

IF 4061
Desain Interaksi, Visualisasi, Game

**Data Visualization:
Taxonomy of Data
Visualization Methods**

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Acknowledgement

Most of the contents of the slides were taken from [Andy Kirk. Data Visualization: A Successful Design Process. Pact Publishing. 2012, chapter 5](#)

Content

- Data visualization methods
- Choosing the appropriate chart type

Methodology

1.

Purpose &
parameters

2.

Prepare &
explore data

3.

Formulate
questions

4.

Design
concepting

5.

Construct &
launch

The Visualization Anatomy of Data Representation

1. Choosing the correct visualization "method" (Ch.5)
2. Accommodating the physical properties of the data (Ch.5)
3. Facilitating the desired degree of precision
4. Creating an appropriate metaphor to depict the subject stylistically

Visualization “method” Taxonomy (1)

1. Comparing categorical values

- To facilitate comparisons between the relative and absolute sizes of categorical values.
- Example: bar chart.

2. Assessing hierarchies and part-of-a-whole relationships

- To provide a breakdown of categorical values in their relationship to a population of values or as constituent elements of hierarchical structures.
- Example: pie chart.

Visualization “method” Taxonomy (2)

3. Showing changes over time

- To exploit temporal data and show the changing trends and patterns of values over a continuous timeframe.
- Example: line chart.

4. Charting and graphing relationships

- To assess the associations, distributions, and patterns that exists between multivariate datasets.
- This collection of solutions reflects some of the most complex visual solutions and usually focuses on facilitating exploratory analysis.
- Example : scatter plot.

Visualization “method” Taxonomy (3)

5. Mapping geo-spatial data

- To plot and present datasets with geo-spatial properties via the many different mapping frameworks.
- Example: choropleth map

Choosing the appropriate chart type

1. Does it accommodate the physical properties of your data?
2. Does it facilitate the desired degree of accuracy?
3. Is it potentially capable of conveying a certain metaphorical and design consistency with our subject matter?

Lets Look Some Examples!

Visual Analytic Techniques

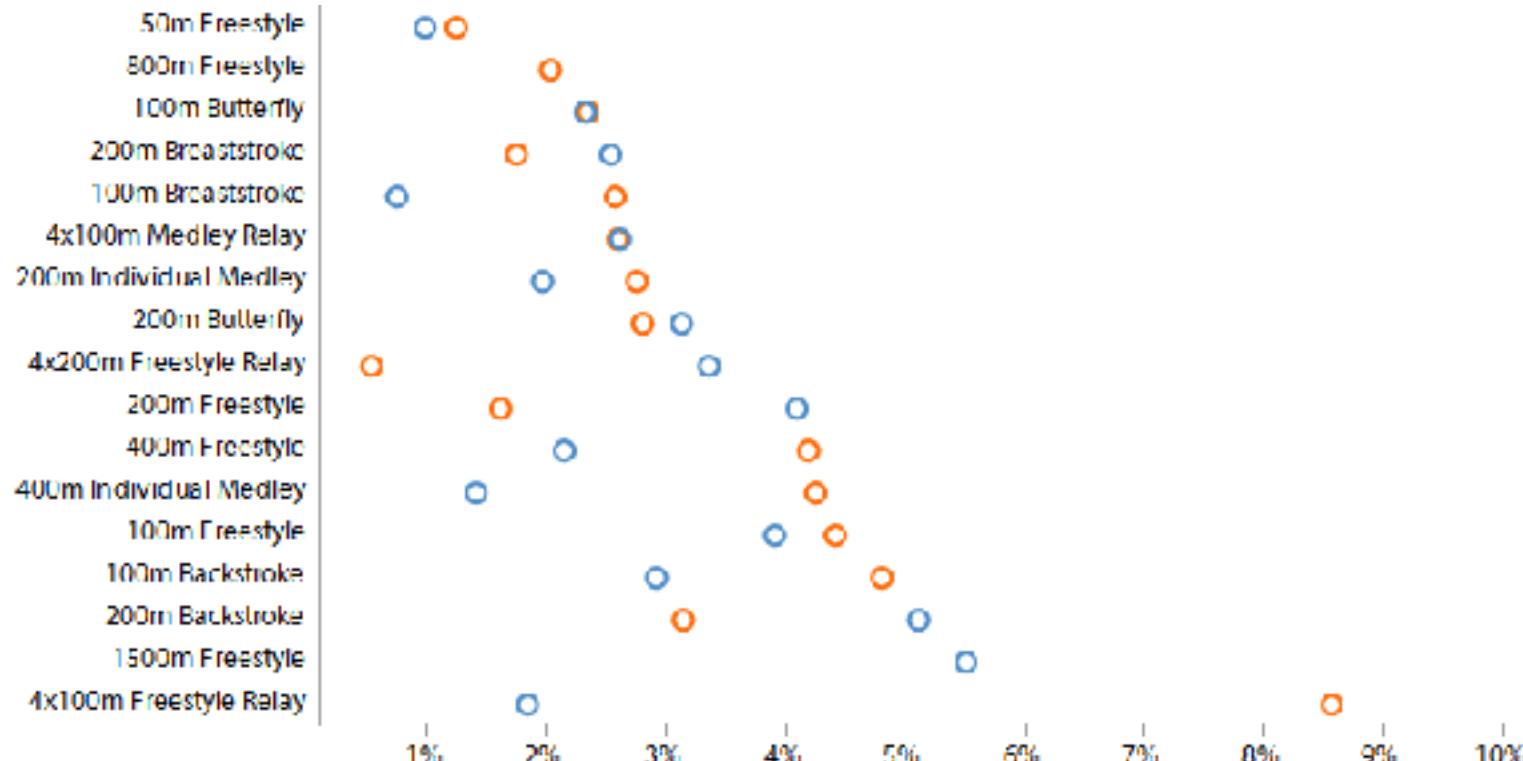
- Comparison and proportions:
 - Range and distribution
 - Ranking
 - Measurement
 - Judging

Questionnaire Results Analysis Summary



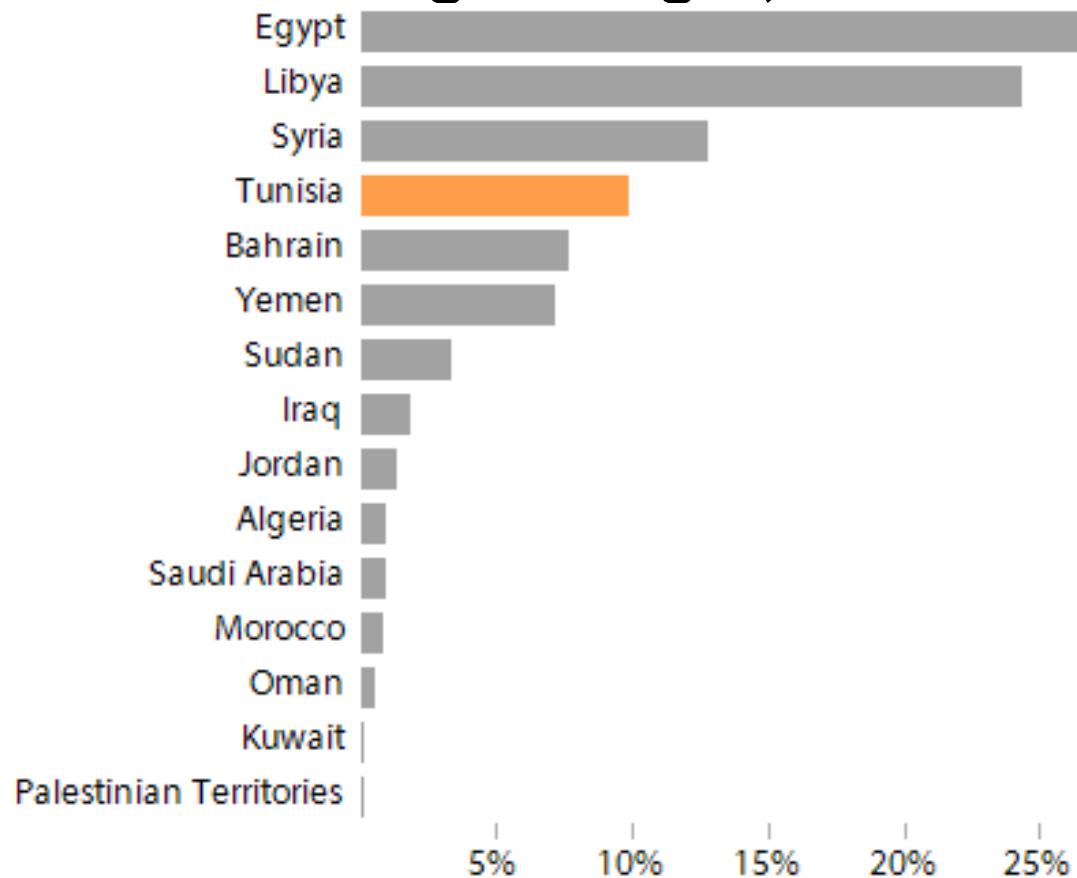
Comparing categories: Dot Plot

- Data variables: 2 x categorical, 1 x quantitative.
- Visual variables: Position, color-hue, symbol.



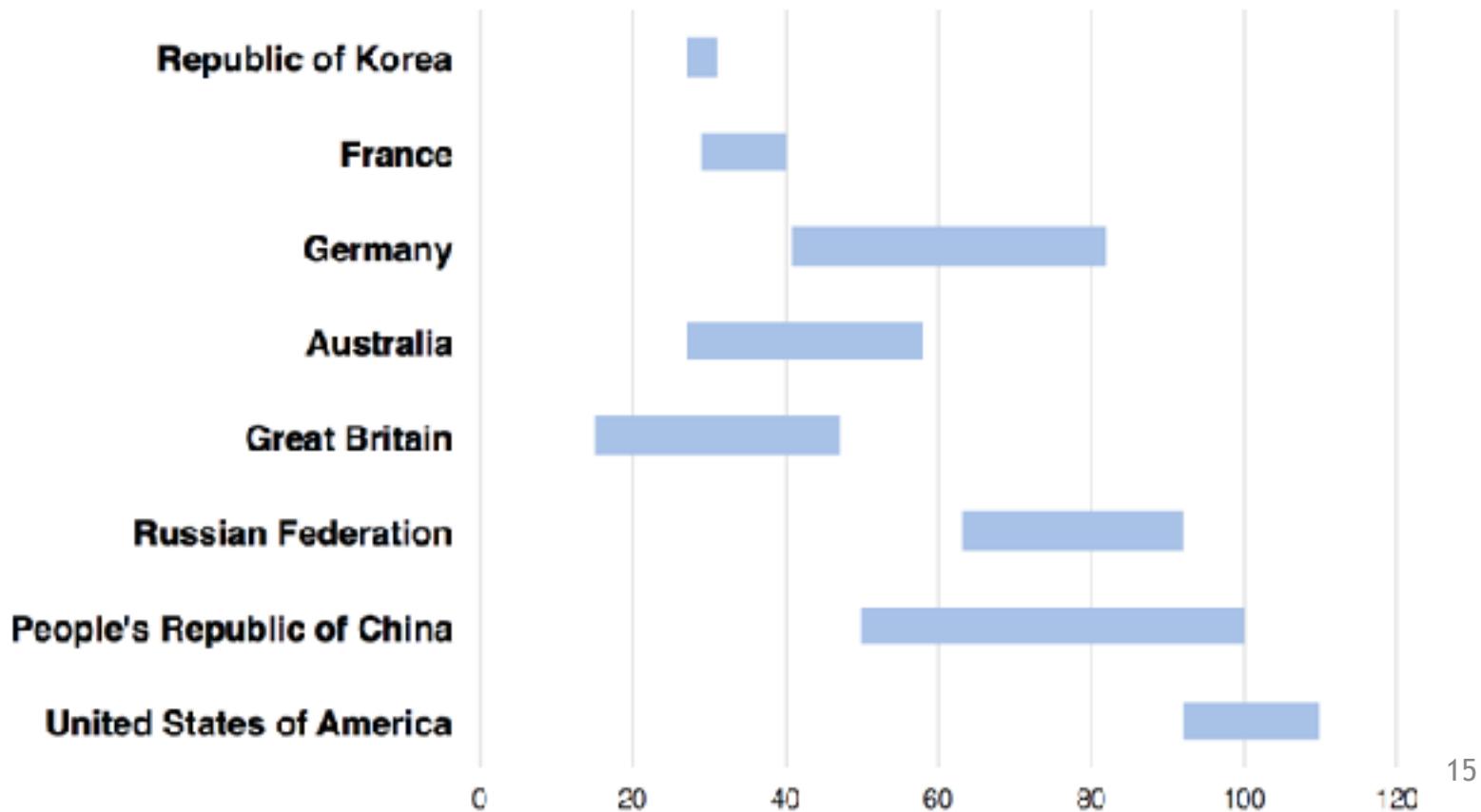
Comparing categories: Bar chart (or column chart)

- **Data variables:** 1 x categorical, 1 x quantitative-ratio.
- **Visual variables:** Length/height, color-hue.



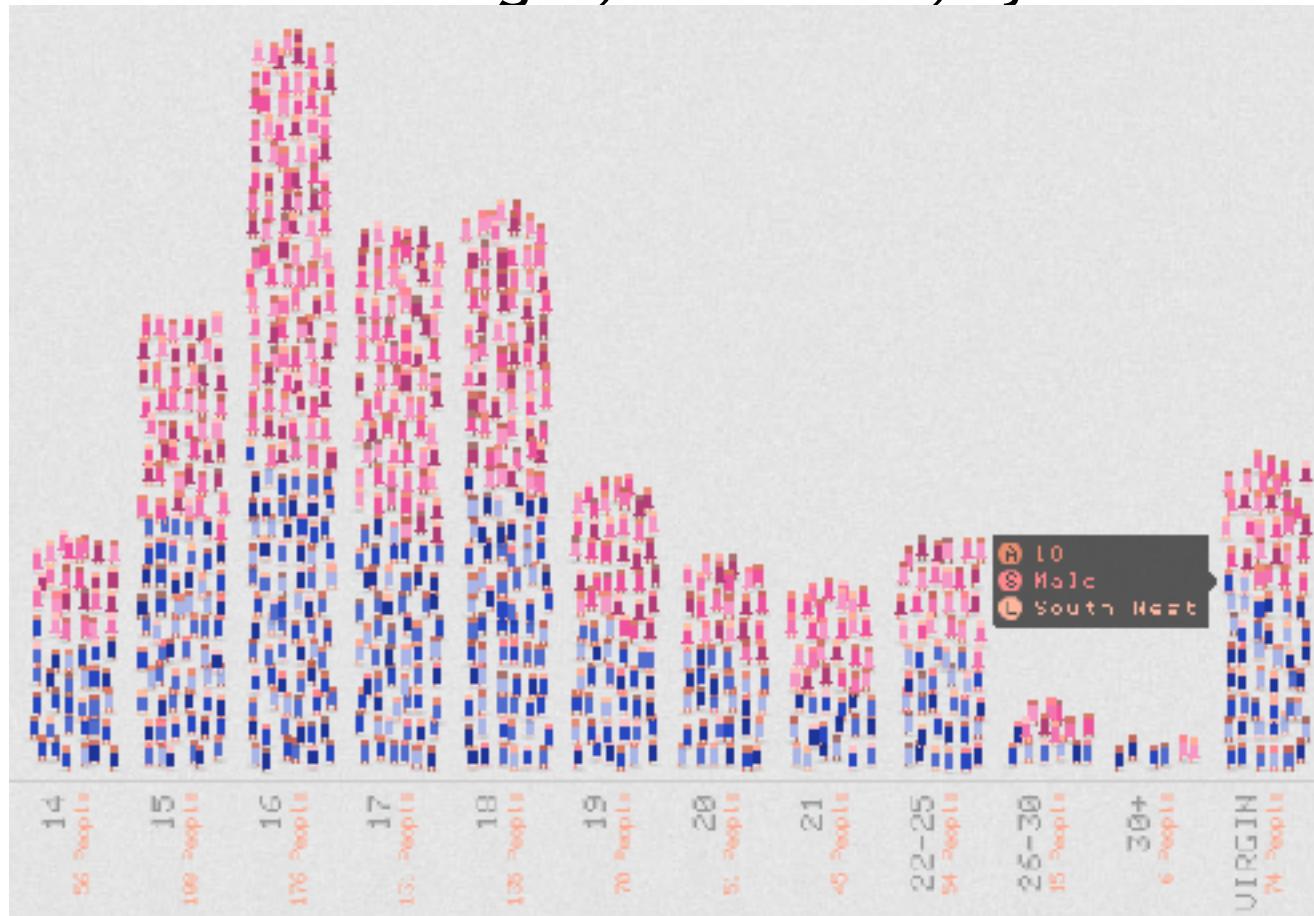
Comparing categories: Floating bar (or Gantt chart)

- Data variables: 1 x categorical-nominal, 2 x quantitative.
- Visual variables: Position, length



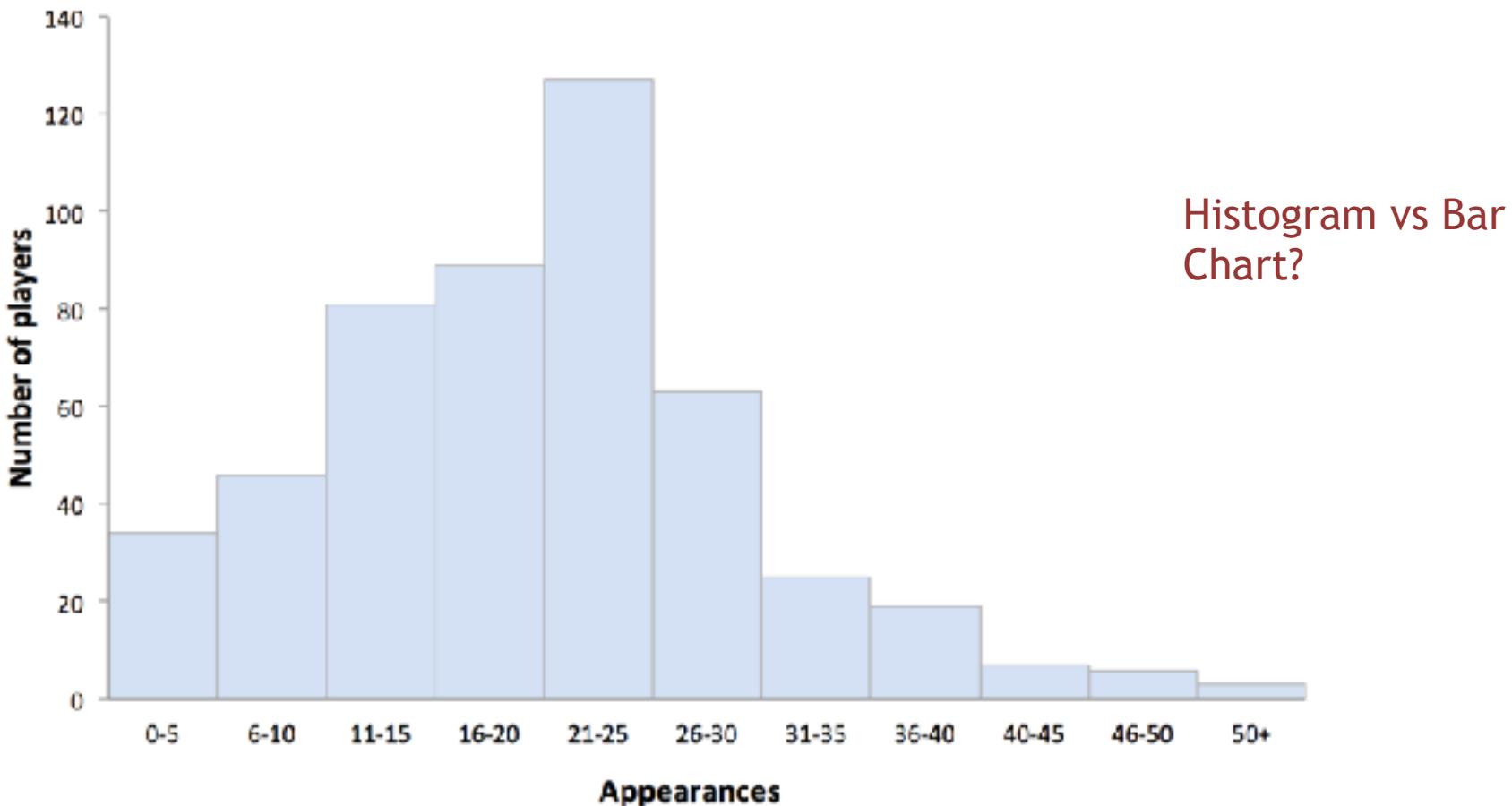
Comparing categories: Pixelated bar chart

- **Data variables:** Multiple x categorical, 1 x quantitative.
- **Visual variables:** Height, color-hue, symbol.



