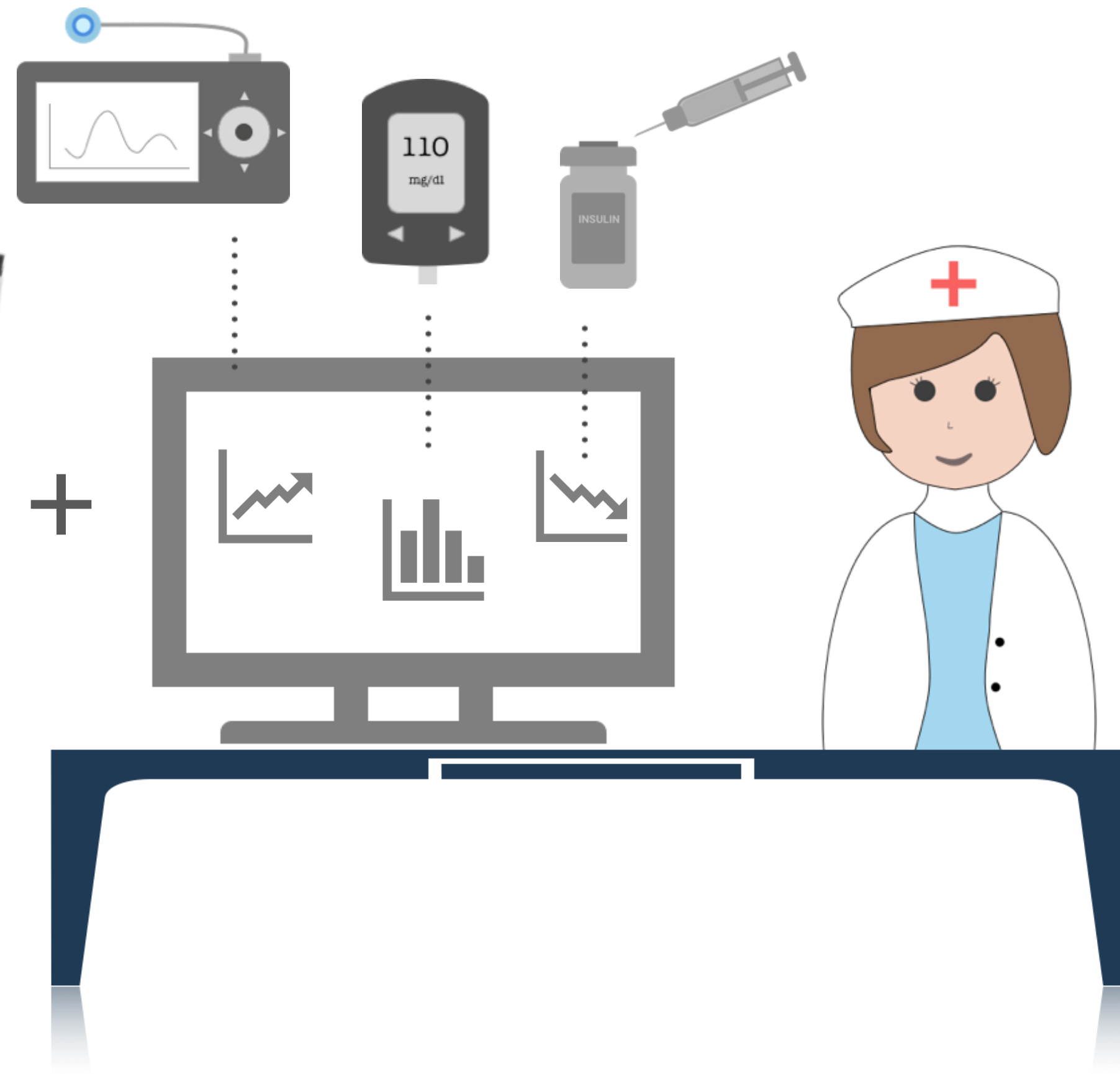
During a clinical visit ...



