



# CoGrammar

## Advanced Data Visualisation and Data Analytics

**SKILLS  
FOR LIFE**

**SKILLS BOOTCAMPS**



Department  
for Education

## Data Science Lecture Housekeeping

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- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly.  
**(FBV: Mutual Respect.)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Open Classes.  
You can submit these questions here: [Open Class Questions](#)

## Data Science Lecture Housekeeping cont.

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- For all **non-academic questions**, please submit a query:  
[www.hyperiondev.com/support](https://www.hyperiondev.com/support)
- Report a **safeguarding** incident:  
[www.hyperiondev.com/safeguardreporting](https://www.hyperiondev.com/safeguardreporting)
- We would love your **feedback** on lectures: [Feedback on Lectures](#)

# Lecture Objectives

- Generate graphs in Python using **Matplotlib and Seaborn**.
- Gain an understanding of more **advanced graphing techniques**.

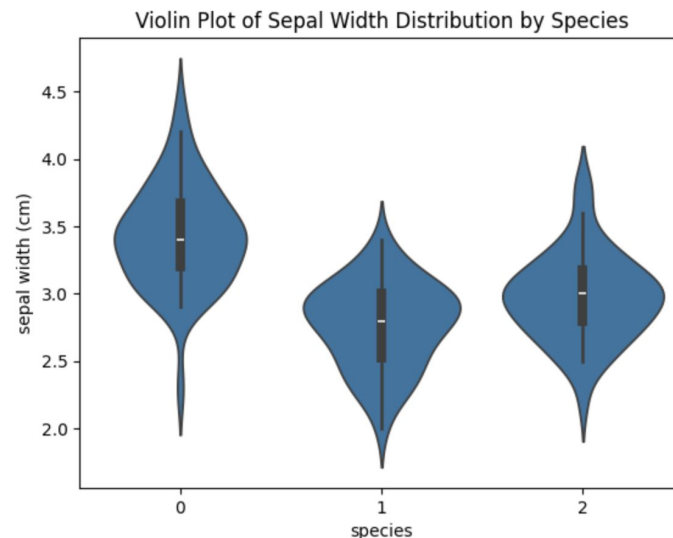
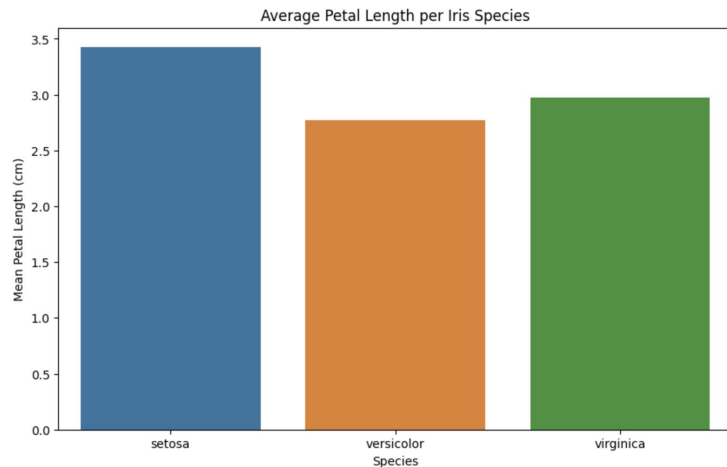
# Key Goals of Data Visualization

- ★ Expose **underlying trends, outliers, and relationships within data.**
- ★ Support **intuitive exploration** and **rapid insight generation.**
- ★ Create **visual narratives** that resonate with your audience.

# Why Advanced Visualization?

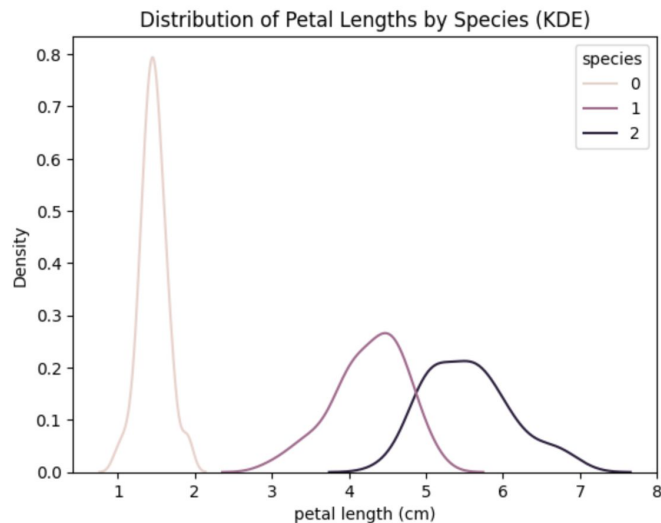
- ★ Complex data demands **more sophisticated and flexible visual analysis** methods.
- ★ Answering **specific questions** sometimes requires **going beyond standard plots**.