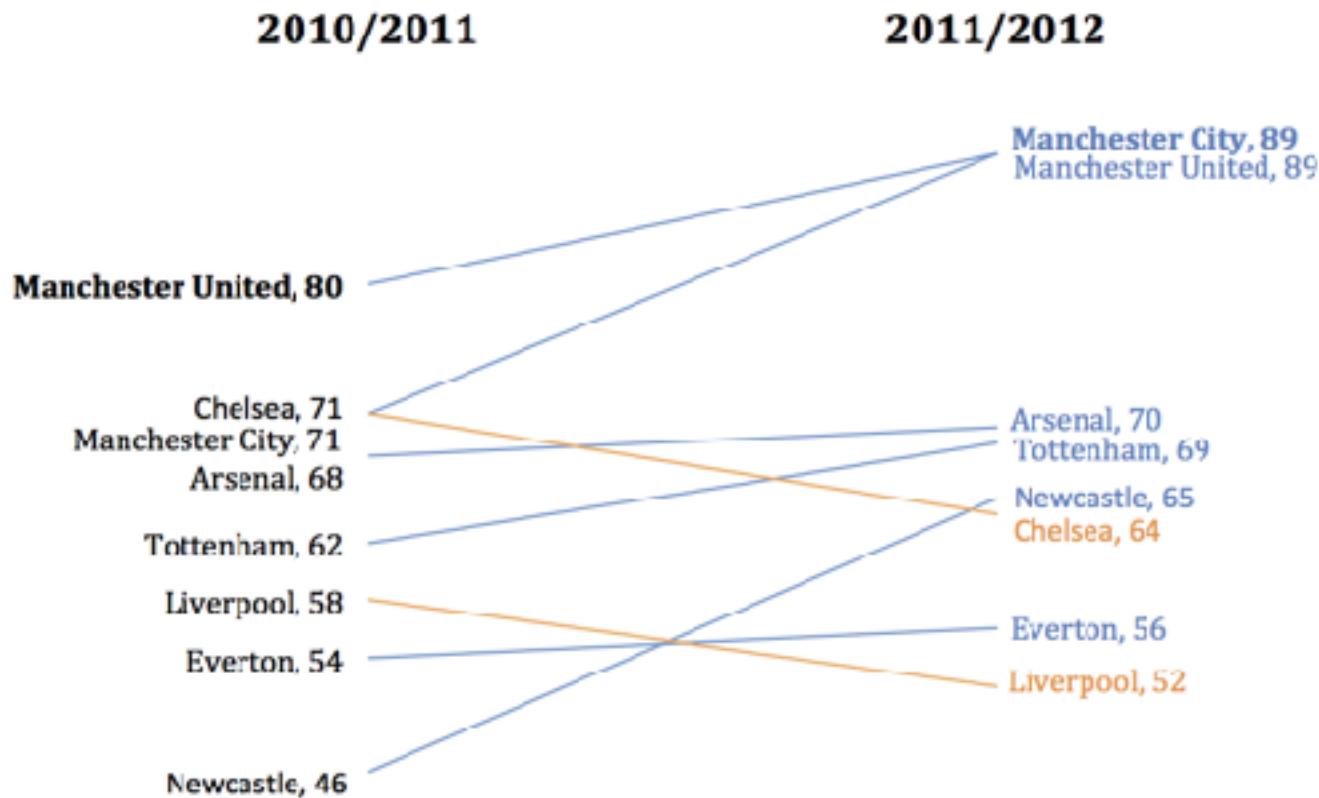
Comparing categories: Histogram

- Data variables: 1 x quantitative-interval, 1 x quantitative-ratio.



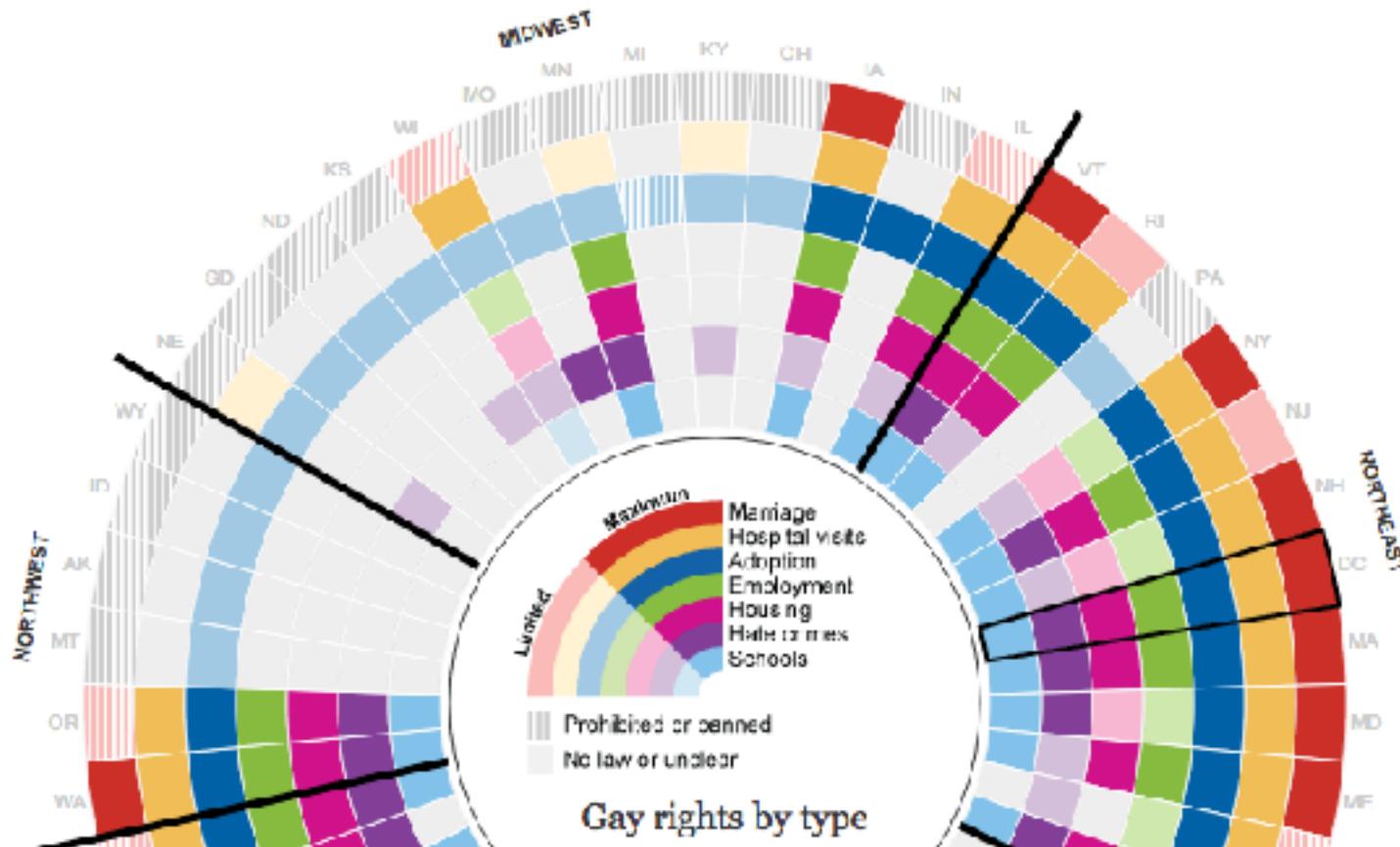
Comparing categories: Slopegraph (or bumps chart or table chart)

- Data variables: 1 x categorical, 2 x quantitative.
- Visual variables: Position, connection, color-hue.



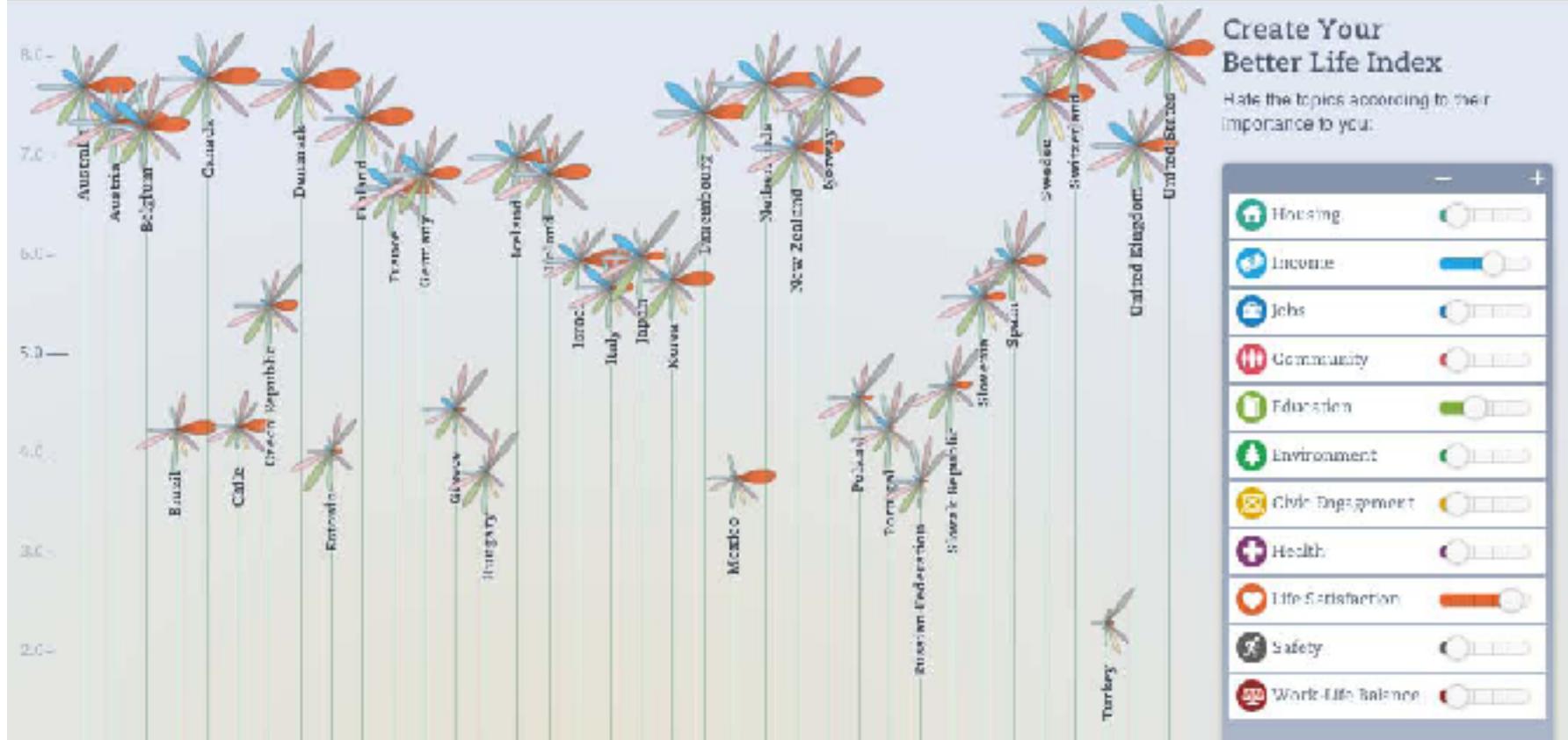
Comparing categories: Radial Chart

- **Data variables:** Multiple x categorical, 1 x categorical-ordinal.
 - **Visual variables:** Position, color-hue, color-saturation/lightness, texture.



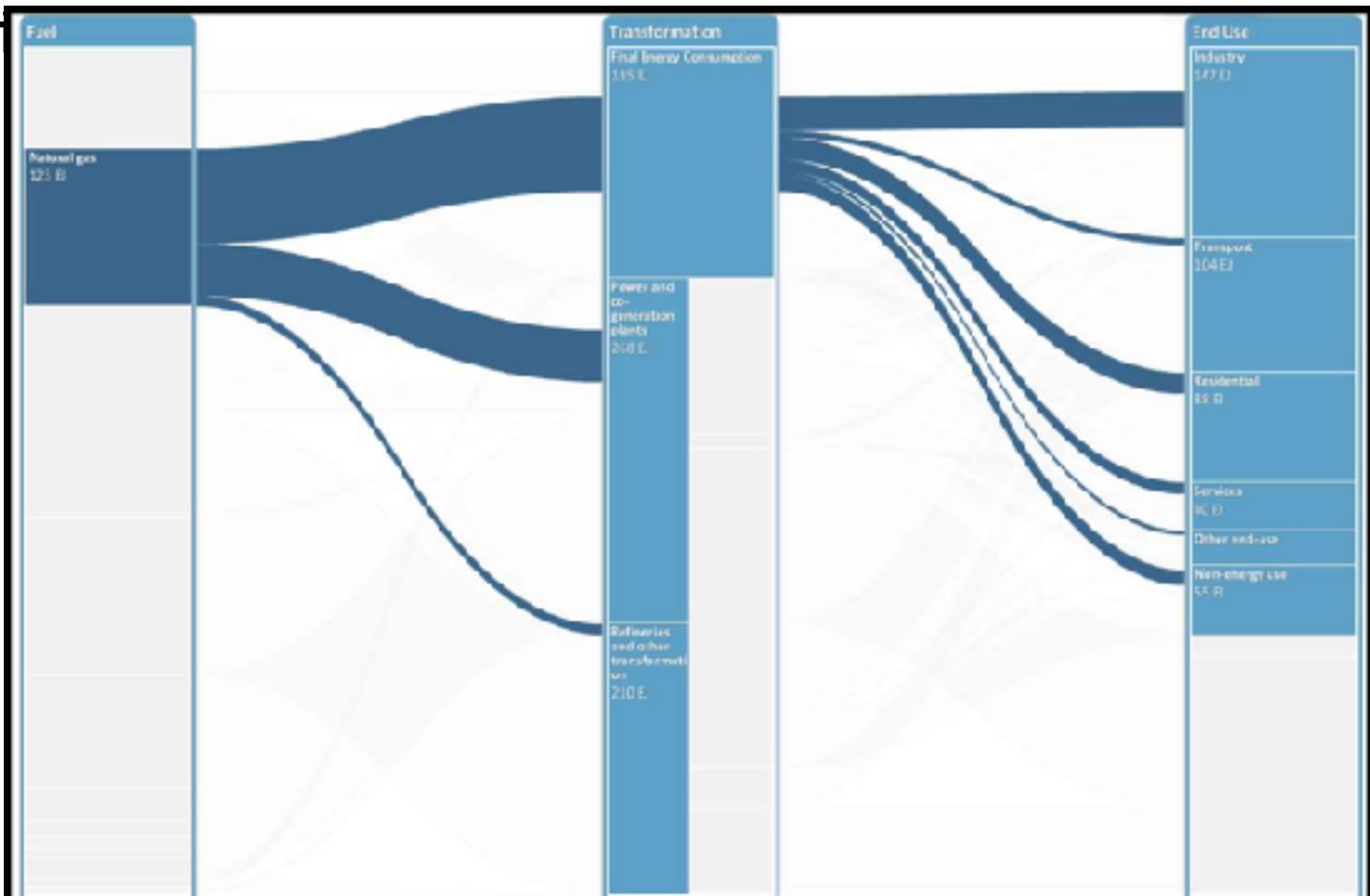
Comparing categories: Glyph Chart

- **Data variables:** Multiple x categorical, multiple x quantitative.
- **Visual variables:** Shape, size, position, color-hue



Comparing categories: Sankey Diagram

- Data variables: Multiple x categorical, multiple x quantitative.
- Visual comparison -hue.



