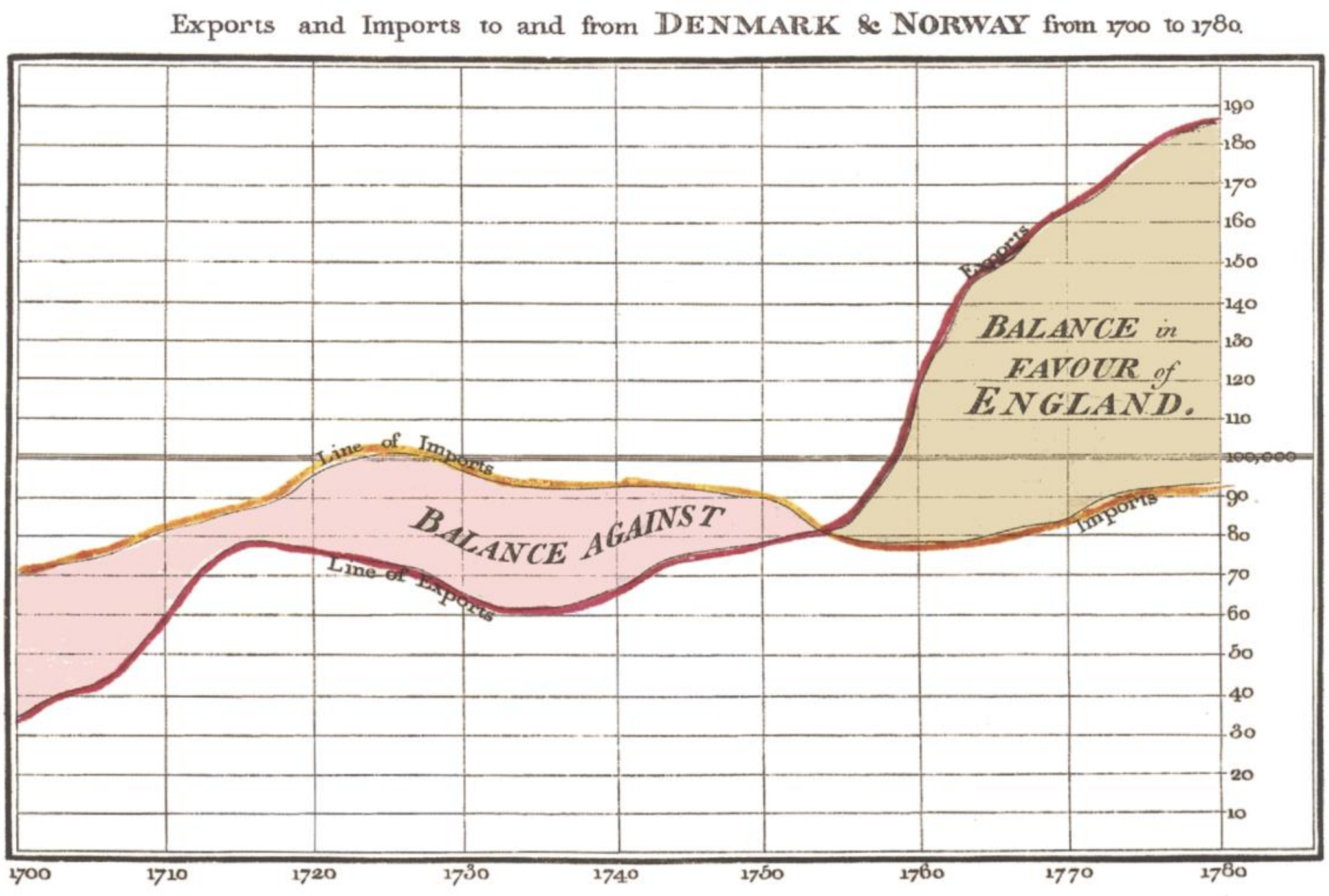