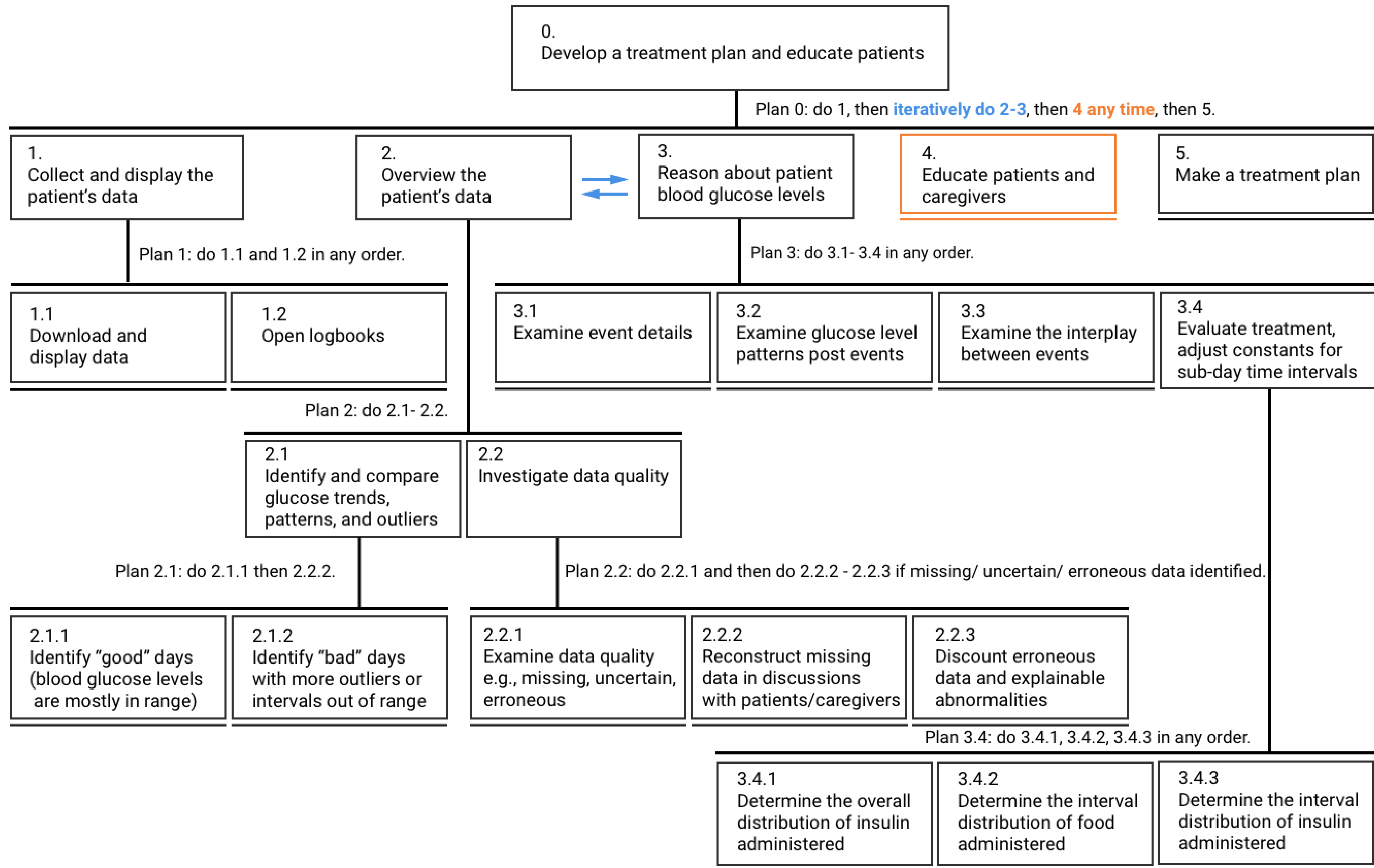
Diabetes Logbook

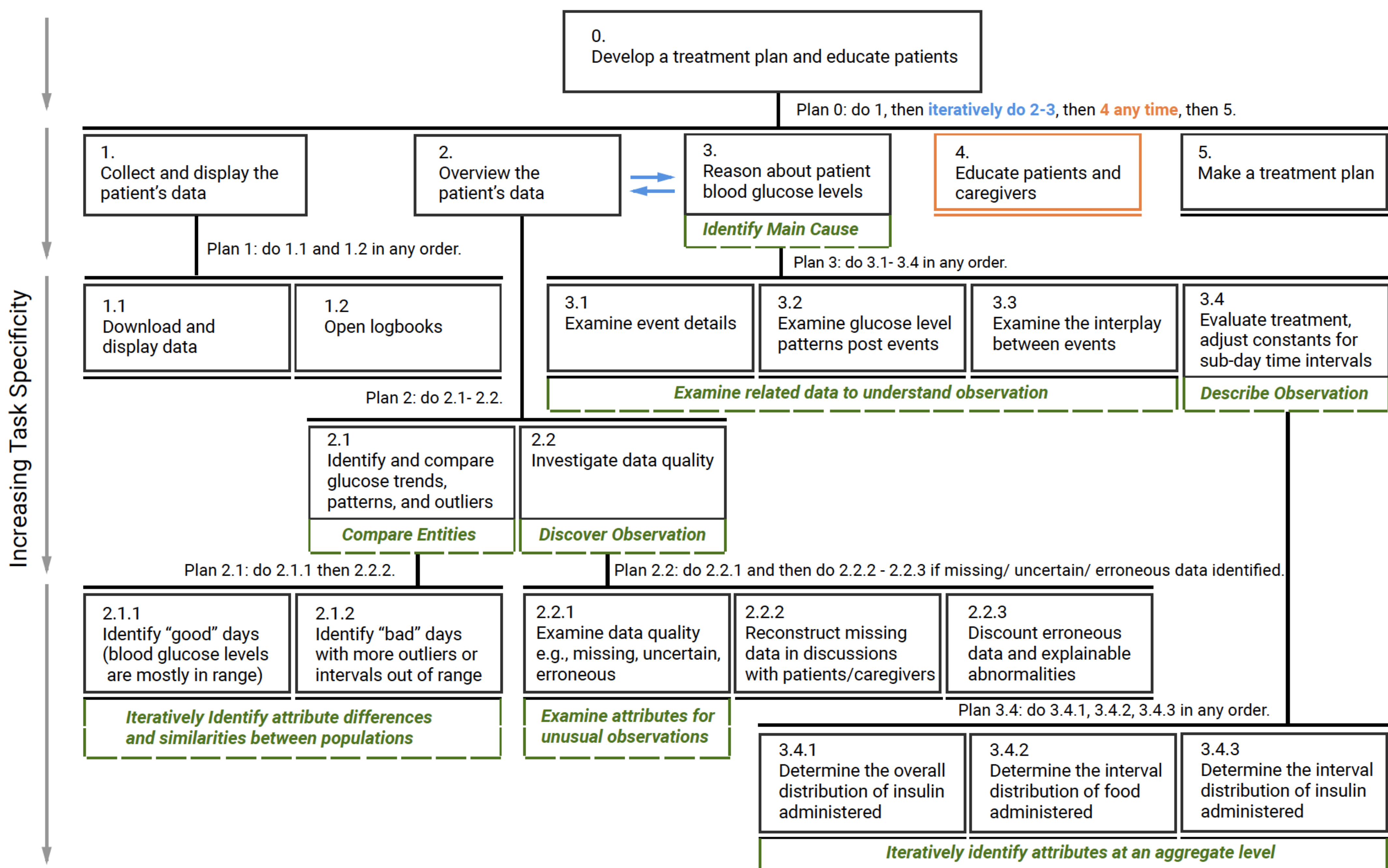
Day	Breakfast			Lunch			Dinner			Bedtime		
	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose	Insulin	Carbs	Glucose
08/25	2.0	30	100	1.5	45	105	1.5	30	100			
08/26	1.4	25	100	1.5	45	105	1.5	30	100			
08/27	1.5	30	100	1.5	45	105	1.5	30	100			
08/28	1.7	35	100	1.5	45	105	1.5	30	100			
08/29	1.5	30	100	1.5	45	105	1.5	30	100			
08/30	1.5	30	100	1.5	45	105	1.5	30	100			
08/31	1.5	30	100	1.5	45	105	1.5	30	100			

Note: checking before heading out.