Comparing categories: Area Size Chart

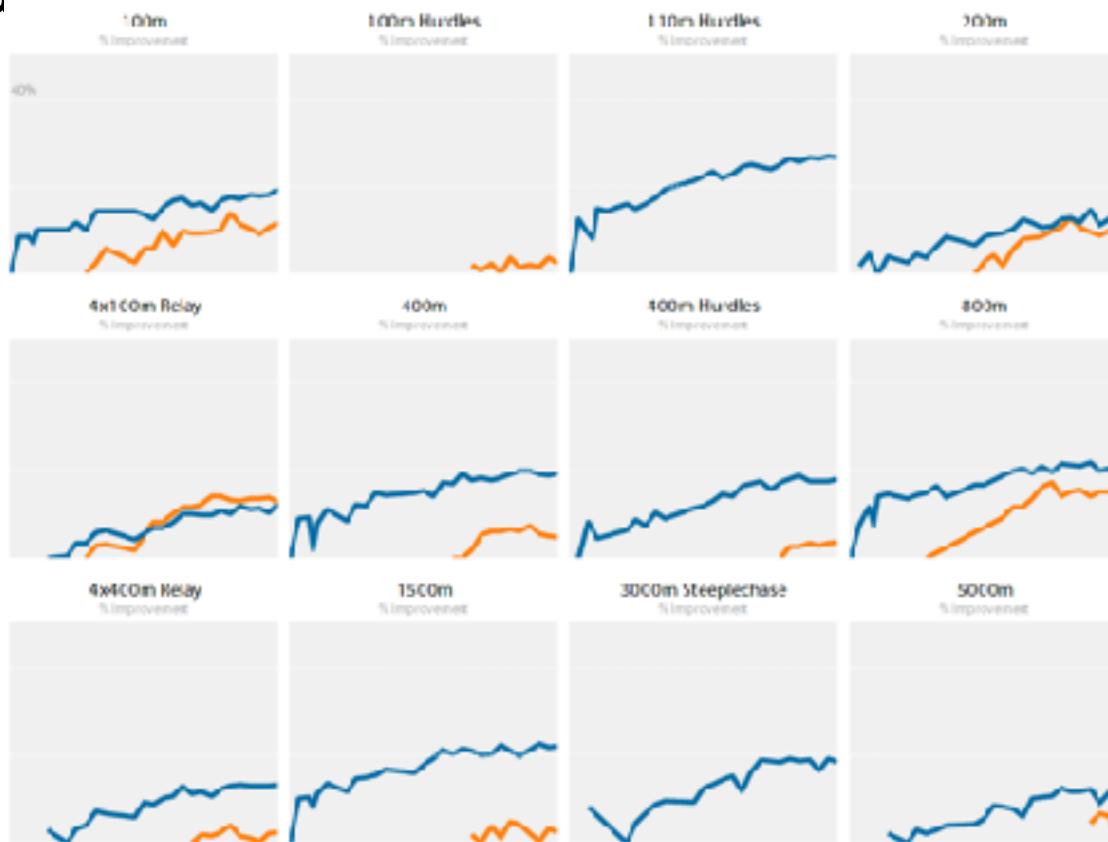
- Data variables: 1 x categorical, 1 x quantitative-ratio.
- Visual variables: Area, color-hue.

A Tale of Two Leagues: Comparing Transfer Spend (Summer 2012)



Comparing categories: Small multiples (or trellis chart)

- **Data variables:** Multiple x categorical, multiple x quantitative.
- **Visual variables:** Position any visual variable



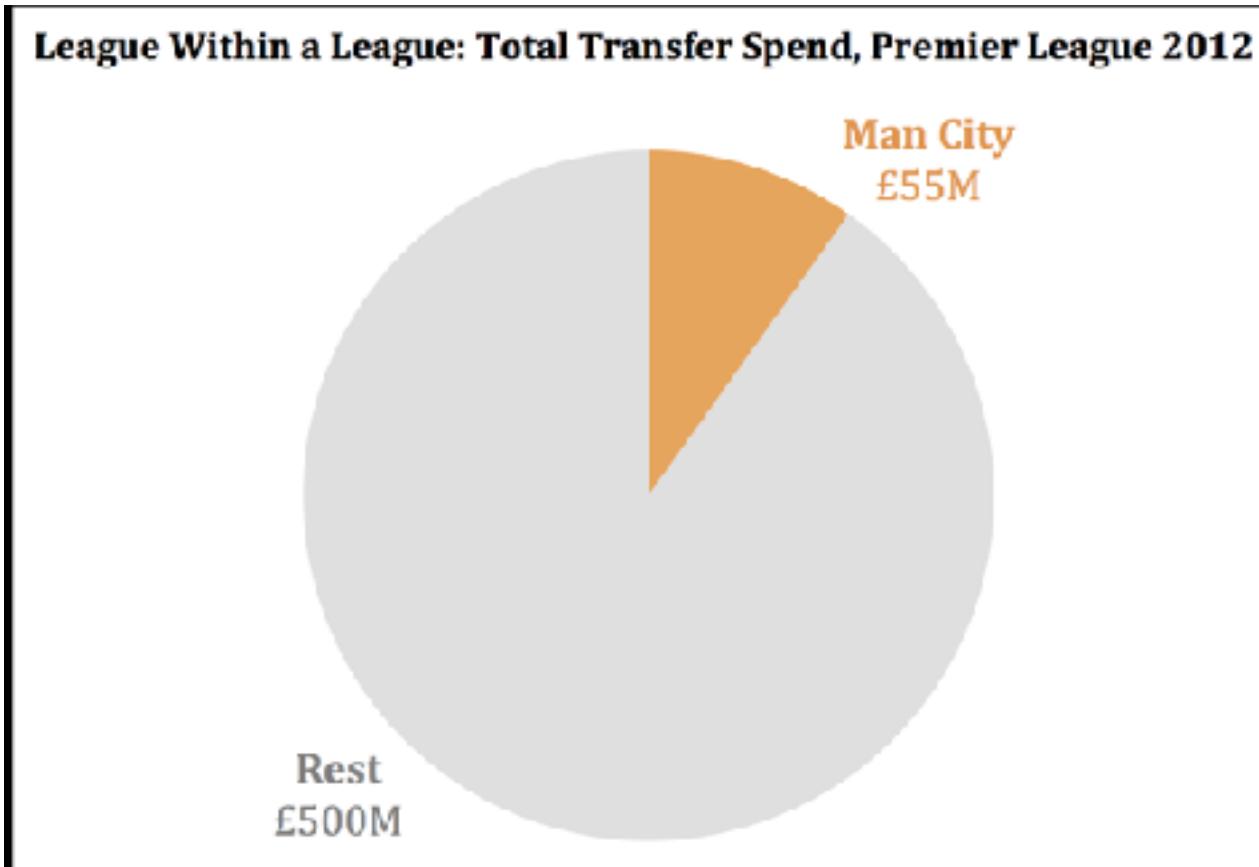
Comparing categories: Word Cloud

- Data variables: 1 x categorical, 1 x quantitative-ratio.
- Visual variables: Size.



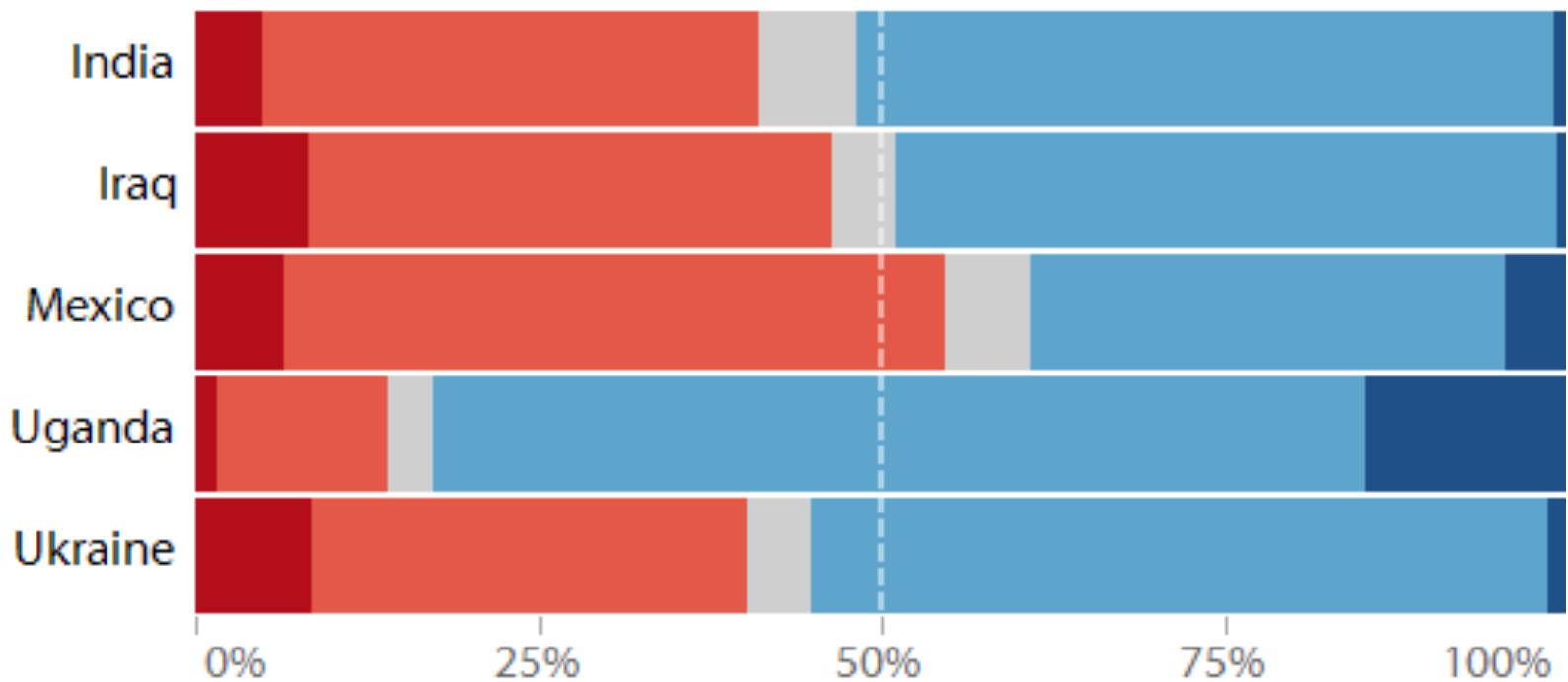
Assessing hierarchies: Pie chart

- Data variables: 1 x categorical, 1 x quantitative-ratio.
- Visual variables: Angle, area, color-hue.



Assessing hierarchies: Stacked bar chart (or stacked column chart)

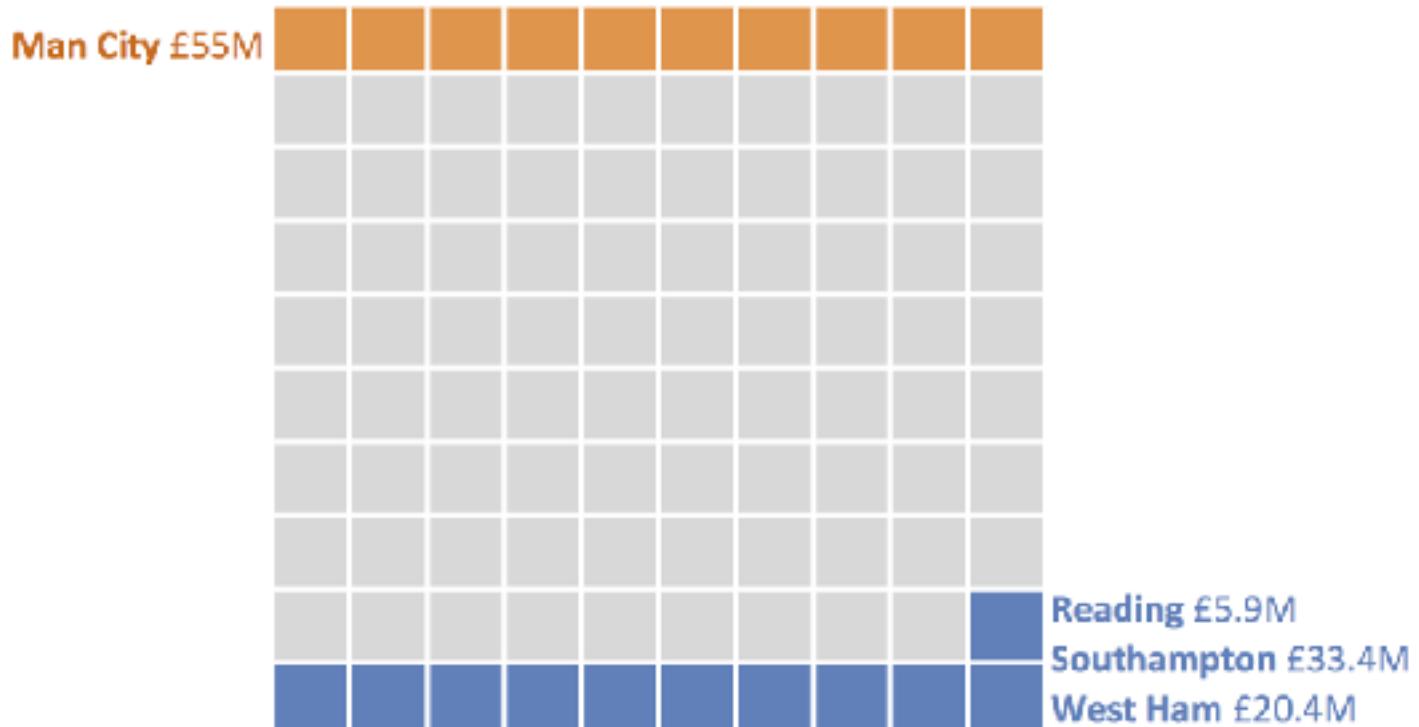
- **Data variables:** 2 x categorical, 1 x quantitative-ratio.
- **Visual variables:** Length, color-hue, position, color-saturation/lightness.



Assessing hierarchies: Square pie (or unit chart or waffle chart)

- **Data variables:** 1 x categorical, 1 x quantitative-ratio.
- **Visual variables:** Position, color-hue, symbol.

Champions vs. Promoted Teams: Total Transfer Spend, Premier League 2012



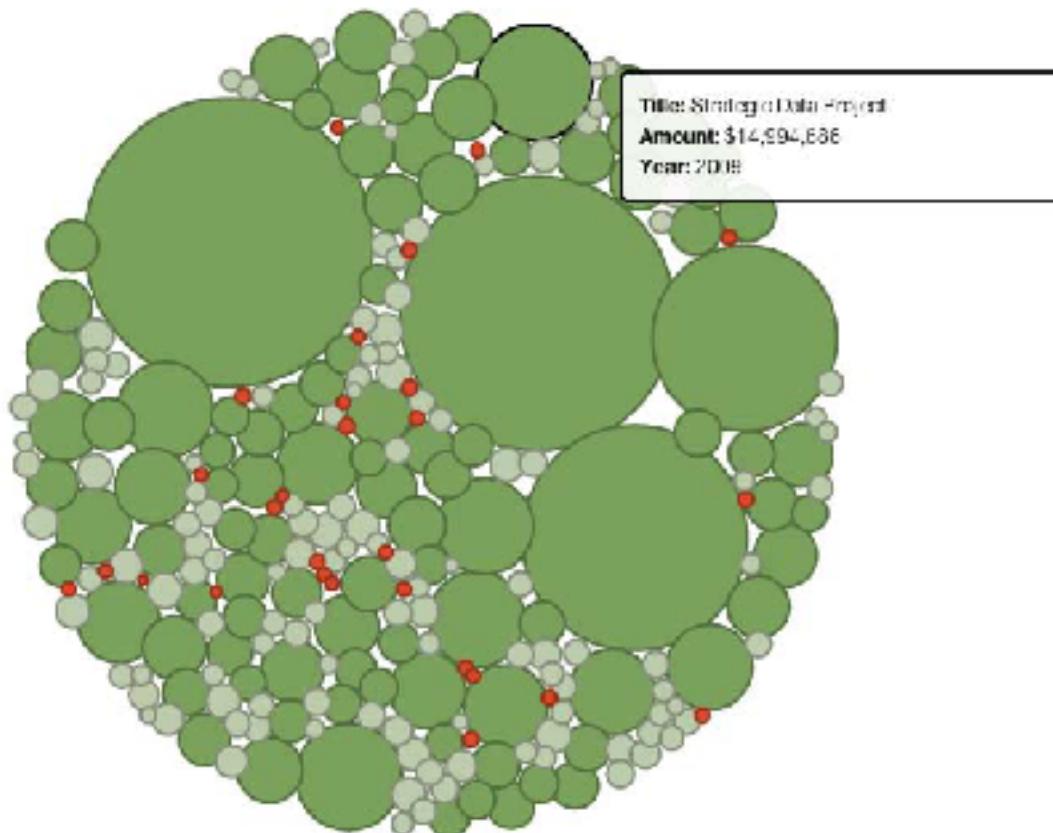
Assessing hierarchies: Tree Map

- Data variables: Multiple x categorical-nominal, 1 x quantitative-ratio.
 - Visual variables: Area, position, color-hue, color-saturation/lightness.