# Beyond Standard Charts - Distributions



# Kernel Density Plots (KDEs)

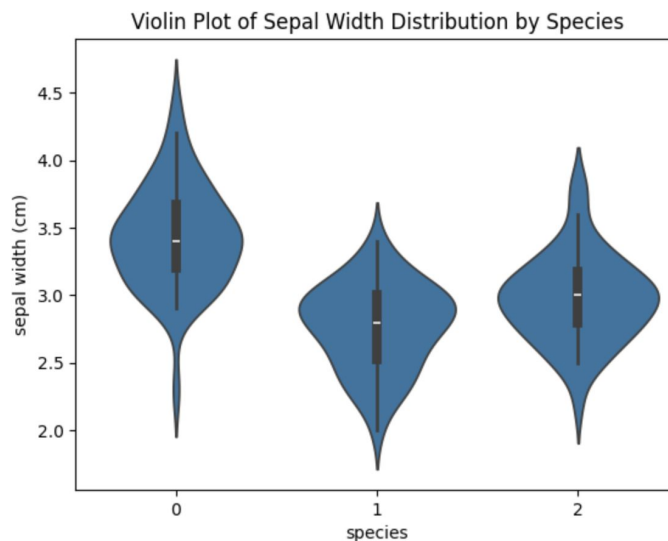
- ★ Smooth curves representing the **density of data points**, great for **comparing distributions of several groups**.





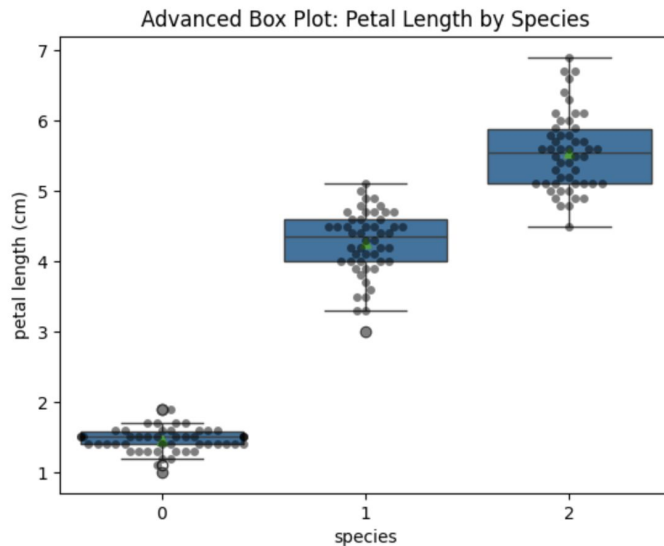
# Violin Plots

- ★ Combine aspects of KDEs and boxplots, **ideal for showing density alongside summary statistics.**

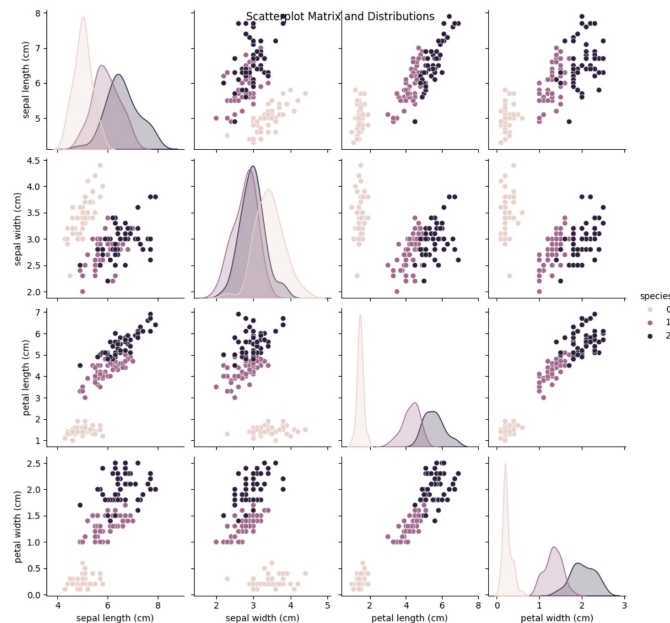


# Advanced Box Plots

- ★ Overlay raw data points or swarm plots on top of standard box plots to **convey more intricate distribution details**.