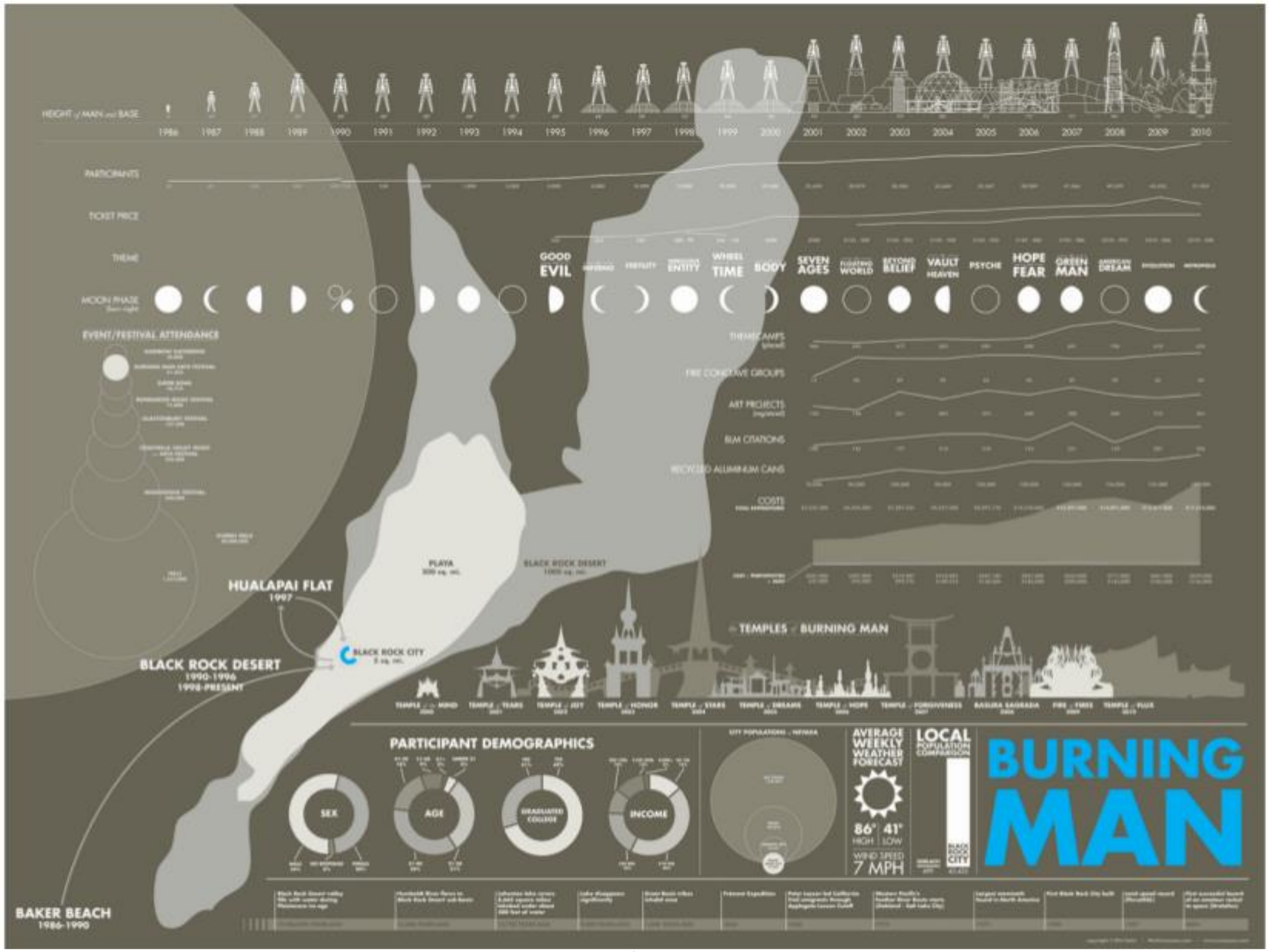
Data Visualizations
vs
Infographics