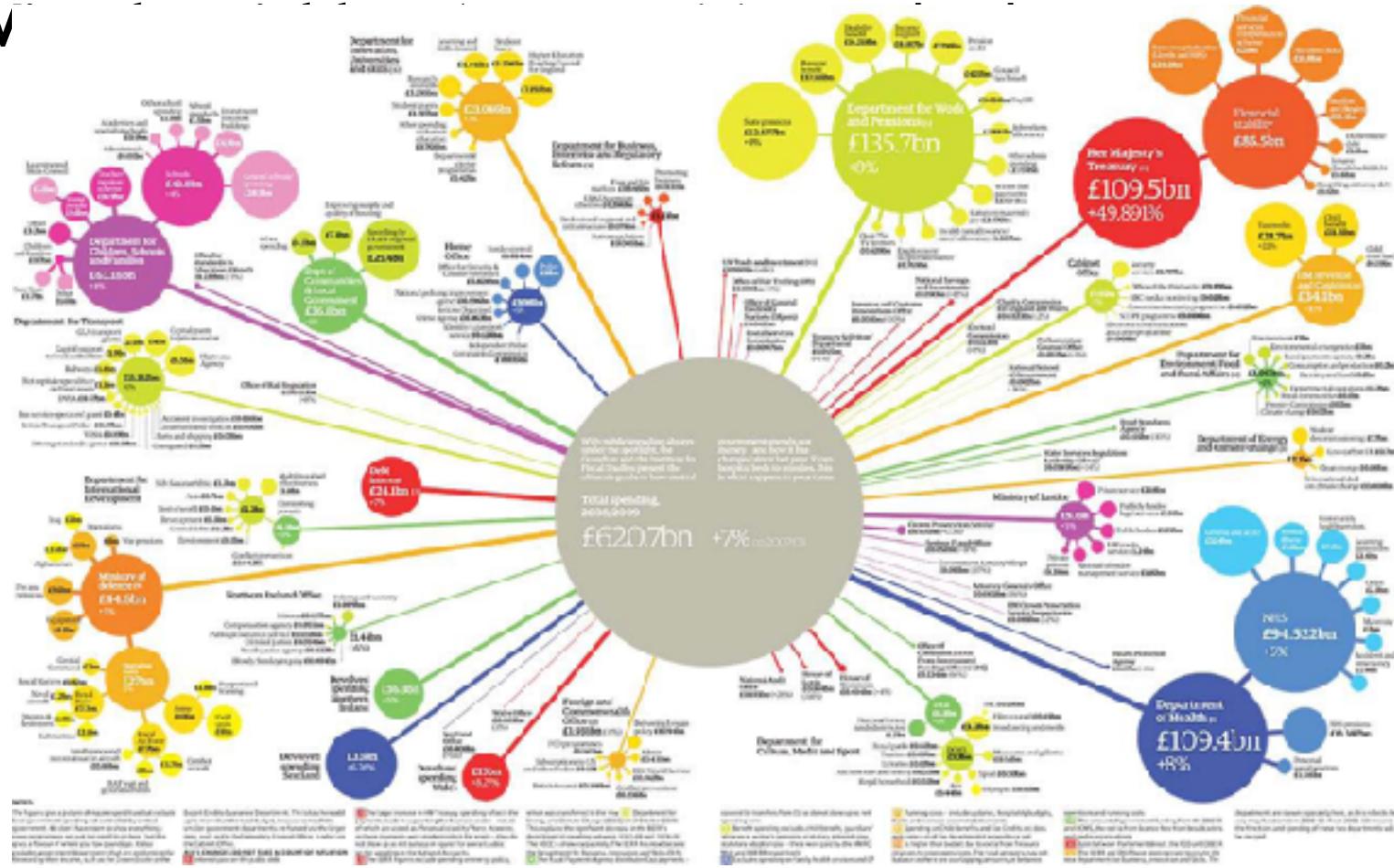
Assessing hierarchies: Circle packing diagram

- Data variables: 2 x categorical, 1 x quantitative-ratio.
- Visual variables: Area, color-hue, position.



Assessing hierarchies: Bubble hierarchy

- **Data variables:** Multiple x categorical, 1 x quantitative-ratio.
 - V



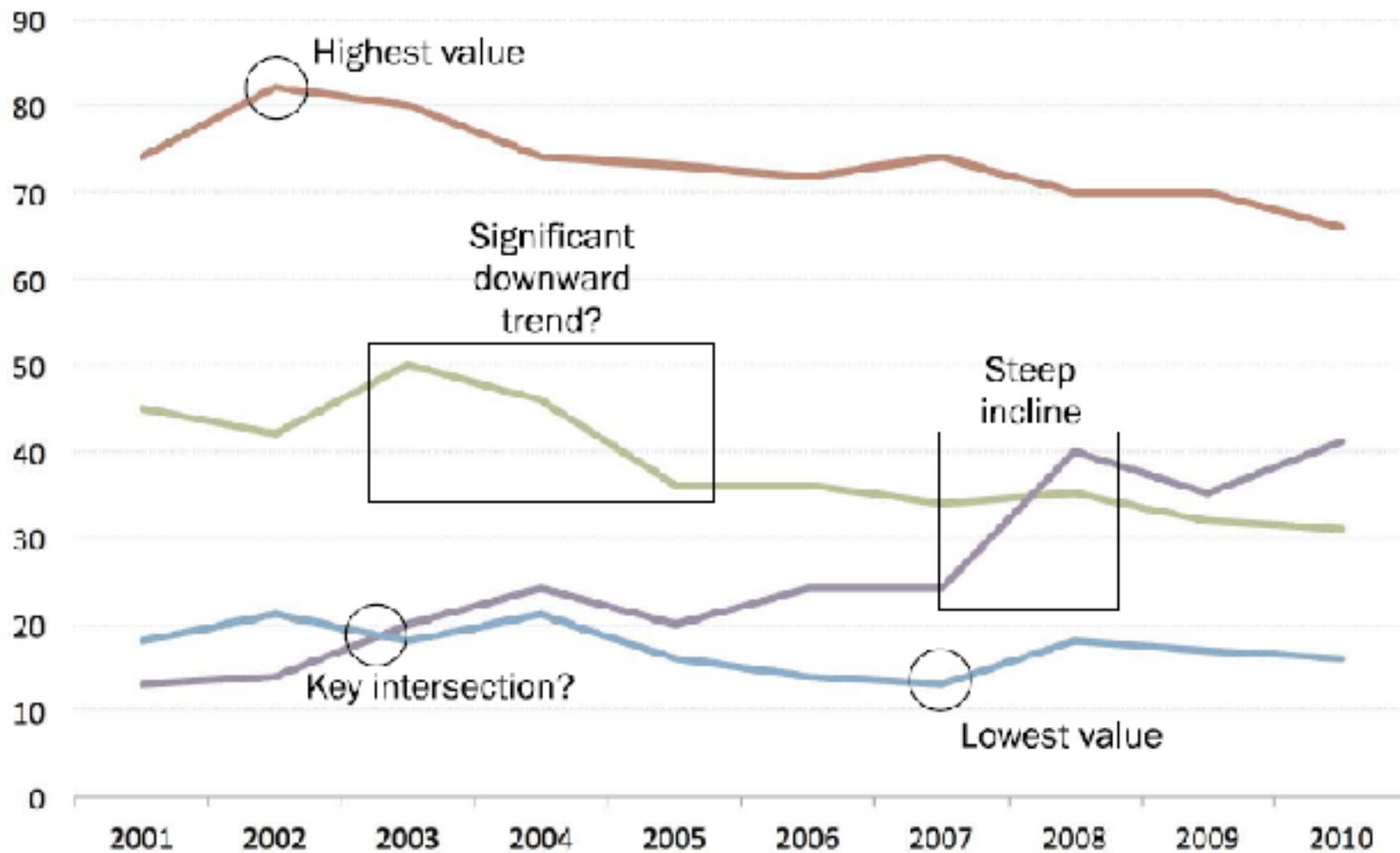
Assessing hierarchies: Tree hierarchy

- Data variables: 2 x categorical, 1 x quantitative-ratio.
- Visual variables: Angle/area, position, color-hue.



Visual Analytic Techniques

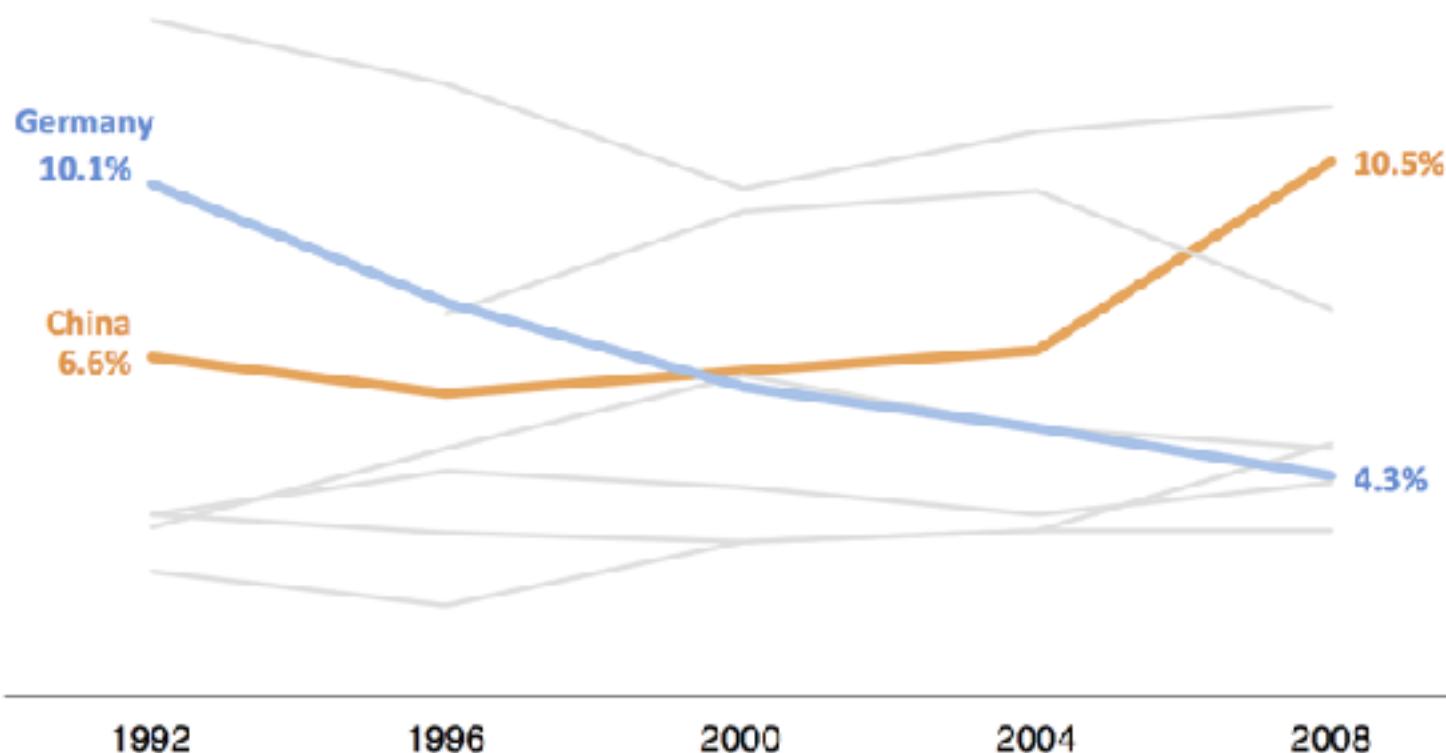
- Trend and Pattern
 - Direction
 - Rate of Change
 - Fluctuation
 - Significance
 - Intersection



Showing changes over time: Line chart

- **Data variables:** 1 x quantitative-interval, 1 x quantitative-ratio, 1 x categorical.
- **Visual variables:** Position, slope, color-hue.

The Contrasting Fortunes of German and Chinese Olympic Success
Percentage of total medals won across past five Olympics (eight countries selected based on ranking at 2008)



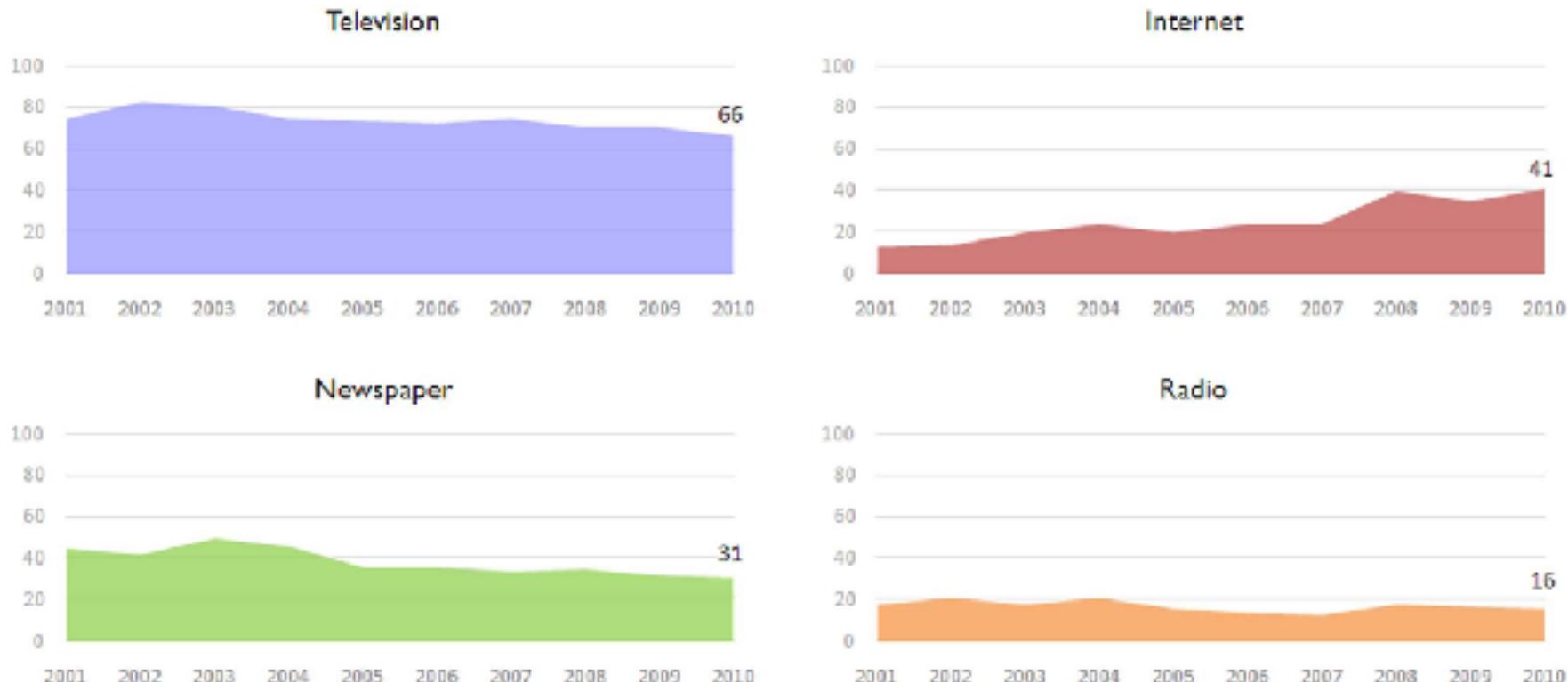
Showing changes over time: Sparklines

- **Data variables:** 1 x quantitative-interval, 1 x quantitative-ratio.
- **Visual variables:** Position, slope.



Showing changes over time: Area chart

- **Data variables:** 1 x quantitative-interval, 1 x categorical, 1 x quantitative-ratio.
- **Visual variables:** Height, slope, area, color-hue.

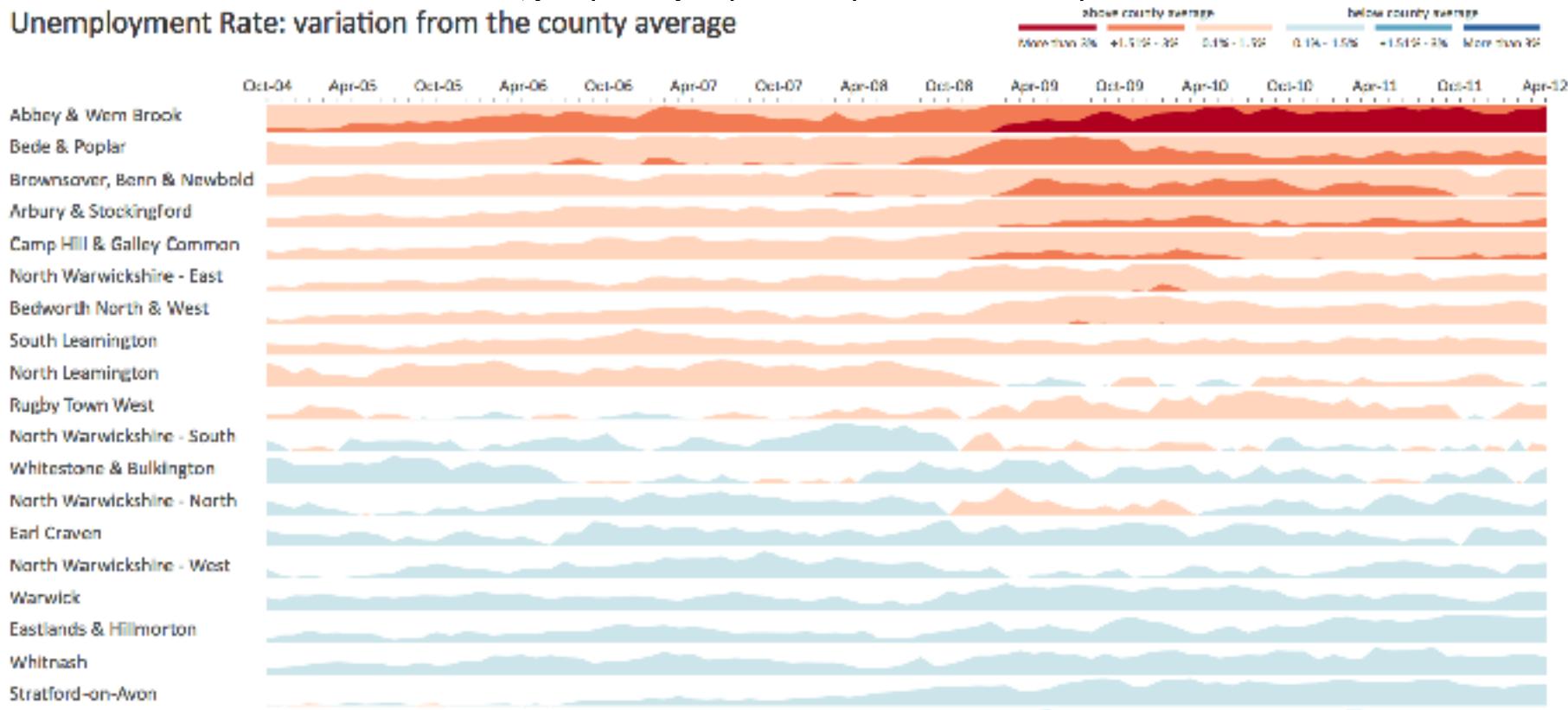


Area chart vs Line Chart?