Increasing Task Specificity

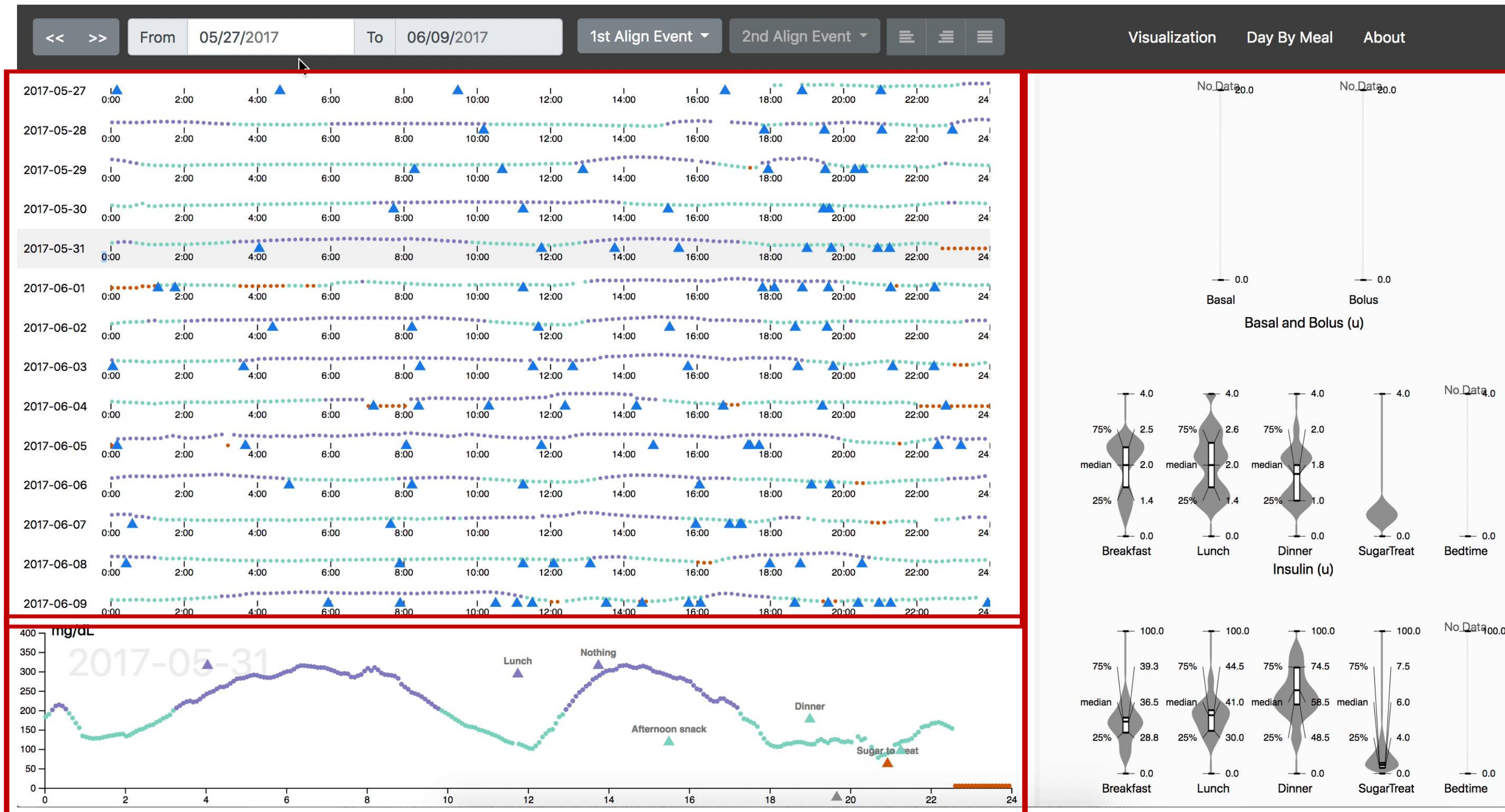




## Design Requirements

- DR1. Composite Visualization of **Integrated Data**
- DR2. Visualization of **Folded Temporal Data**
- DR3. **Align and Scale** Temporal Data
- DR4. **Summary** Statistics