Data Visualization



Infographic

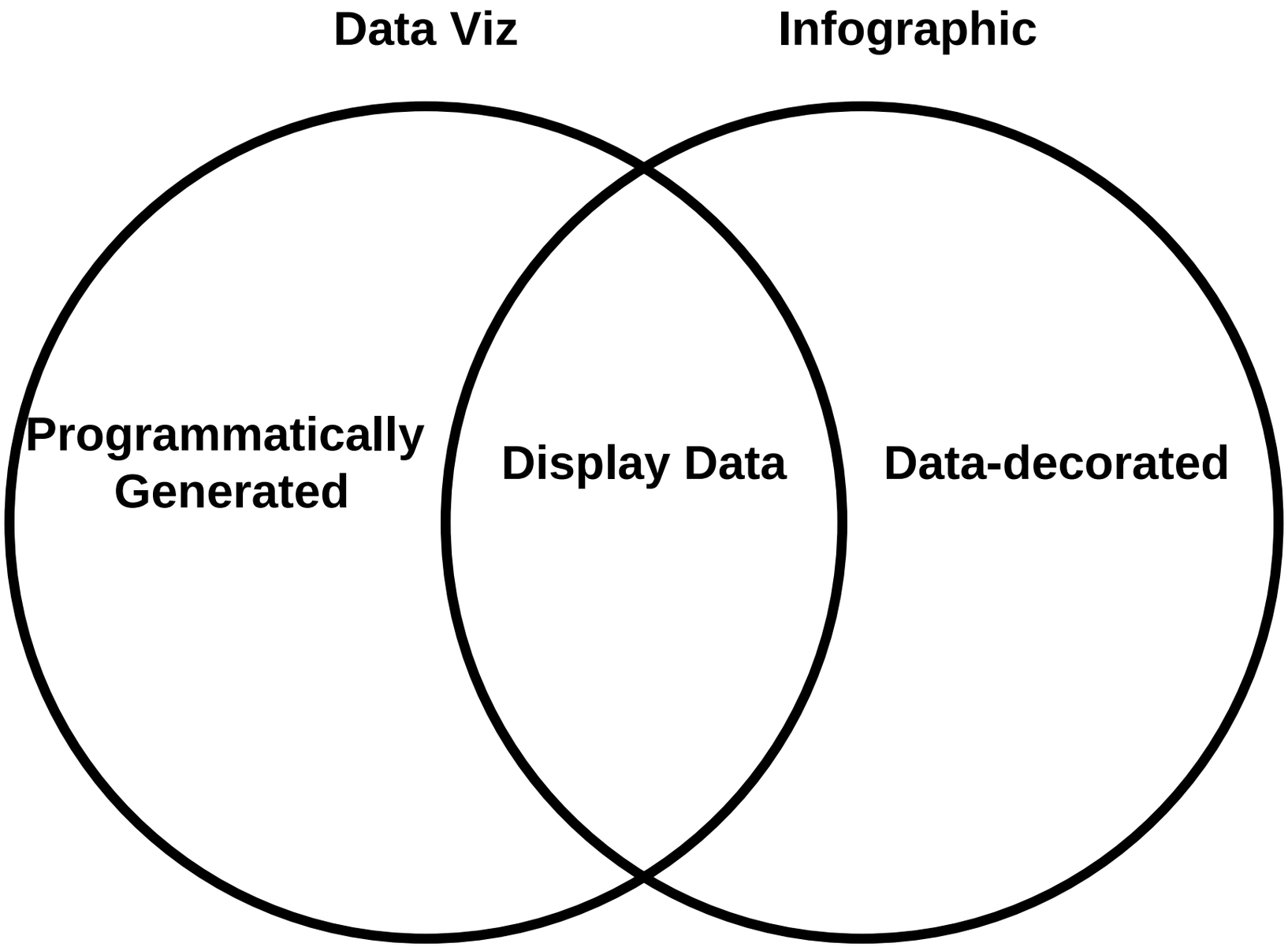


What’s the difference?

- **Infographic – Present information and tell a visual story**
  subjective, guide audience to a conclusion
- **Data viz – Illustrate raw values, offers objectivity**

https://visme.co/blog/what-is-an-infographic/
https://killerinfographics.com/blog/data-visualization-versus-infographics.html

Data Viz vs Infographics



What is Data Visualization?