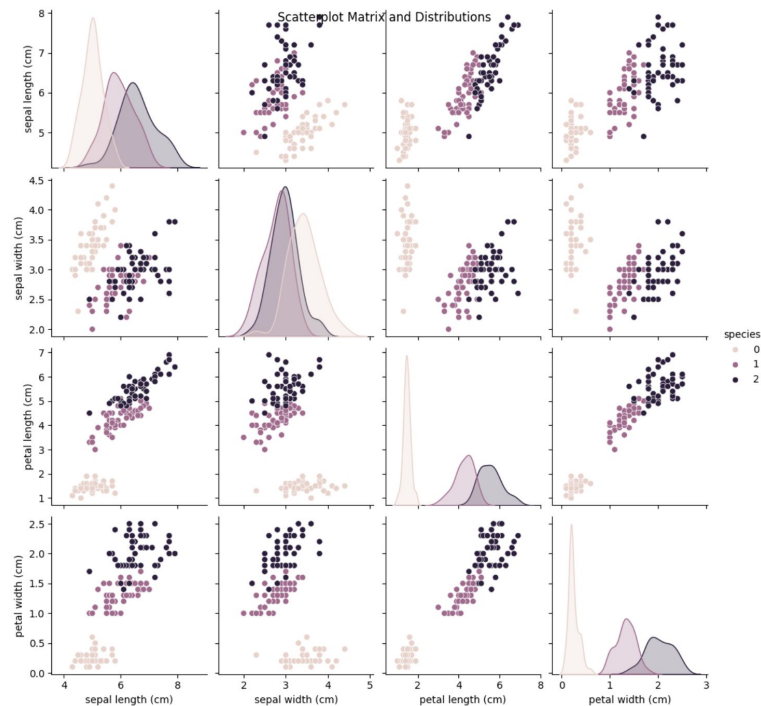


# Beyond Standard Charts - Multidimensionality




# Scatter plot Matrices

- ★ Compact way to **depict pairwise relationships between several variables simultaneously.**




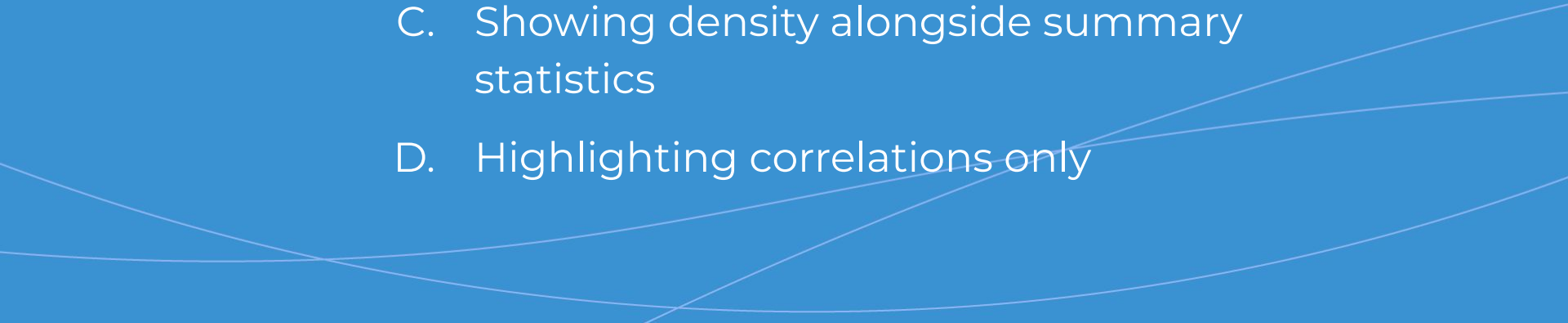


# Which plot is best for comparing distributions of several groups?

- A. Scatter plot
  - B. Bar chart
  - C. Kernel Density Plots (KDEs)
  - D. Pie chart
- 