Showing changes over time: Horizon chart

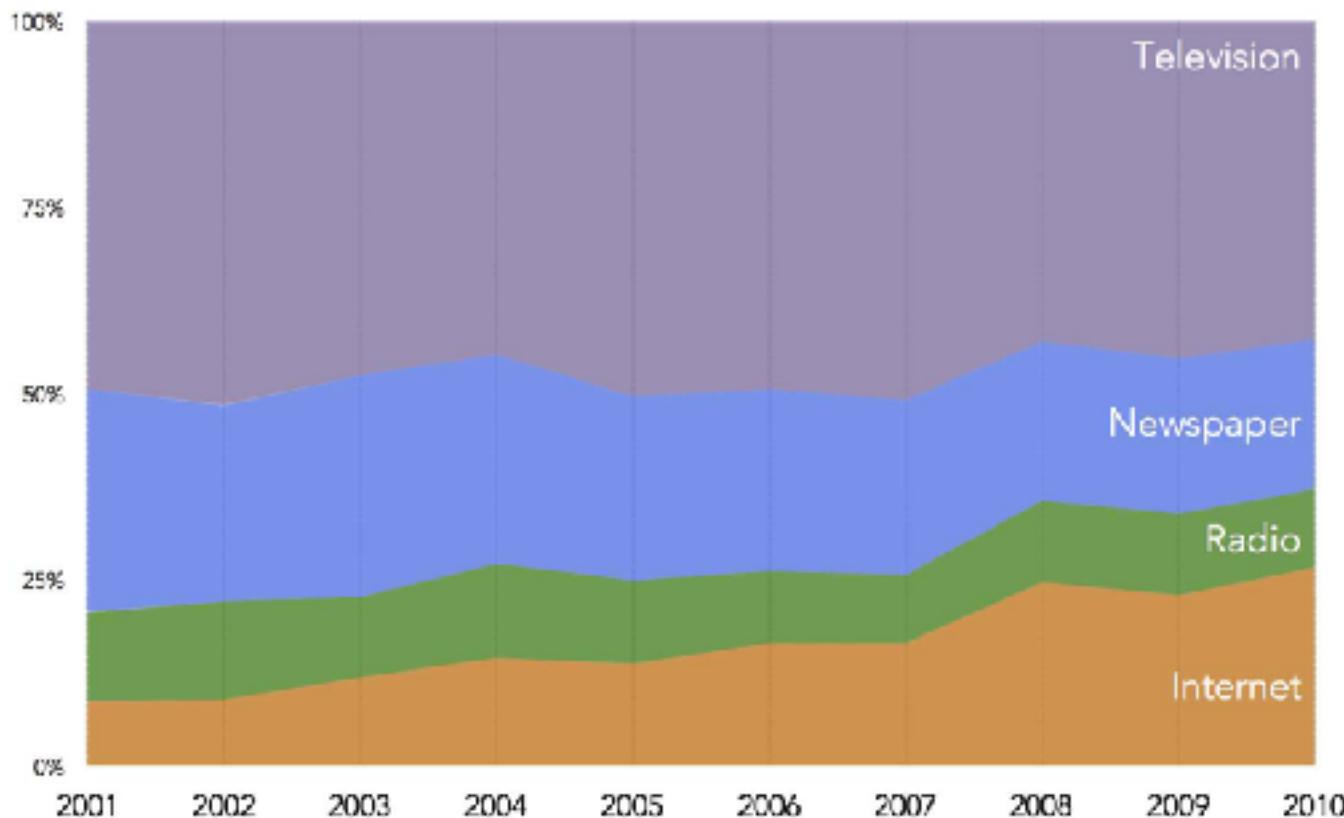
- **Data variables:** 1 x quantitative-interval, 1 x categorical, 2 x quantitative-ratio.
- **Visual variables:** Height, slope, area, color-hue, color-saturation/

Unemployment Rate: variation from the county average



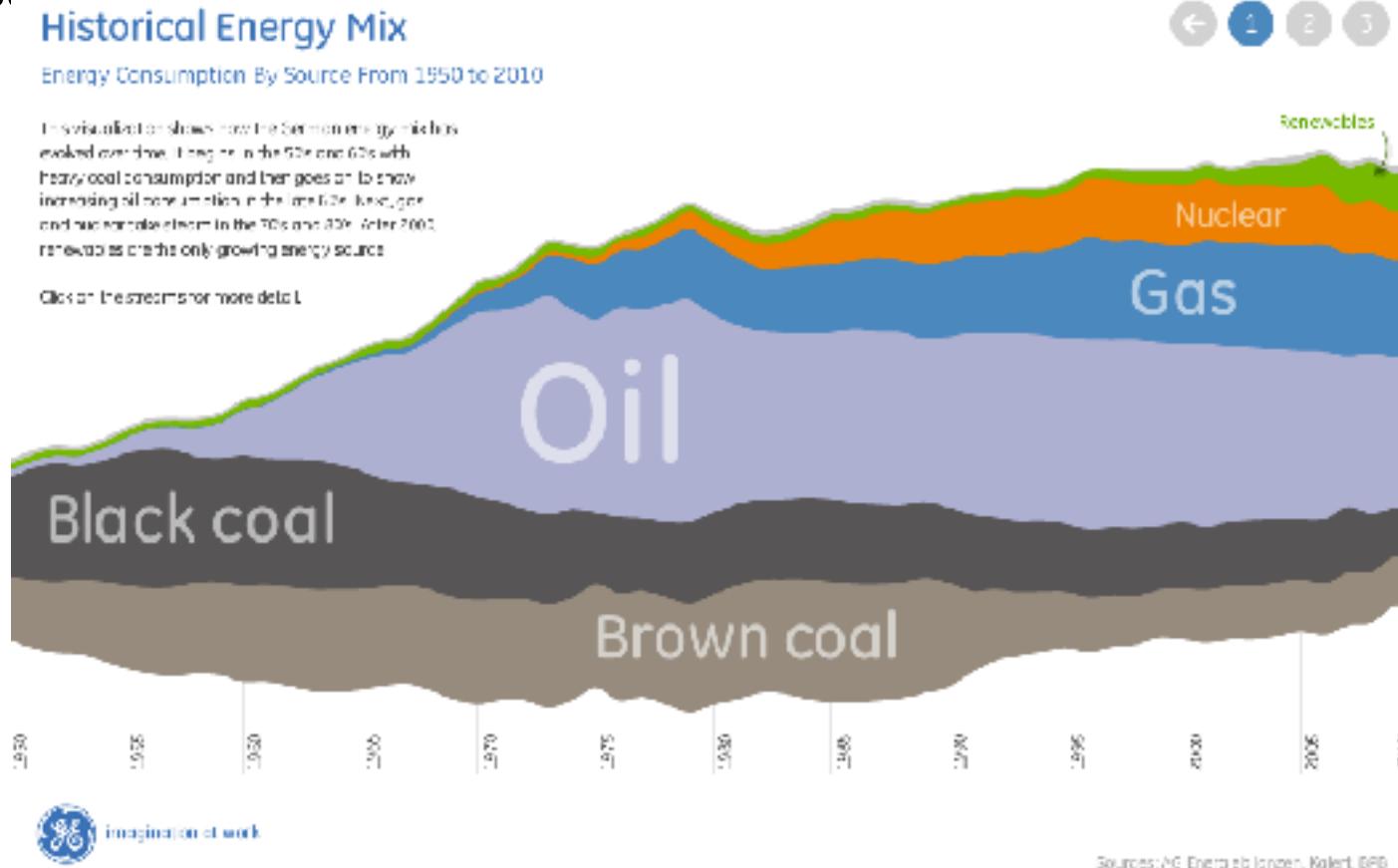
Showing changes over time: Stacked area chart

- **Data variables:** 1 x quantitative-interval, 1 x categorical, 1 x quantitative-ratio.
- **Visual variables:** Height, area, color-hue.



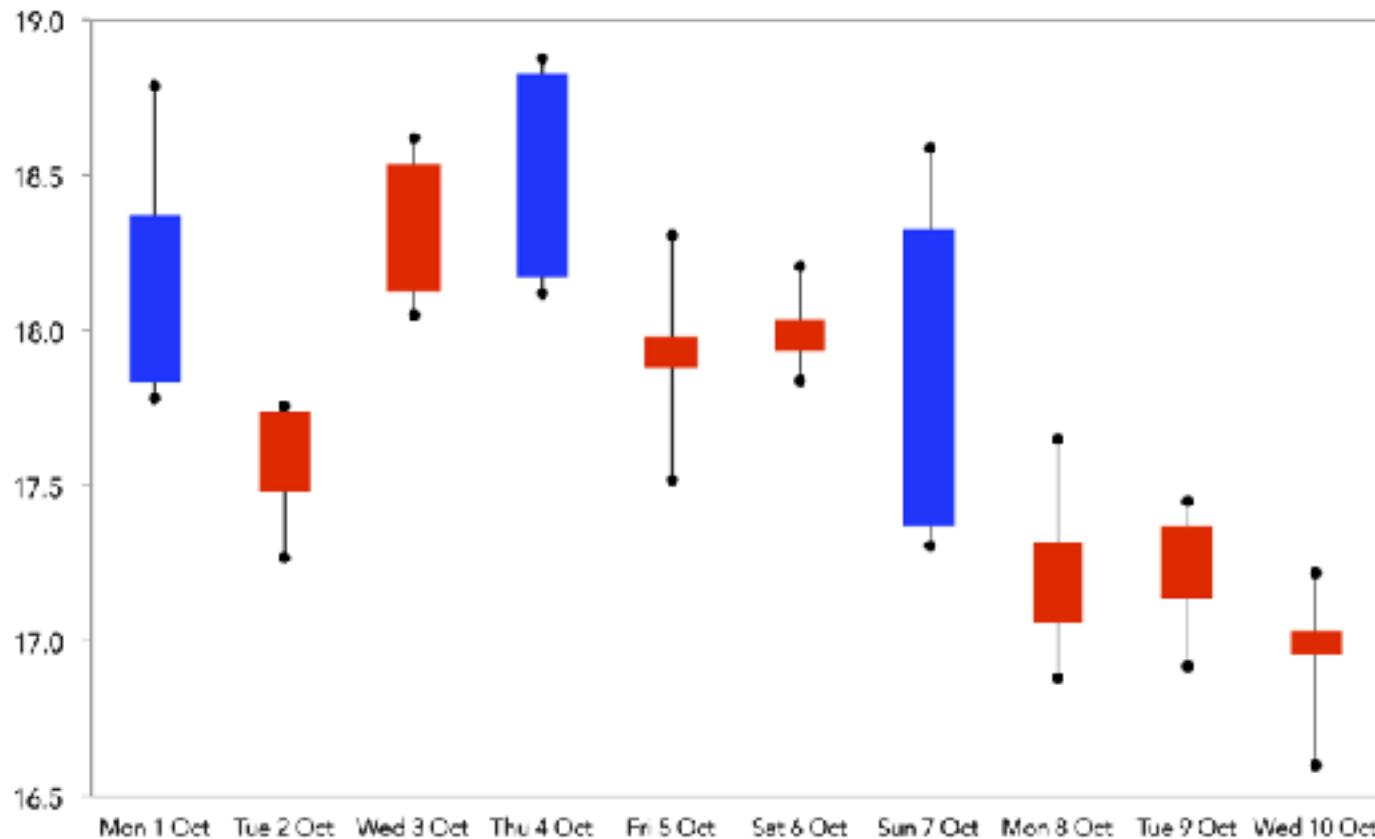
Showing changes over time: Stream graph

- Data variables: 1 x quantitative-interval, 1 x categorical, 1 x quantitative-ratio.
- Visual variables: Height area color-hue



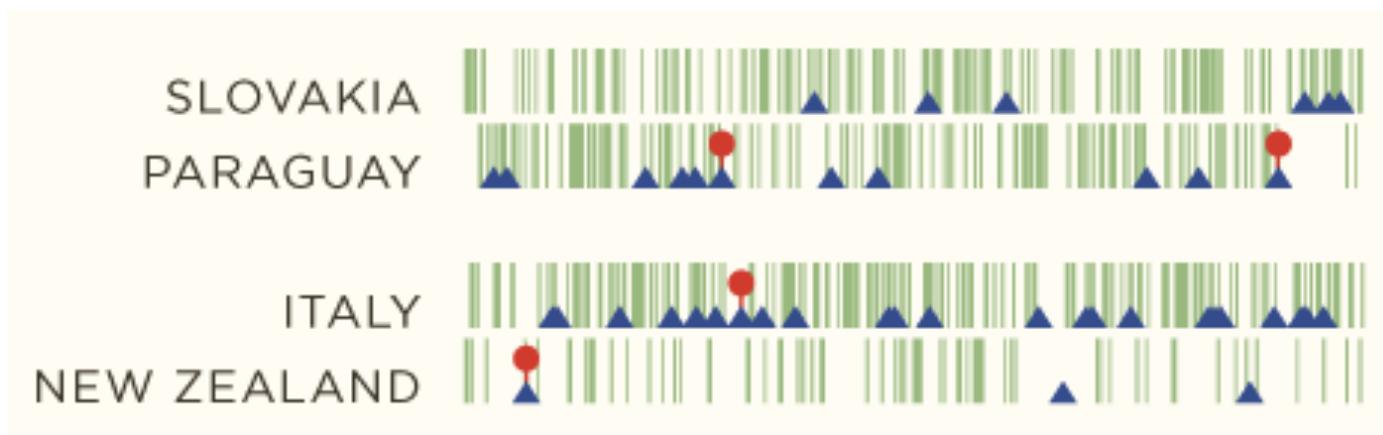
Showing changes over time: Candlestick chart

- Data variables: 1 x quantitative-interval, 4 x quantitative-ratio.
- Visual variables: Position, height, color-hue.



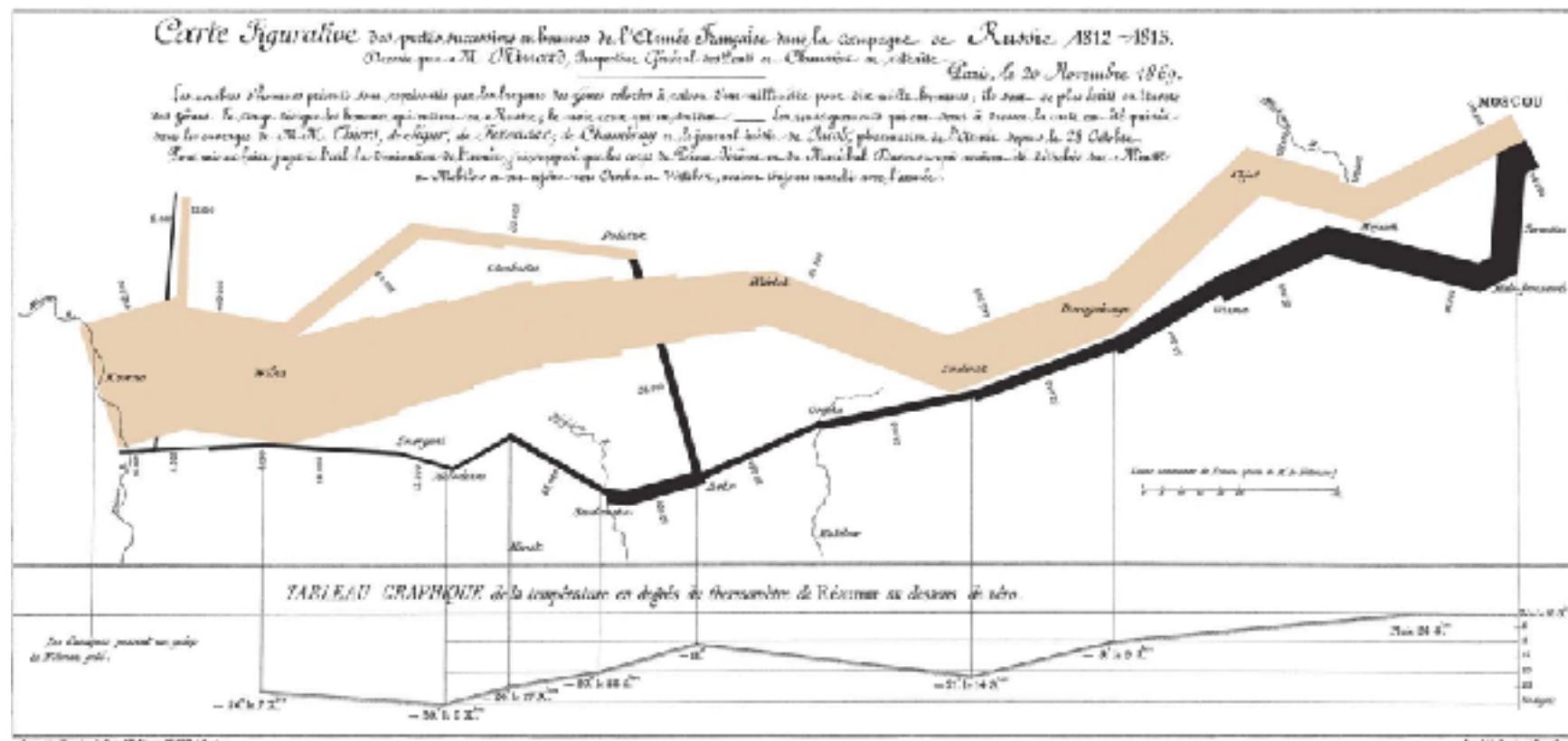
Showing changes over time: Barcode chart

- **Data variables:** 1 x quantitative-interval, 3 x categorical.
- **Visual variables:** Position, symbol, color-hue.