- Conveying a message with images.
  - Sometimes, the message is known (explanatory).
  - Sometimes, it is not (exploratory).

Explanatory Visualization

- Data visualizations that are used to transmit information or a point of view from the designer to the reader.

- Typically have a specific story or information they are intended to transmit.

Source: DDV

Exploratory Visualization

- Data visualizations that are used by the designer for self-informative purposes to discover patterns, trends, or sub-problems in a dataset.

- Exploratory visualizations typically don’t have an already-known story.

Source: DDV

What is Data Visualization?

- Data visualizations should communicate data in the most effective way.

Purpose

- Should communicate:
  - Quickly.
  - Accurately.
  - Expansively.

Purpose

- Should communicate quickly.
  - Creating visuals can easily summarize and communicate data to other people.
  - Should communicate faster than naive representations (plain tables, plain text).
- How?
  - By distributing information across multiple channels.
    - Color
    - Shape
    - …

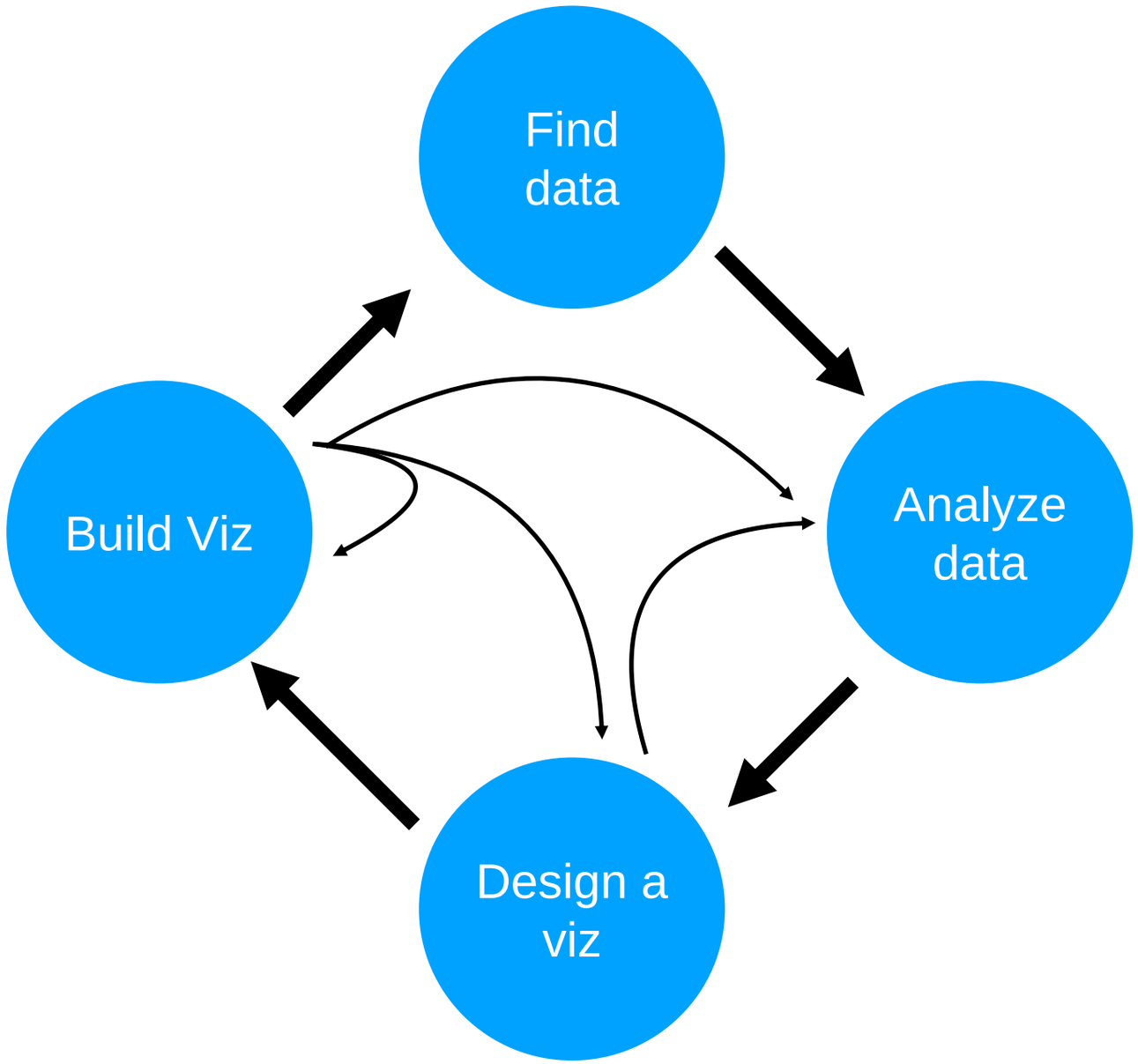
Purpose

- Should communicate accurately.

Purpose

- Should communicate expansively.
  - Good visualizations convey tremendous amounts of information for the space they take.

Thinking, Planning, Executing



Thinking, Planning, Executing

- Don’t reverse the order.

- Find a data set, explore it, then plan out the visualization, then code it.

- Don’t find code, then find a data set to match it. Your critique will generate much more work for you than if you had done it in the proper order.

Data Visualization Processes

Five Step Process:

(from Braun 1998)

- Gather, Collect, or Create Data
- Formulate a Vision
- Prepare and import data into visualization software
- Design the Visualization Analysis
- Determine Final Visualization Output Requirements

Five Step Process: Data Collection

- **Gather data** – project data is often scattered across different user computers. Use a common data repository. Scientist/engineers often reluctant to share “their” data.

- **Collect data** – Many online data sources today, such as www.data.gov, think.cs.vt.edu/corgis/, spatial/gis data, etc.

- **Create data** – Use existing modeling and simulation software or create your programs that generate data

Five Step Process: Formulate a vision

- Identify the visualization goal
- Ideas for the computer visualization or “vision” can come from sources like:
  - **Scientific journals**
  - **Professional presentations**
  - **Web sites,** some even provide interactive visualizations
  - **Visualization tutorials** – code often provided
  - **TV or Videos** – Scientific and educational shows on PBS (e.g., NOVA) often have effective visualizations