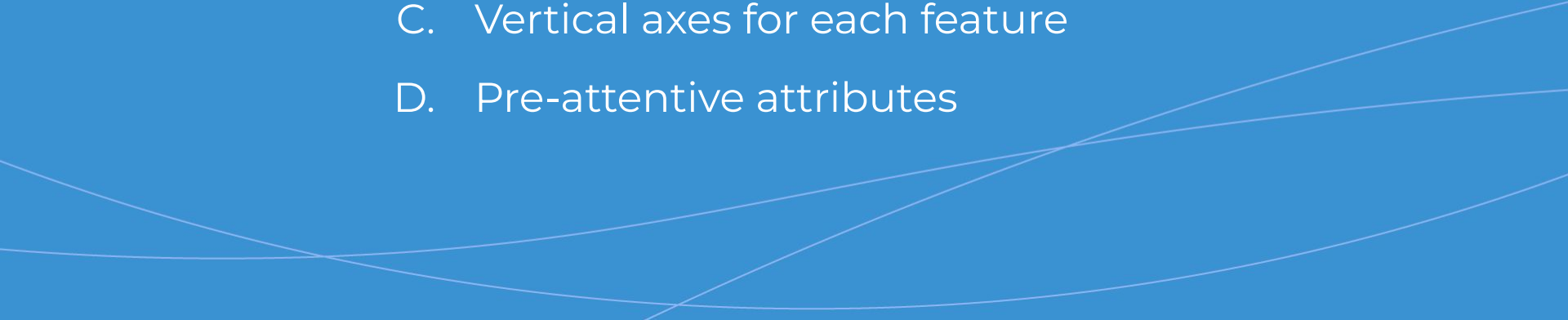
# Violin plots are ideal for:

- 
- A. Showing relationships over time
  - B. Comparing individual values
  - C. Showing density alongside summary statistics
  - D. Highlighting correlations only
- 



# Advanced Box Plots can be enhanced by adding:



- A. Color-coded matrices
  - B. Raw data points or swarm plots
  - C. Vertical axes for each feature
  - D. Pre-attentive attributes
- 



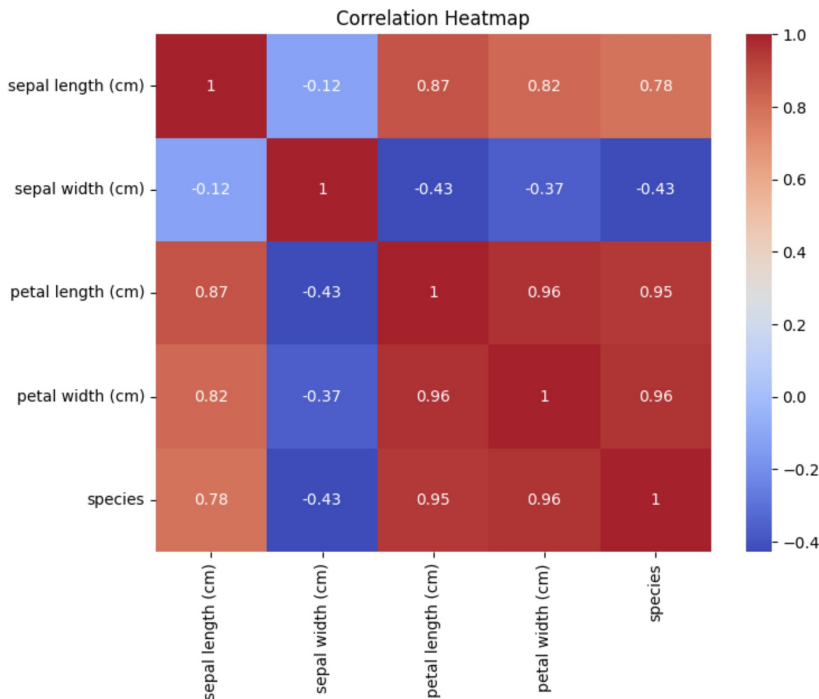
# Let's Breathe!