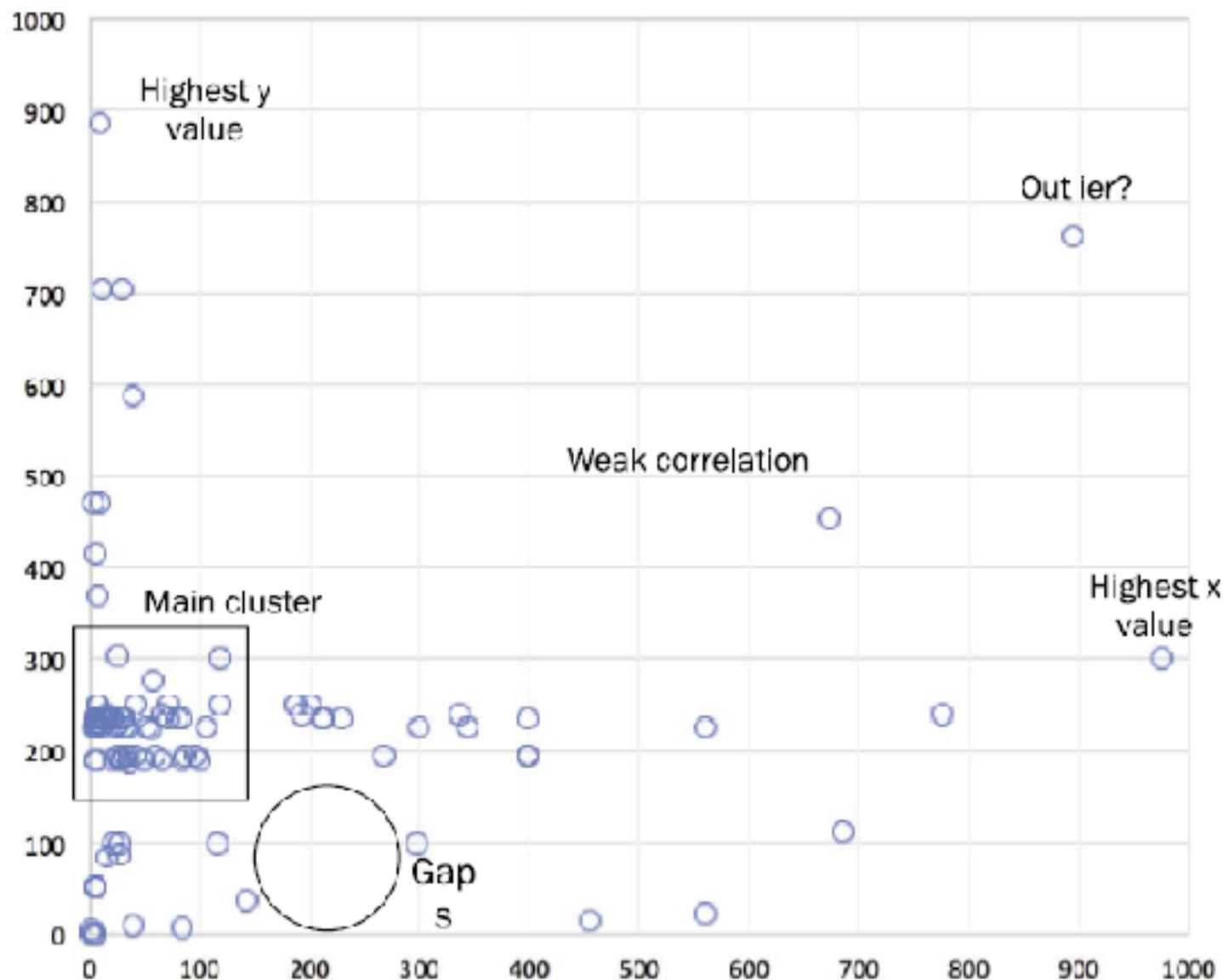
Showing changes over time: Flow map

- **Data variables:** Multiple x quantitative-interval, 1 x categorical, 1 x quantitative-ratio.
 - **Visual variables:** Position, height/width, color-hue.



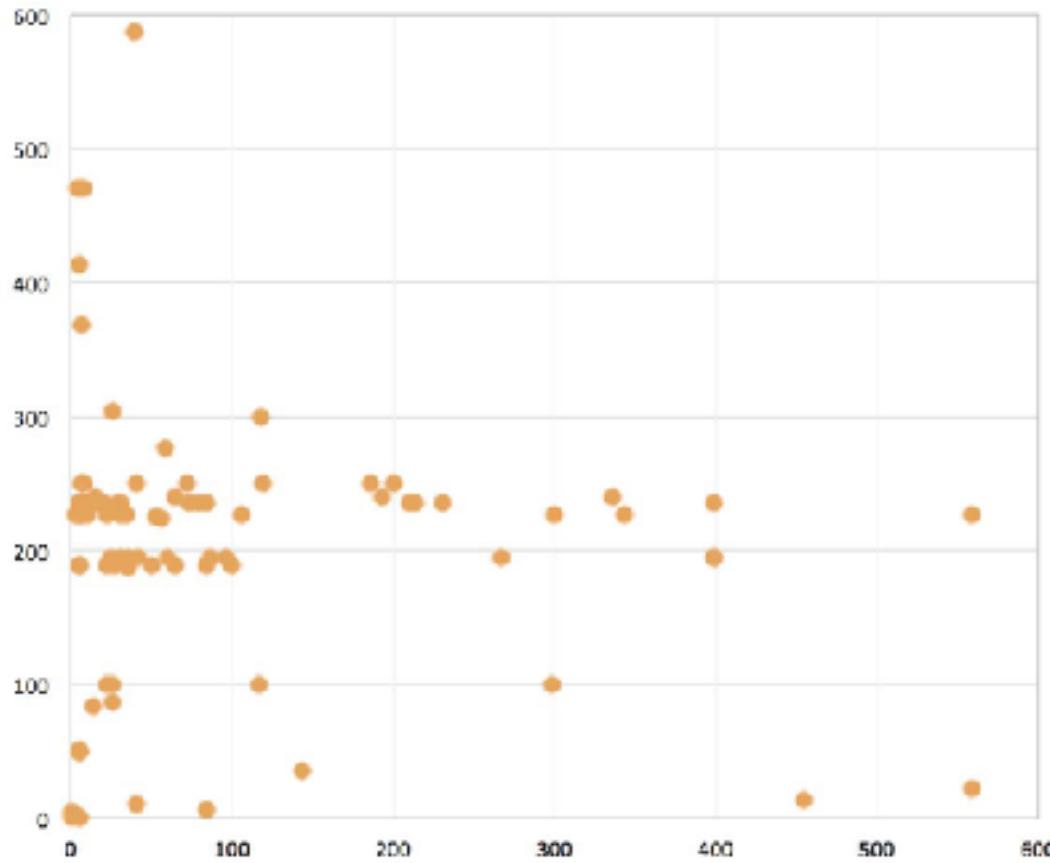
Visual Analytic Techniques

- Relationships and Connections
 - Exceptions
 - Correlations
 - Associations
 - Cluster and Gaps
 - Hierarchical Relationships



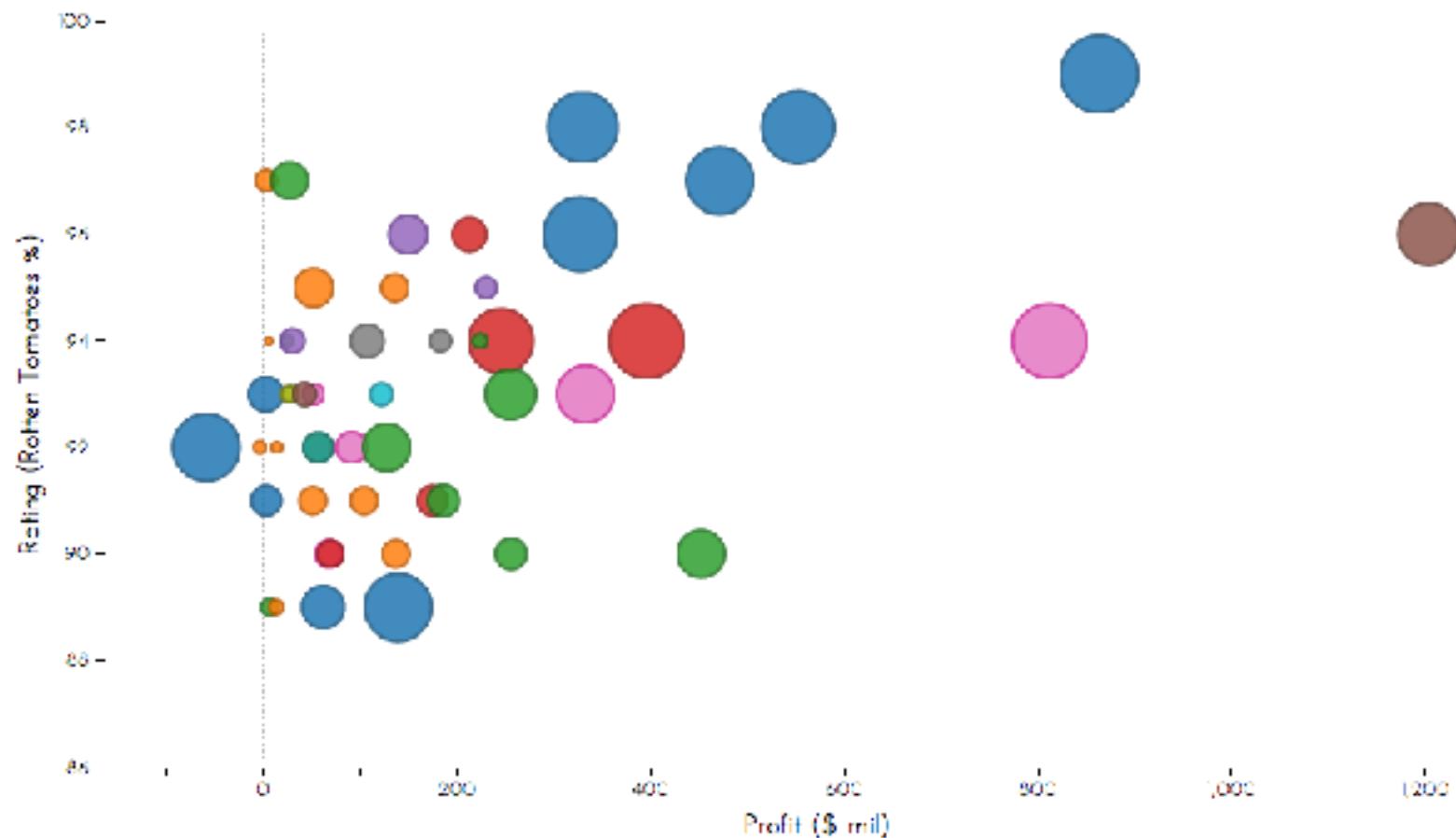
Plotting connections and relationships: Scatter plot

- Data variables: 2 x quantitative.
- Visual variables: Position, color-hue.



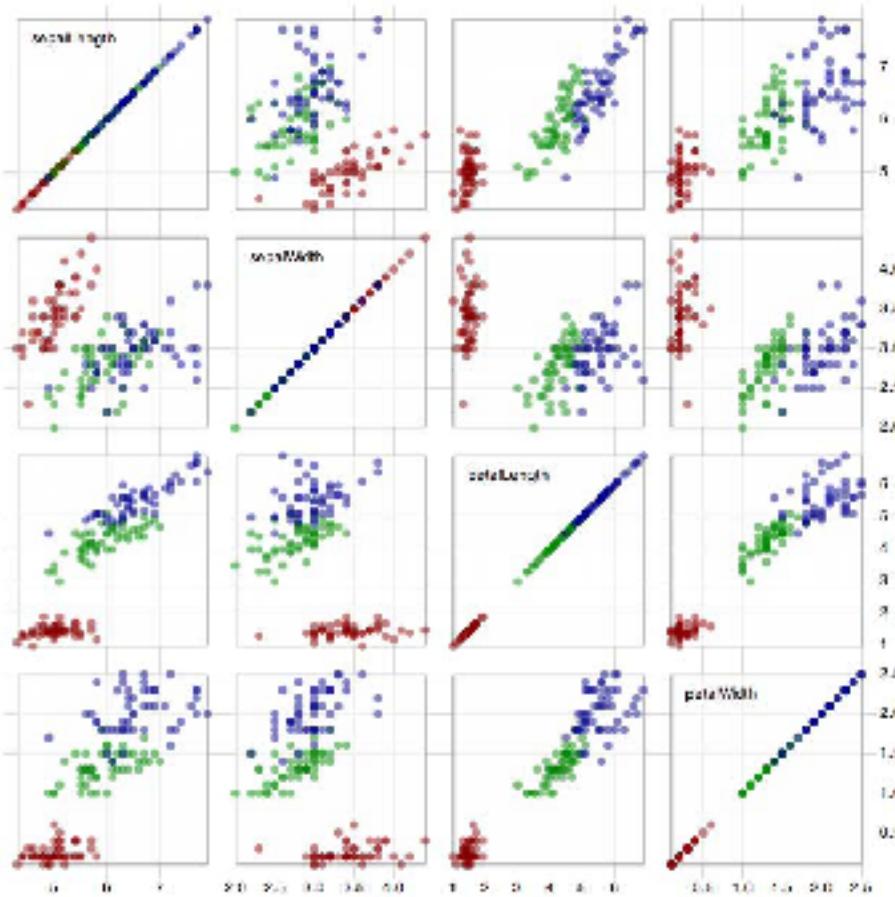
Plotting connections and relationships: Bubble plot

- Data variables: 2 x quantitative, 2 x categorical.
- Visual variables: Position, area, color-hue.



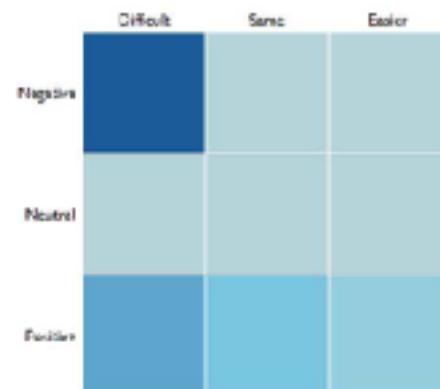
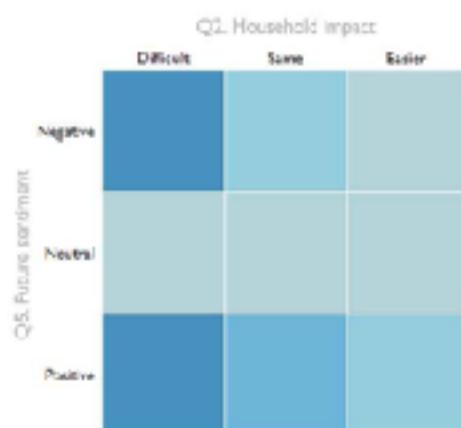
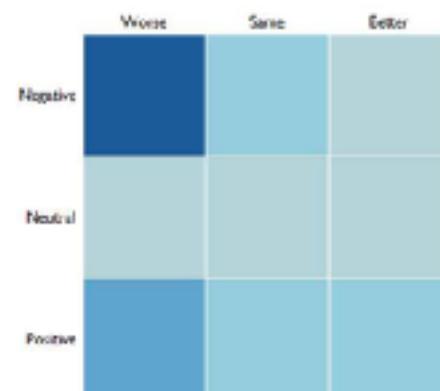
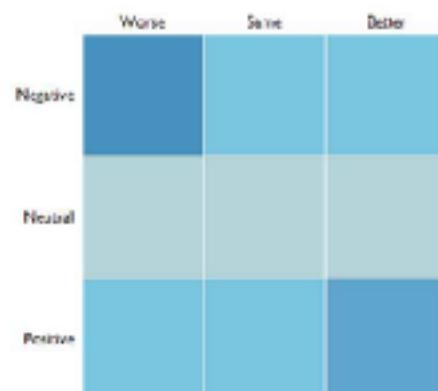
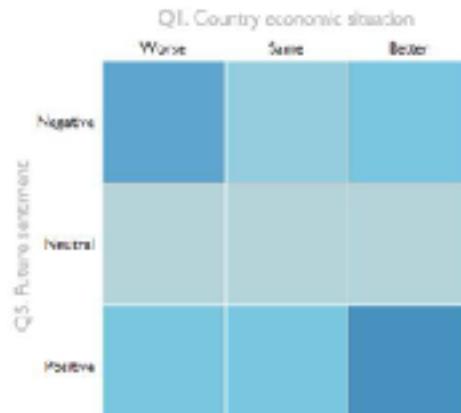
Plotting connections and relationships: Scatter plot matrix

- **Data variables:** 2 x quantitative, 2 x categorical.
- **Visual variables:** Position, area, color-hue.



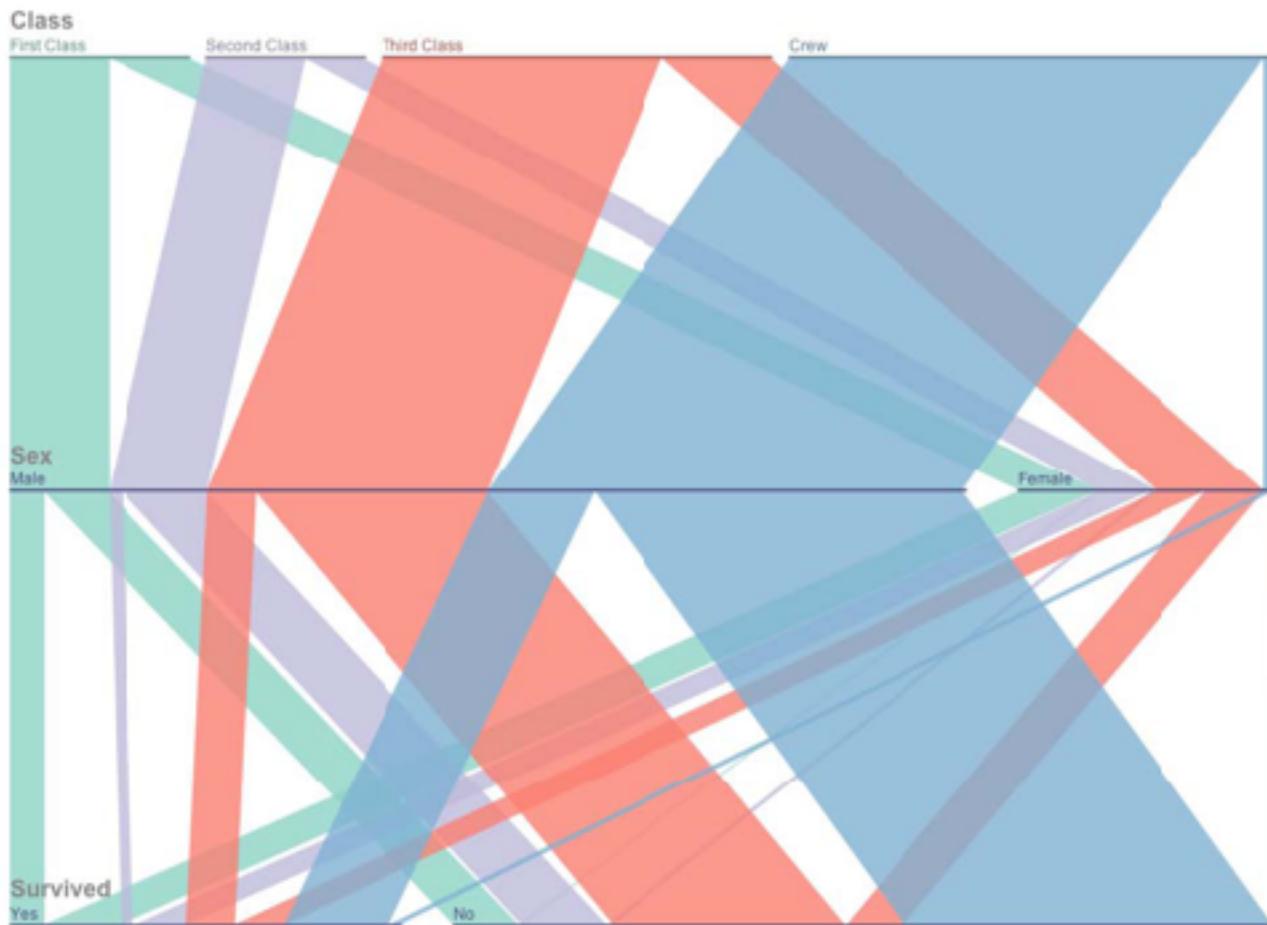
Plotting connections and relationships: Heatmap (or matrix chart)

- **Data variables:** Multiple x categorical, 1 x quantitative-ratio.
- **Visual variables:** Position, color-saturation.