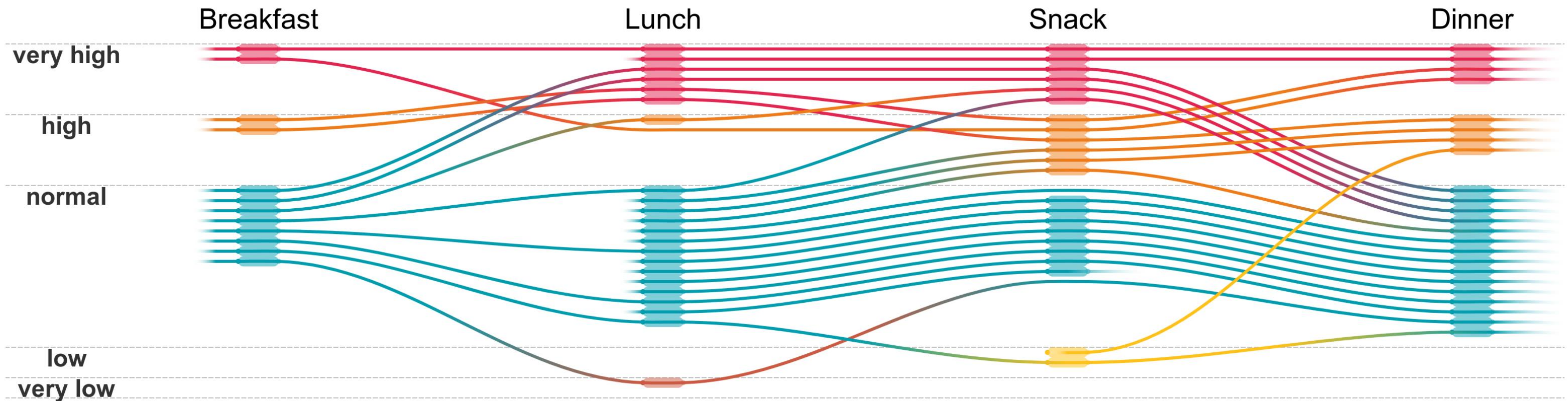
14-Day Overview



Summary Statistics Panel

Detail View

Alternate





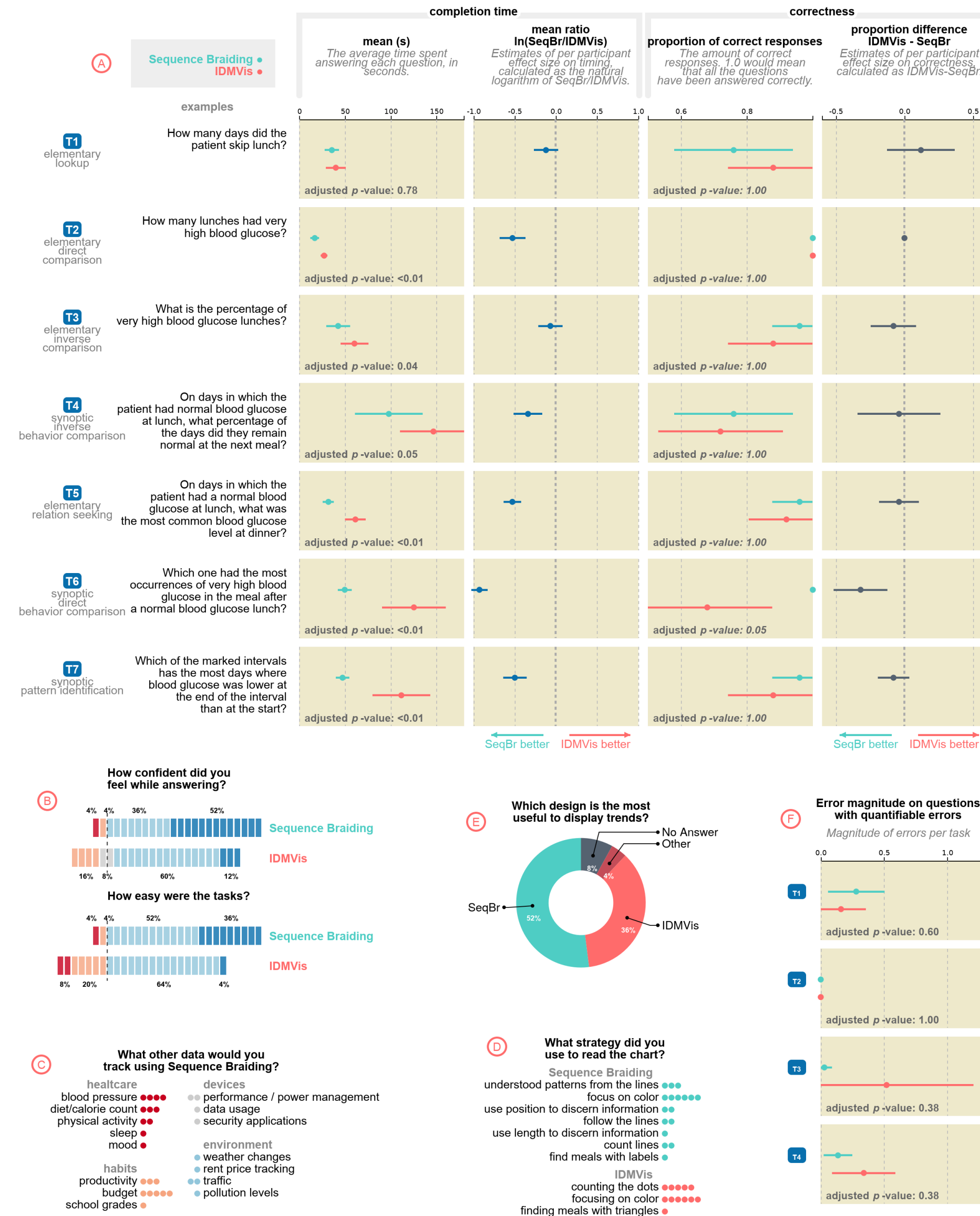


Fig. 9: Results of our evaluation comparing SEQUENCE BRAIDING vs. IDMVis [63]. **A** Completion time and correctness per task. Each row corresponds to the task at left, which is classified based on Andrienko & Andrienko [3]. The specific question instantiating that task for the study is in the second column. **B** Participants' Likert scale responses regarding confidence and ease of use. **C** Participants' answers when asked what other types of data would they use with SEQUENCE BRAIDING. **D** Participants' reported strategies used. **E** Participants' preference for which method was most useful for displaying trends. **F** Error magnitude per task, for those which are quantifiable.