**Let's take a small break  
before moving on to the  
next topic.**



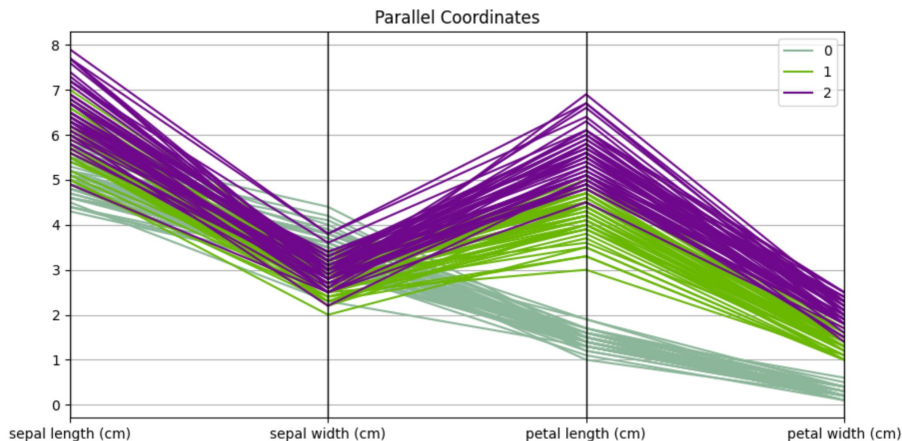
# Heatmaps

- ★ Color-coded matrices excellent for **revealing structure, highlighting correlations, and identifying clusters.**
- ★ **Customization** in heatmaps is key for optimal interpretation.

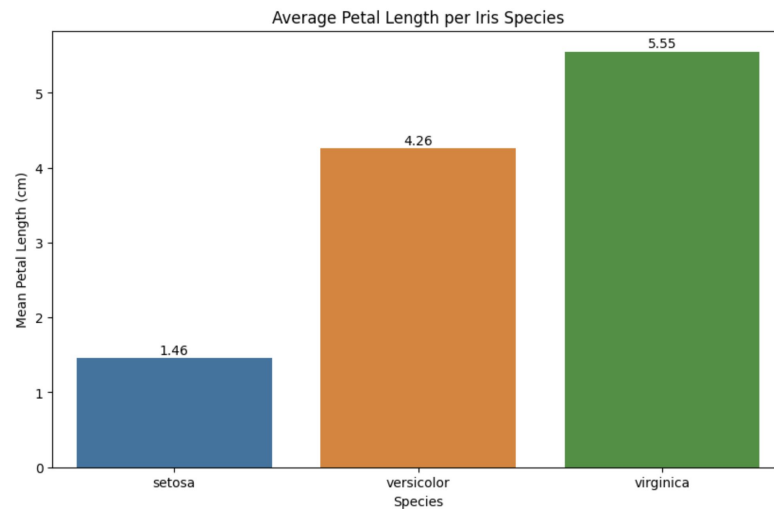
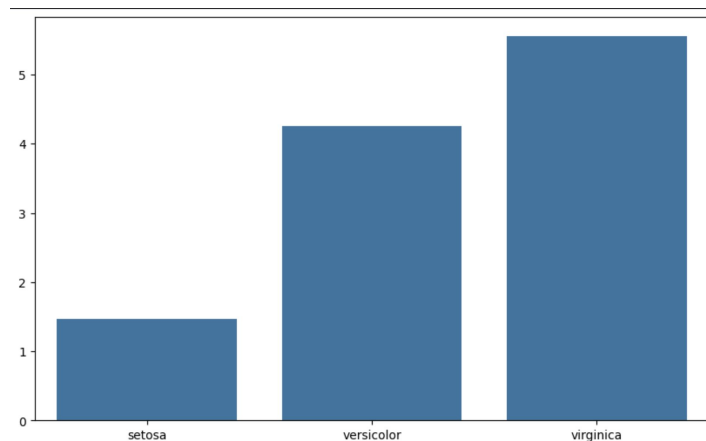


# Parallel Coordinates

- ★ Show **many dimensions on the same plot**; each feature has a vertical axis, data points become lines crossing them. **Ideal when you have many interrelated variables and need to spot outliers or group characteristics.**



# Principles of Effective Visualization



# 1. Visual Perception

- ★ **Pre-attentive attributes** (color, position, size, shape) are quickly processed by our brains. **Use them deliberately for emphasis.**
- ★ **Our brains group visual elements automatically;** leverage this fact by using **spatial arrangement, similarity, and clear layout to reinforce the key takeaways of your visualization.**