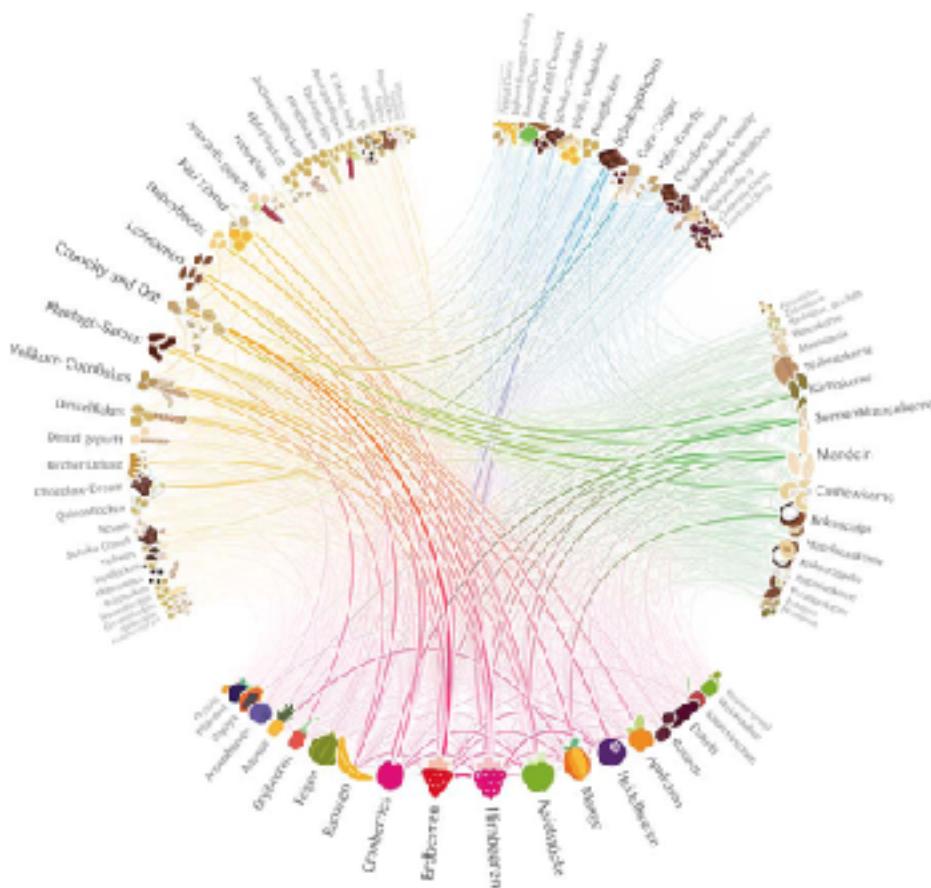
Plotting connections and relationships: Parallel sets (or parallel coordinates)

- **Data variables:** Multiple x categorical, multiple x quantitative-ratio.
- **Visual variables:** Position, width, link, color-hue.



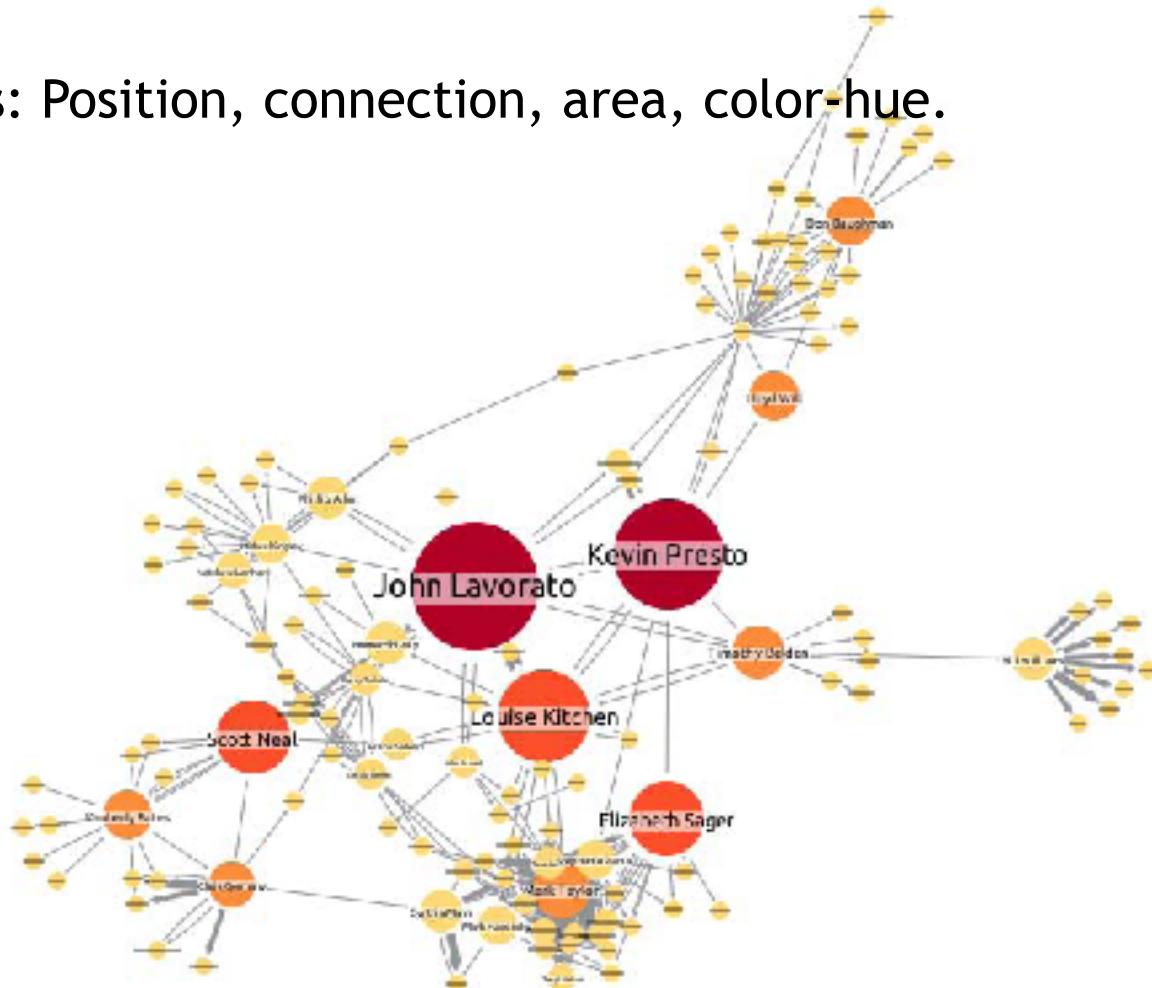
Plotting connections and relationships: Radial network (or chord diagram)

- **Data variables:** Multiple x categorical, 2 x quantitative-ratio.
 - **Visual variables:** Position, connection, width, color-hue, color-lightness, symbol size



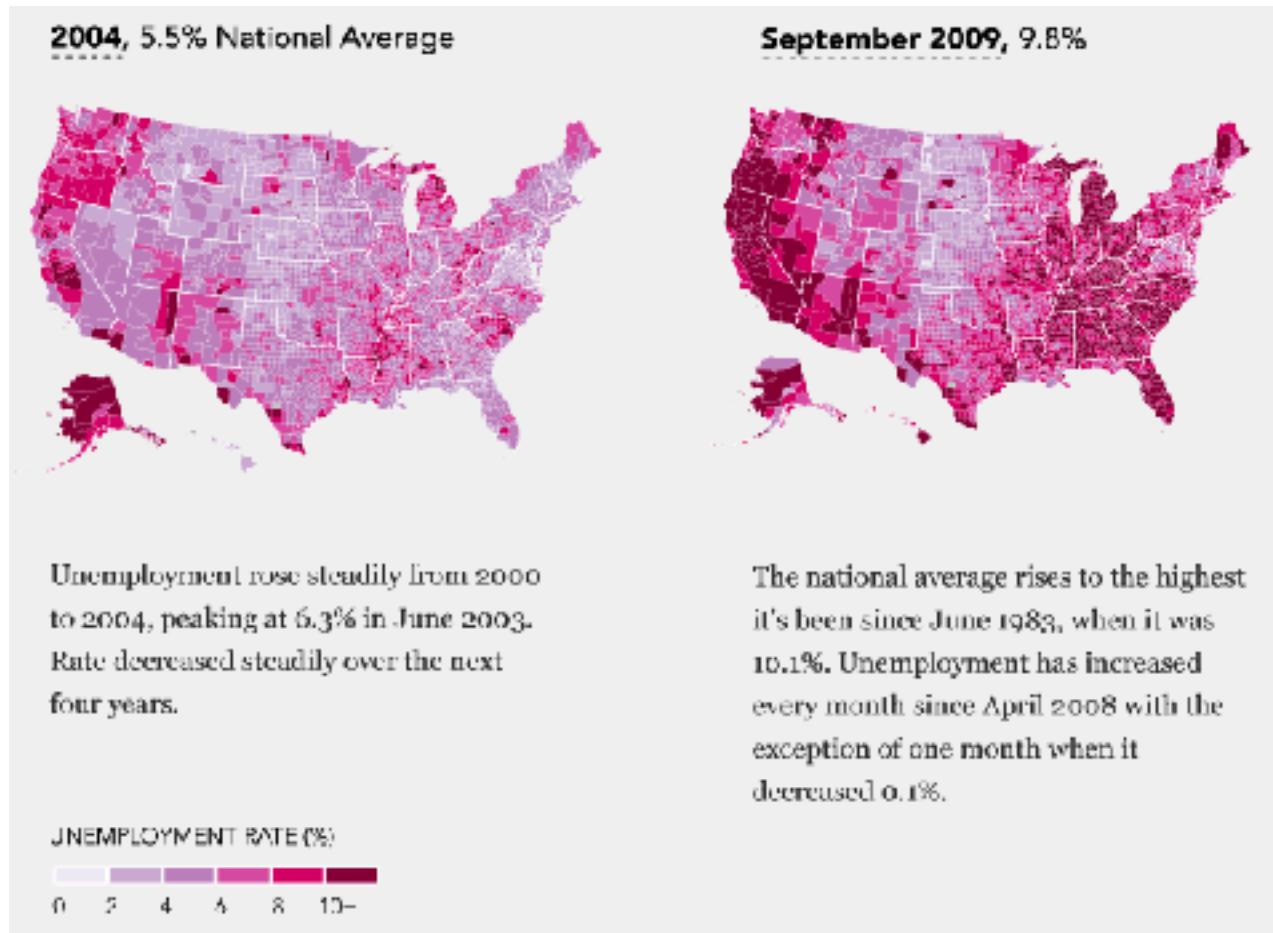
Plotting connections and relationships: Network diagram

- **Data variables:** Multiple x categorical-nominal, 1 x quantitative-ratio.
- **Visual variables:** Position, connection, area, color-hue.



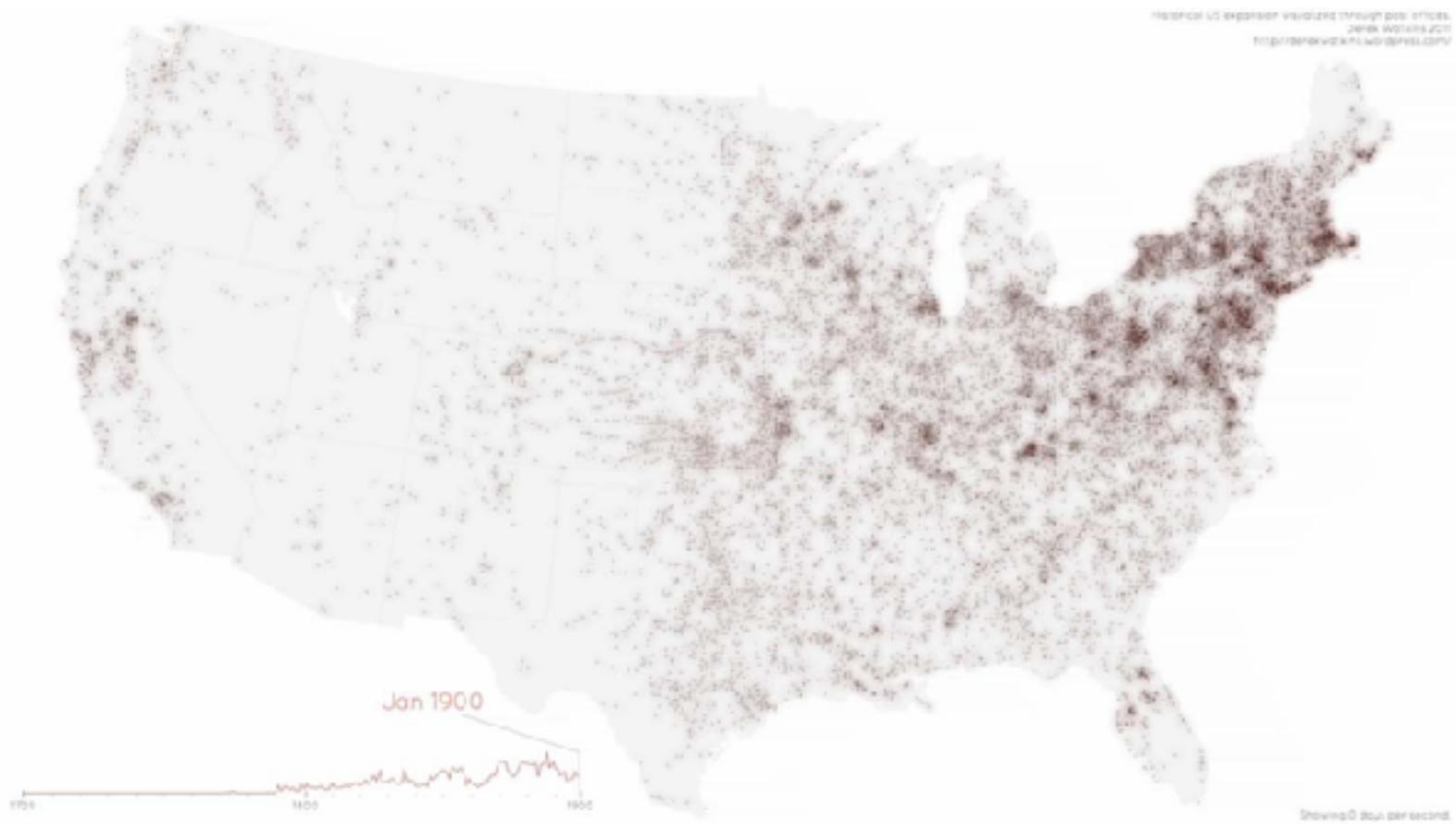
Mapping geo-spatial data: Choropleth map

- **Data variables:** 2 x quantitative-interval, 1 x quantitative-ratio.
- **Visual variables:** Position, color-saturation/lightness.



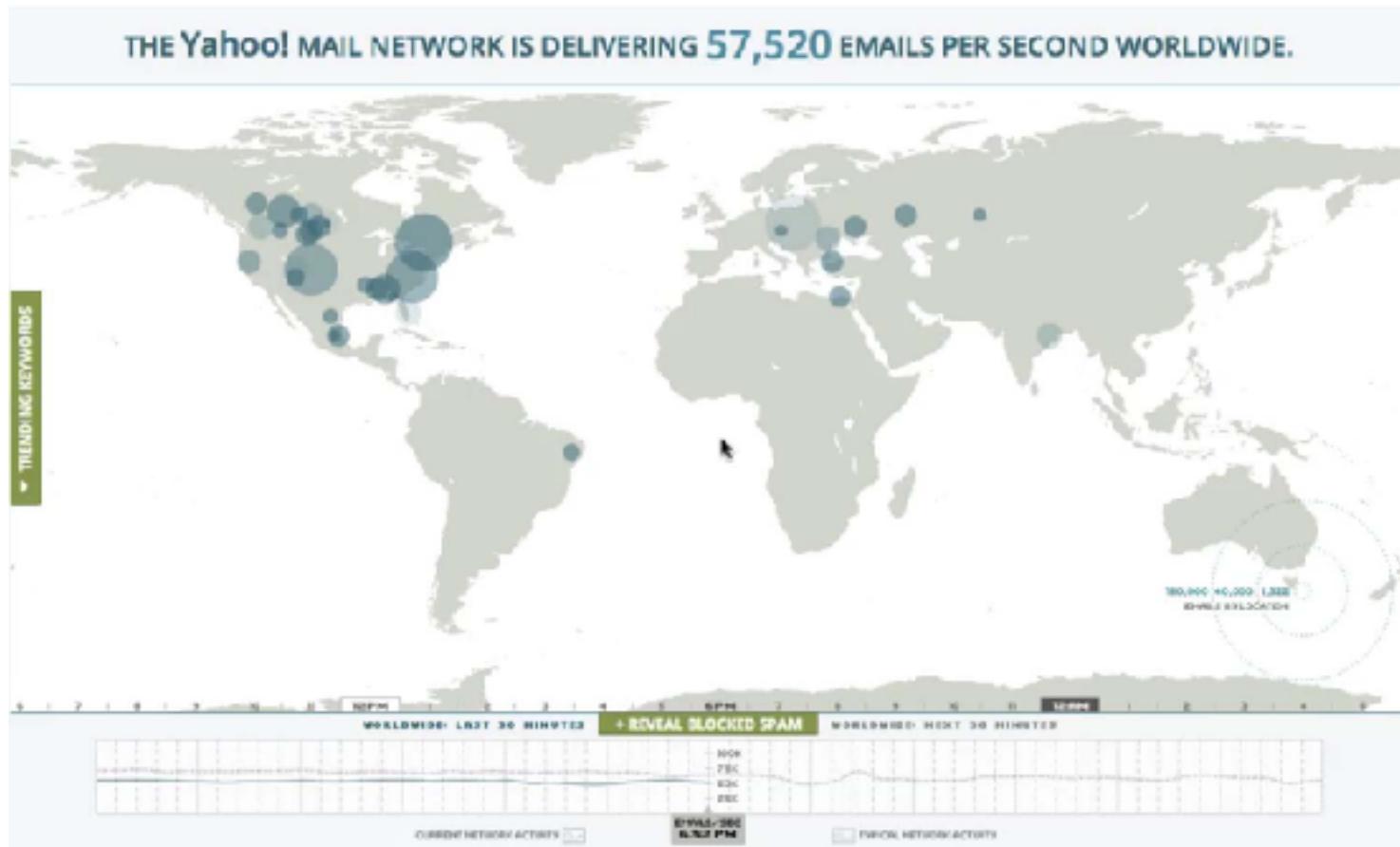
Mapping geo-spatial data: Dot plot map

- **Data variables:** 2 x quantitative-interval.
- **Visual variables:** Position.