Five Step Process: Import Data

- If you are lucky, data is regular and nicely organized and easily imported into visualization system

- Irregular and complex data may need preprocessing or converting to get data into system.

- Common formats (cvs, dem, dlg, netcdf, etc.) often supported in packages.

Five Step Process: Design visualization

- Code to select, manipulate, and transform data into graphic images

- May want to provide user the option to import different data sets

- Use provide libraries or create your modules to create visualization imagery

- Add information to give context – titles, caption labels, color bars, etc.

Five Step Process: Output Requirements

- **Interactive application** - flexible and robust, works with different data sets, user can interact with data.

- **Real time computer presentation** – consider size and resolution needed, need more CPU to render large images

- **Video animations** – saves on rendering time, but not interactive. Include background music when possible.

- **Web site images** (lower resolution)

- **Printed hardcopies** (higher resolution)

Ben Fry’s “Seven Stages of Visualizing Data”

https://www.oreilly.com/library/view/visualizing-data/9780596514556/ch01.html

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
5. Represent
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
    - Obtain the data.
2. Parse
3. Filter
4. Mine
5. Represent
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire

2. Parse

   - Data will not always be organized ideally for visualizing it. Give your data structure by ordering it into categories.

3. Filter

4. Mine

5. Represent

6. Refine

7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
    - Be careful to prevent information overload, remove all but the data of interest
4. Mine
5. Represent
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
    - Apply methods from statistics or data mining as a way to find patterns or meaning in the data.
5. Represent
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
5. Represent
    - Choose a basic visual model to visual the data.
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
5. Represent
    - Choose a basic visual model to visual the data.
        - Linear
        - Tabular
        - Hierarchical
        - Networked
        - Geographical
        - etc.
6. Refine
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
5. Represent
6. Refine
    - Improve the basic representation to make it more clear and more visually engaging.
7. Interact

Ben Fry's "Seven Stages of Visualizing Data"

1. Acquire
2. Parse
3. Filter
4. Mine
5. Represent
6. Refine
7. Interact
    - Add methods for manipulating the data. Allows users to control what they see or even possibly how they see it.