## 2. Chart Choice vs. Your Question


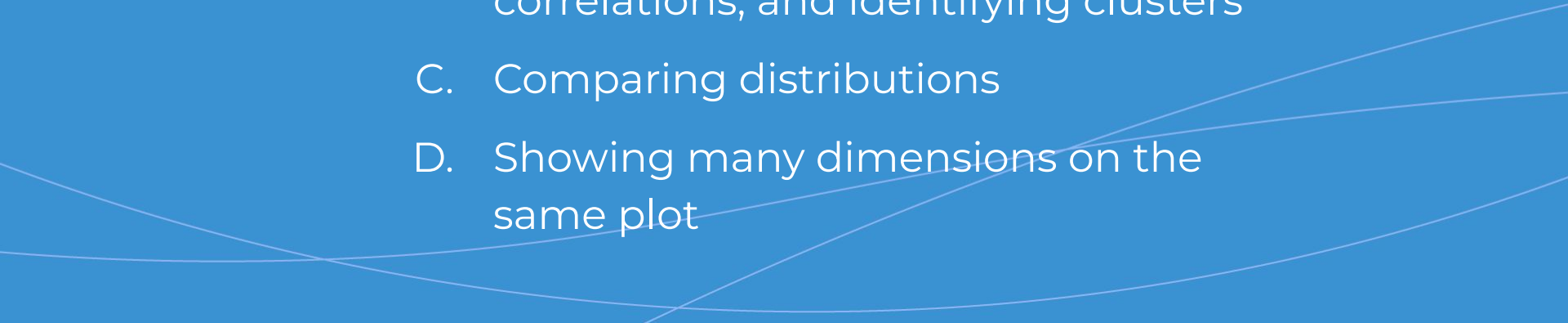
- ★ Comparing **individual values**? Consider **bar charts, or dot plots**.
- ★ Analyzing **trends over time**? **Line charts** are well-suited.
- ★ Interested in **proportions of a whole**? **Pie charts** (sparingly), treemaps, etc.
- ★ Focus on **relationships between variables**? **Scatter plots** (and their extensions) and **heatmaps** excel.

### 3. Less is More

- ★ **Clear labels, thoughtful color choice, and minimal clutter improve the impact of your visual message.** Unnecessary embellishment creates a distraction.



# Heatmaps are excellent for:

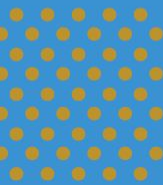

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- A. Depicting pairwise relationships
  - B. Revealing structure, highlighting correlations, and identifying clusters
  - C. Comparing distributions
  - D. Showing many dimensions on the same plot
- 



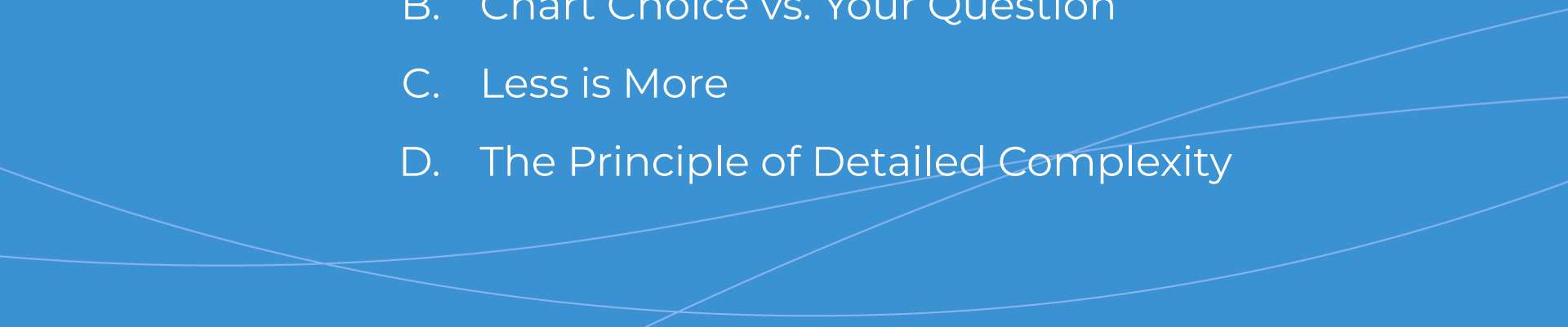
# Parallel Coordinates are used to:

- 
- A. Compare individual values
  - B. Analyze trends over time
  - C. Show many dimensions on the same plot
  - D. Focus on relationships between two variables
- 





# Which principle emphasizes the use of clear labels, thoughtful color choice, and minimal clutter for effective visualization?

- A. Visual Perception
  - B. Chart Choice vs. Your Question
  - C. Less is More
  - D. The Principle of Detailed Complexity
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## Q & A SECTION

**Please use this time to ask  
any questions relating to the  
topic, should you have any.**



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**Thank you for joining!**