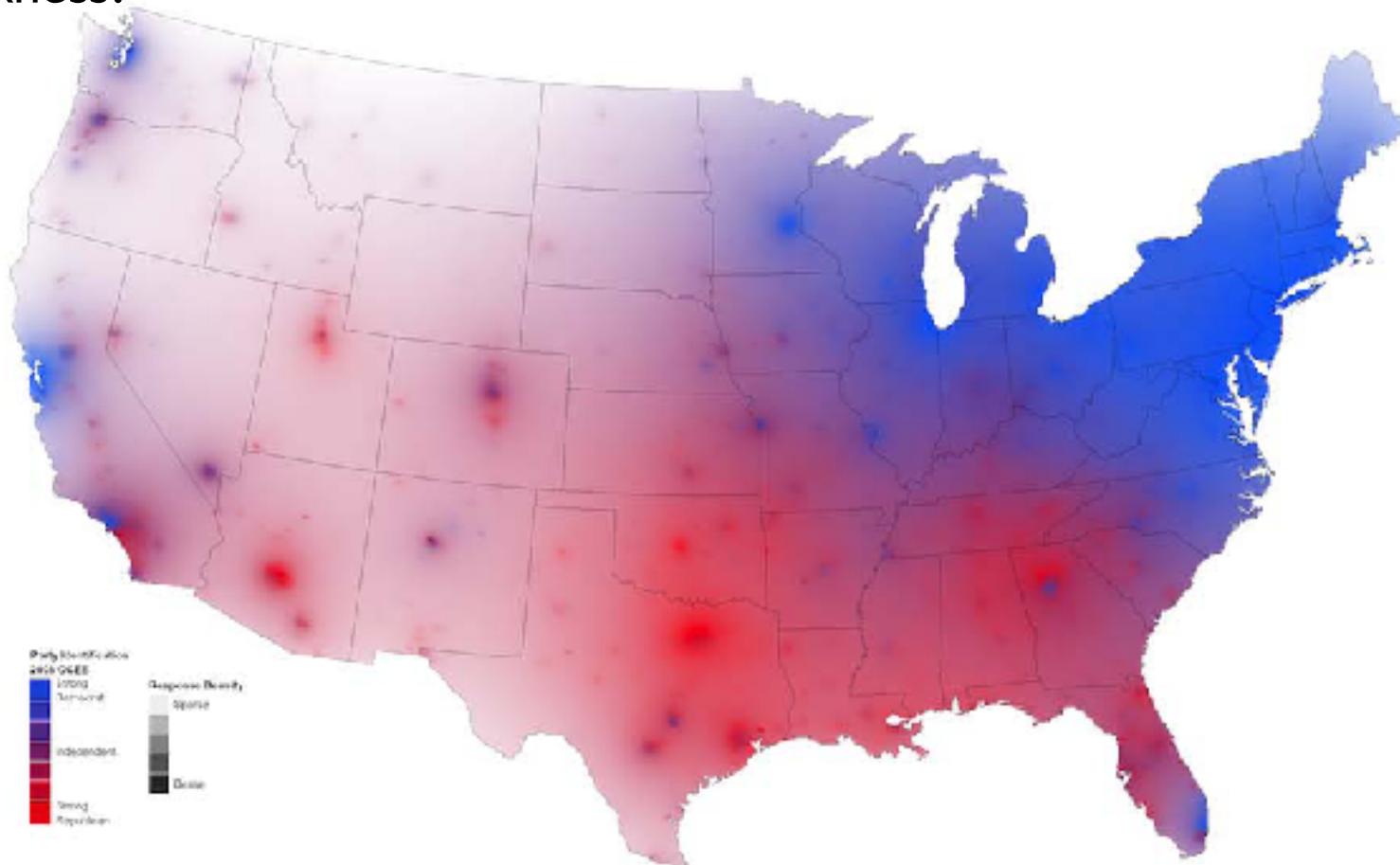
Mapping geo-spatial data: Bubble plot map

- **Data variables:** 2 x quantitative-interval, 1 x quantitative-ratio, 1 x categorical-nominal.
- **Visual variables:** Position, area, color-hue.



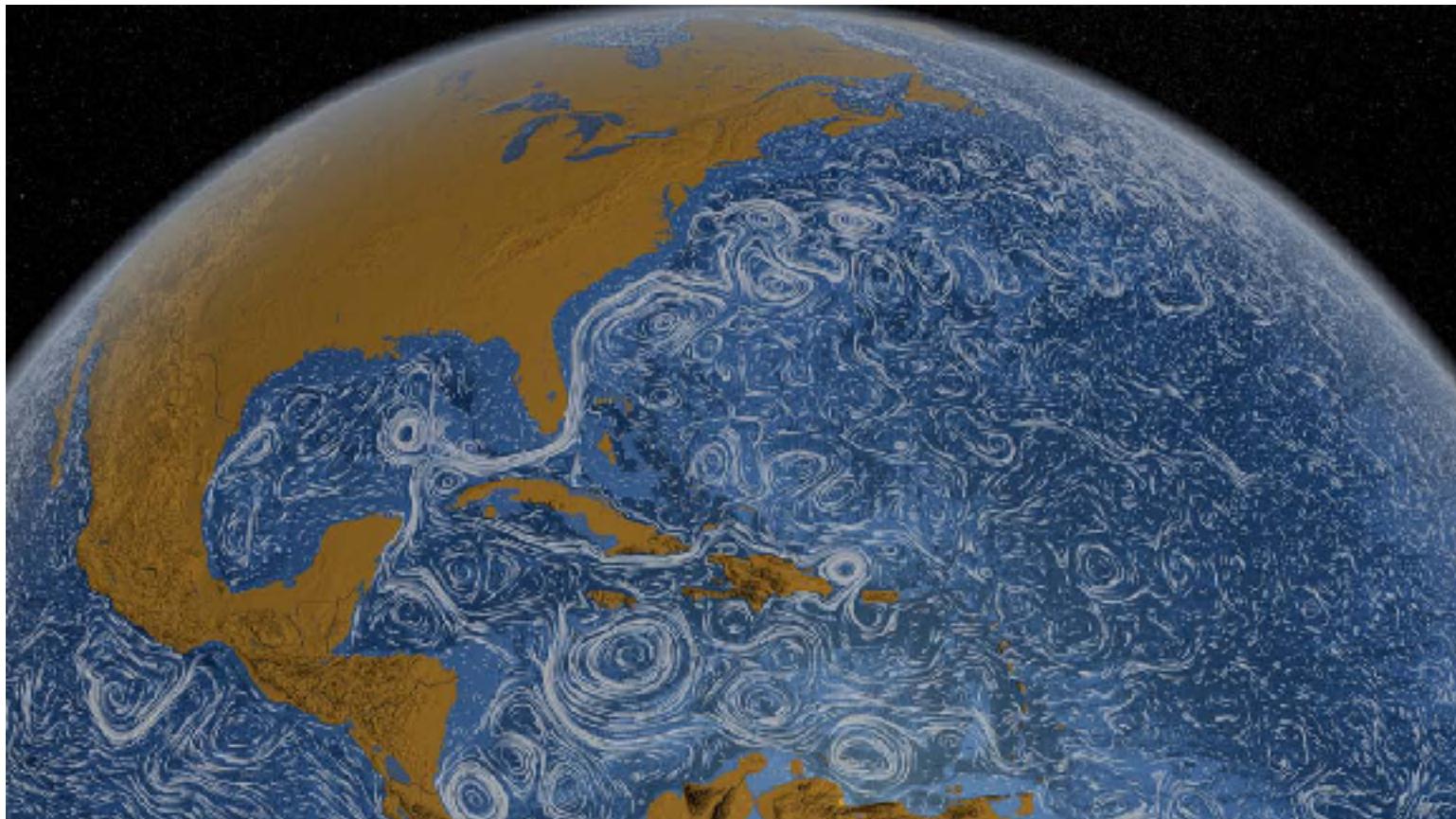
Mapping geo-spatial data: Isarithmic map

- **Data variables:** Multiple x quantitative, multiple x categorical.
- **Visual variables:** Position, color-hue, color-saturation, color-darkness.



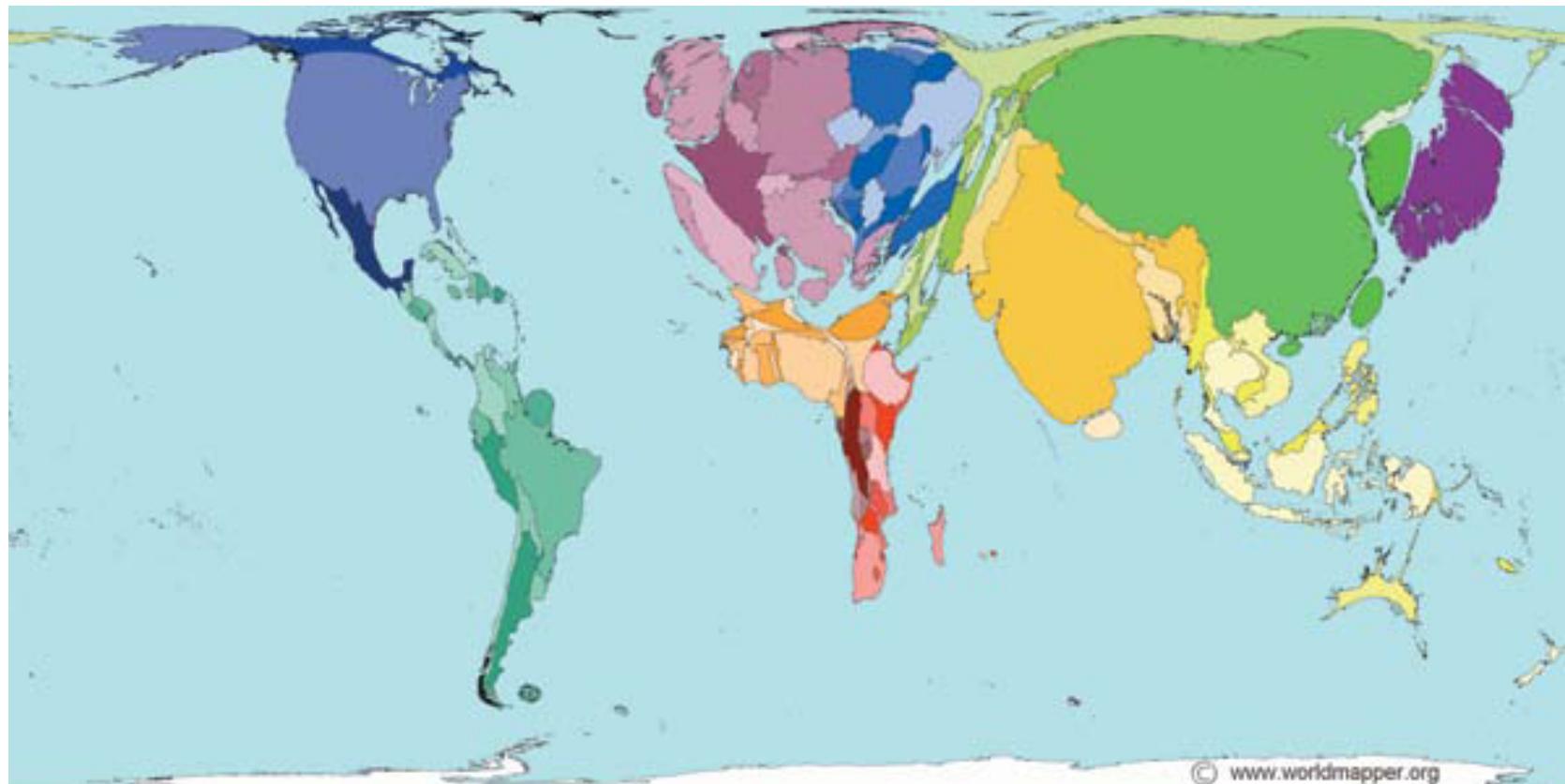
Mapping geo-spatial data: Particle flow map

- **Data variables:** Multiple x quantitative.
- **Visual variables:** Position, direction, thickness, speed.



Mapping geo-spatial data: Cartogram

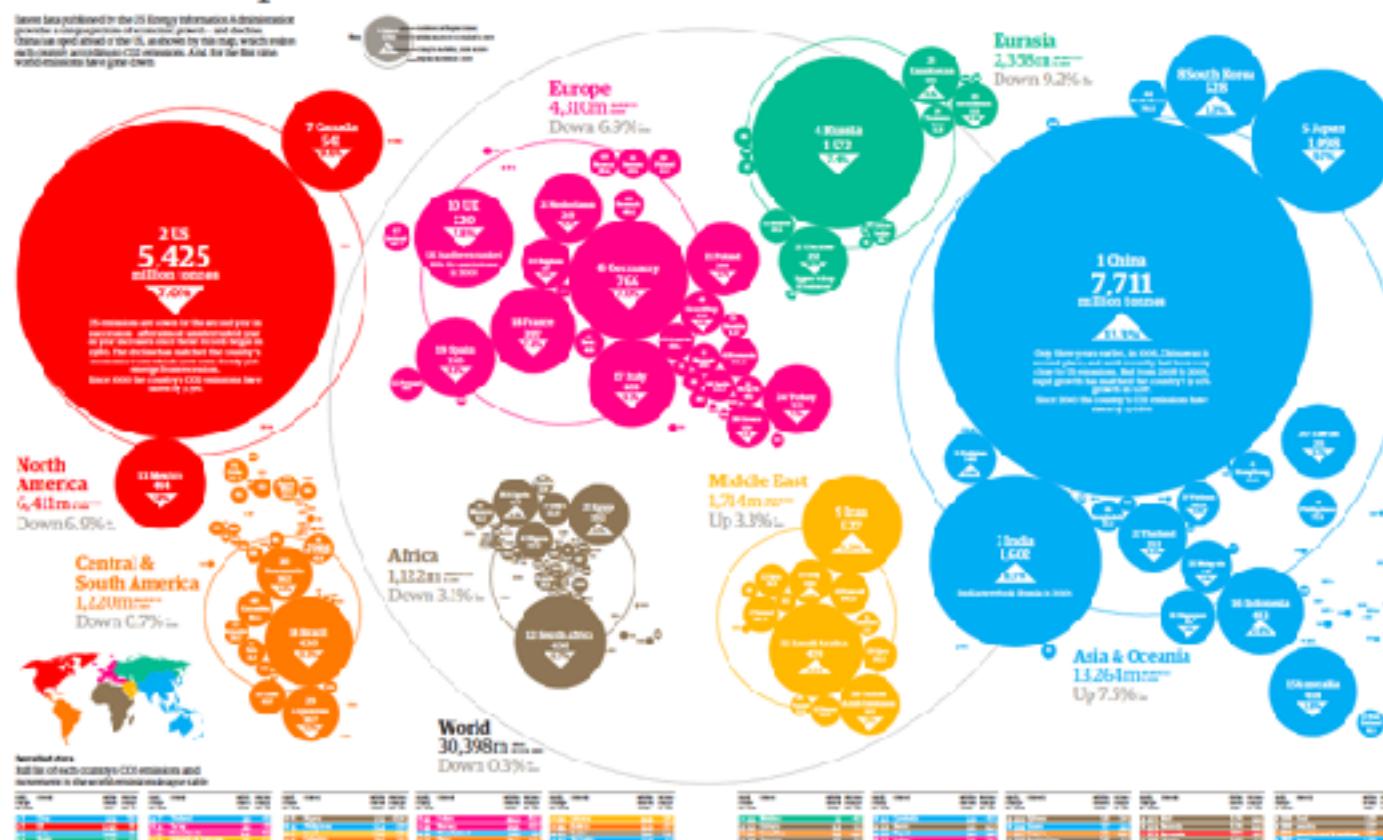
- **Data variables:** 2 x quantitative-interval, 1 x quantitative-ratio.
- **Visual variables:** Position, size.



Mapping geo-spatial data: Dorling cartogram

- **Data variables:** 2 x categorical, 1 x quantitative-ratio.
 - **Visual variables:** Position, size, color-hue.

An atlas of pollution: the world in carbon dioxide emissions



Mapping geo-spatial data: Network connection map

- **Data variables:** 2 x quantitative-interval, 1 x categorical-nominal.
- **Visual variables:** Position, link, color-hue.



Group Project (Cont.)

- Construct your data visualization projects
 - Submit the results on Monday, 27 Feb 2017 not later than 23.55 (Zipped: doc format for the report + pdf for the poster) via kuliah online
 - Prepare a presentation slide (10 minutes + 2 minutes QA) and print your poster in actual size
 - Present your work on Tuesday, 28 Feb 2017.