DDV's Steps of Visualizing Data

Designing Data Visualizations
by Julie Steele, Noah Iliinsky

https://www.oreilly.com/library/view/designing-data-visualizations/9781449314774/

DDV’s Steps of Visualizin

1. State goals: What information need am I attempting to satisfy with this visualization? (Avoid specific content or implementation).
2. Decide what data is *not* needed.
3. Choose appropriate visual encodings.

State Goals

1. What values or data dimensions are relevant in this context?

2. Which of these dimensions matter; matter most; matter least?

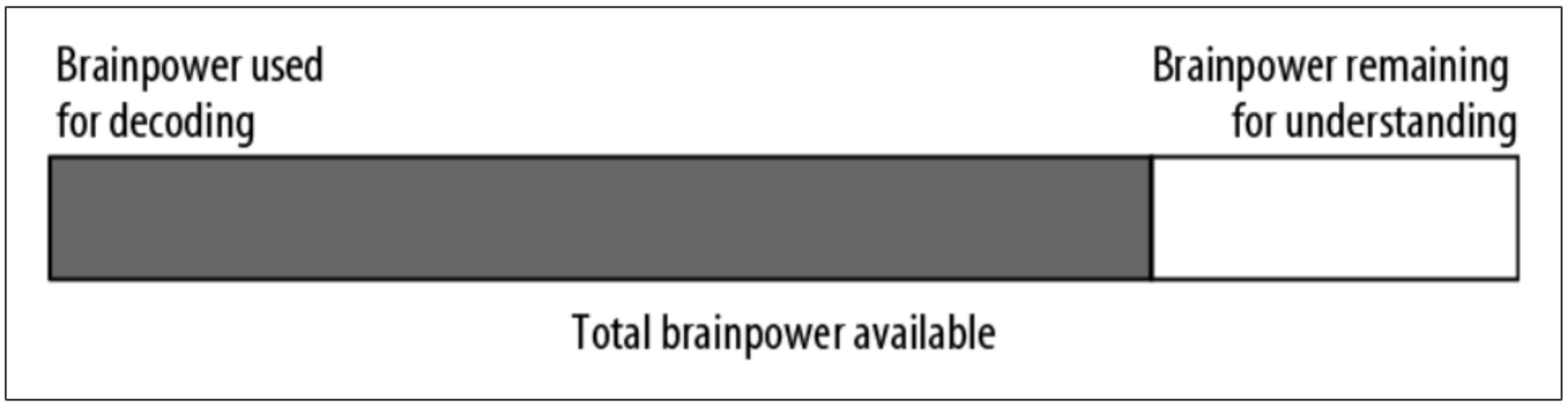
3. What are the key relationships that need to be communicated?