A

Sequence Braiding •  
IDMVis •

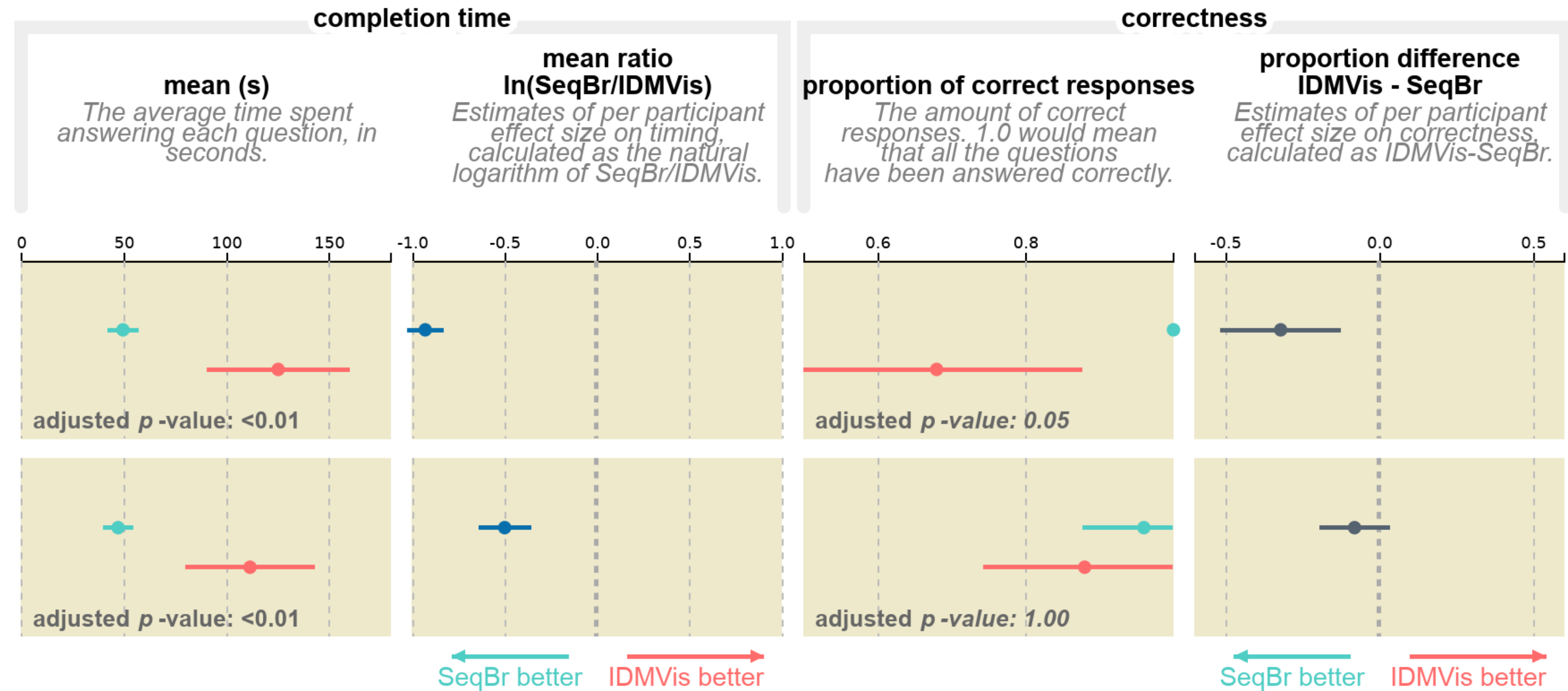
examples

**T6**  
synoptic  
direct  
behavior comparison

Which one had the most occurrences of very high blood glucose in the meal after a normal blood glucose lunch?

**T7**  
synoptic  
pattern identification

Which of the marked intervals has the most days where blood glucose was lower at the end of the interval than at the start?



# For Next Time

[neu-ds-4200-s22.github.io/schedule](https://neu-ds-4200-s22.github.io/schedule)

Look at the upcoming assignments and deadlines

- Textbook, Readings, & Reading Quizzes—Variable days
- In-Class Activities—If due, they are due 11:59pm the same day as class

Everyday Required Supplies:

- 5+ colors of pen/pencil
- White paper
- Laptop and charger

Use Canvas Discussions for general questions, email [codydunne-and-tas@ccs.neu.edu](mailto:codydunne-and-tas@ccs.neu.edu) for questions specific to you.



Week	Topics	Assignments
#1: Jan 17–21	What is visualization Design rules of thumb	A1—Setting up
#2: Jan 24–28	JS development, projects Marks & channels	A2—Encodings & xenographics
#3: Jan 31–Feb 04	Data types and tasks, Tableau D3 tutorial 1/2	P1—Pitches★
#4: Feb 07–11	In-class group formation D3 tutorial 2/2	A3—Tableau analysis P2—Proposal★
#5: Feb 14–18	Altair and JupyterLab Arrange tables	A4—D3 basic charts
#6: Feb 21–25	Color Pop-out, illusions	A5—Altair basic charts P3—Interview & tasks
#7: Feb 28–Mar 04	Interaction & animation (2)	A6—D3 event handling P4—Data, Initial sketches
#8: Mar 07–11	Trees & networks (2)	P5—Final sketches & plan★
Mar 14–18	Spring Break	
#9: Mar 21–25	Project feedback & work Spatial, 3D, and scientific vis.	A7—D3 Brushing & linking 1 P6—Implementation 1
#10: Mar 28–Apr 01	Validation & evaluation Flex day	A8—Brushing & linking 2 P7—Implementation 2
#11: Apr 04–08	Project usability testing, how to give a talk Storytelling	
#12: Apr 11–15	Project presentations 1/2 Project presentations 2/2	P9—Presentations★☒
#13: Apr 18–22	Flex day	P10—Presentation peer review
#14: Apr 25–29	Reflecting & project work	
May 02–06		P11—Video & Final Deliverables★☒