4. What properties or values make some individual data points more interesting than the rest?

5. What actions might be taken once this information need is satisfied, and what values will justify that action?

Determine what data is *not* needed

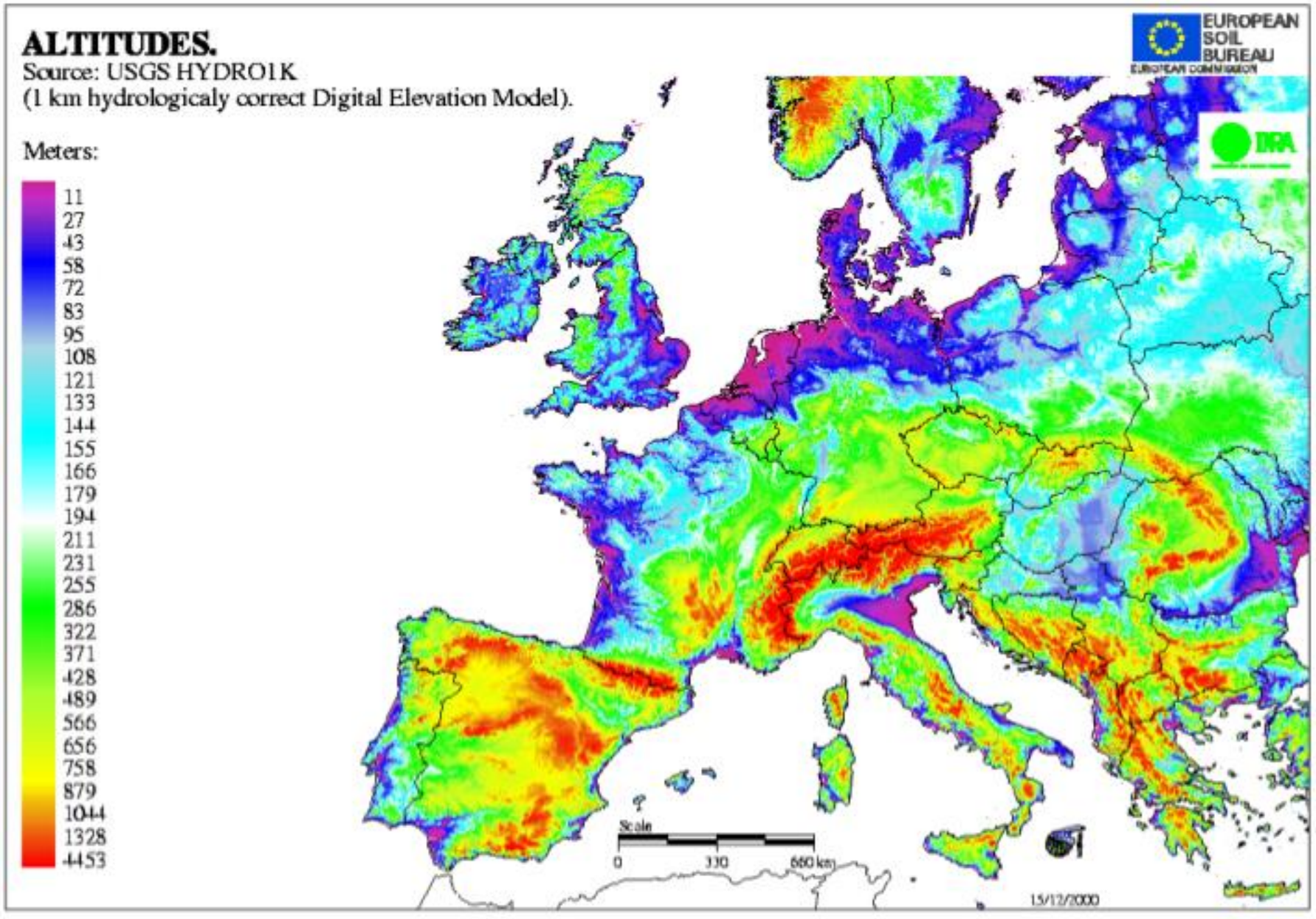
- You probably can’t get more data.
- You can get less.



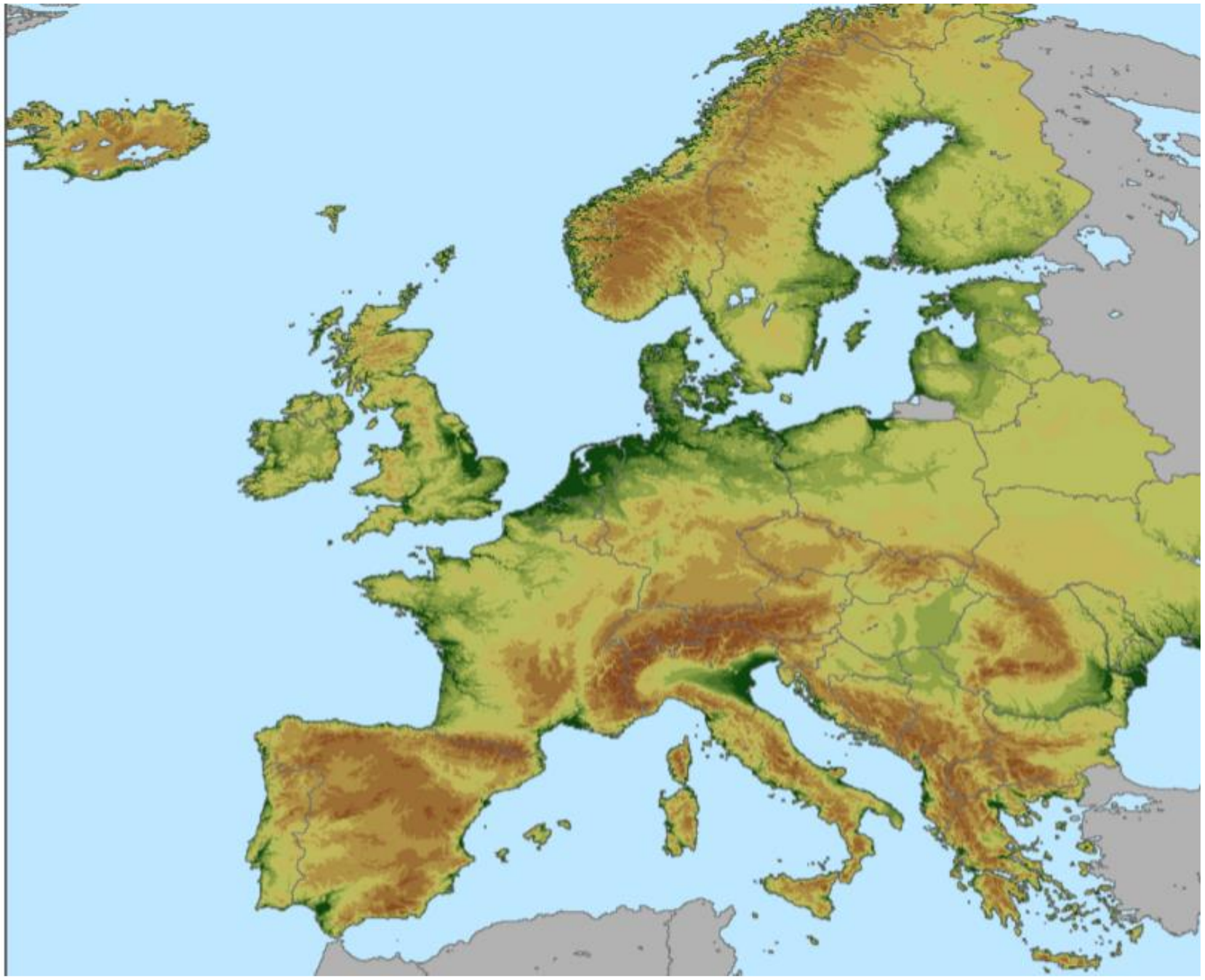
Choose appropriate encodings

- Are aspects of the data ordered? This suggests using position or line thickness, but not shape, line style, texture, or color.

Choose appropriate encodings



Choose appropriate encodings



Choose appropriate encodings

Example	Encoding	Ordered	Useful values	Quantitative	Ordinal	Categorical	Relational
	position, placement	yes	infinite	Good	Good	Good	Good
1, 2, 3; A, B, C	text labels	optional alpha or num	infinite	Good	Good	Good	Good
	length	yes	many	Good	Good		
	size, area	yes	many	Good	Good		
	angle	yes	medium	Good	Good		
	pattern density	yes	few	Good	Good		
	weight, boldness	yes	few		Good		
	saturation, brightness	yes	few		Good		
	color	no	few (<20)			Good	
	shape, icon	no	medium			Good	
	pattern texture	no	medium			Good	
	enclosure, connection	no	infinite			Good	Good
	line pattern	no	few				Good
	line endings	no	few				Good
	line weight	yes	few		Good		

Figure 4-3. Use this table of common visual properties to help you select an appropriate encoding for your data type.

Choose appropriate encodings

- If you have any unused visual channels, consider using them to redundantly express an already-expressed dimension.

Choose appropriate encodings