



Interactive Visualization

Data Visualization: Basic Techniques

Bachelor of Arts in Interaction Design

Zürich University of the Arts

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Module 2

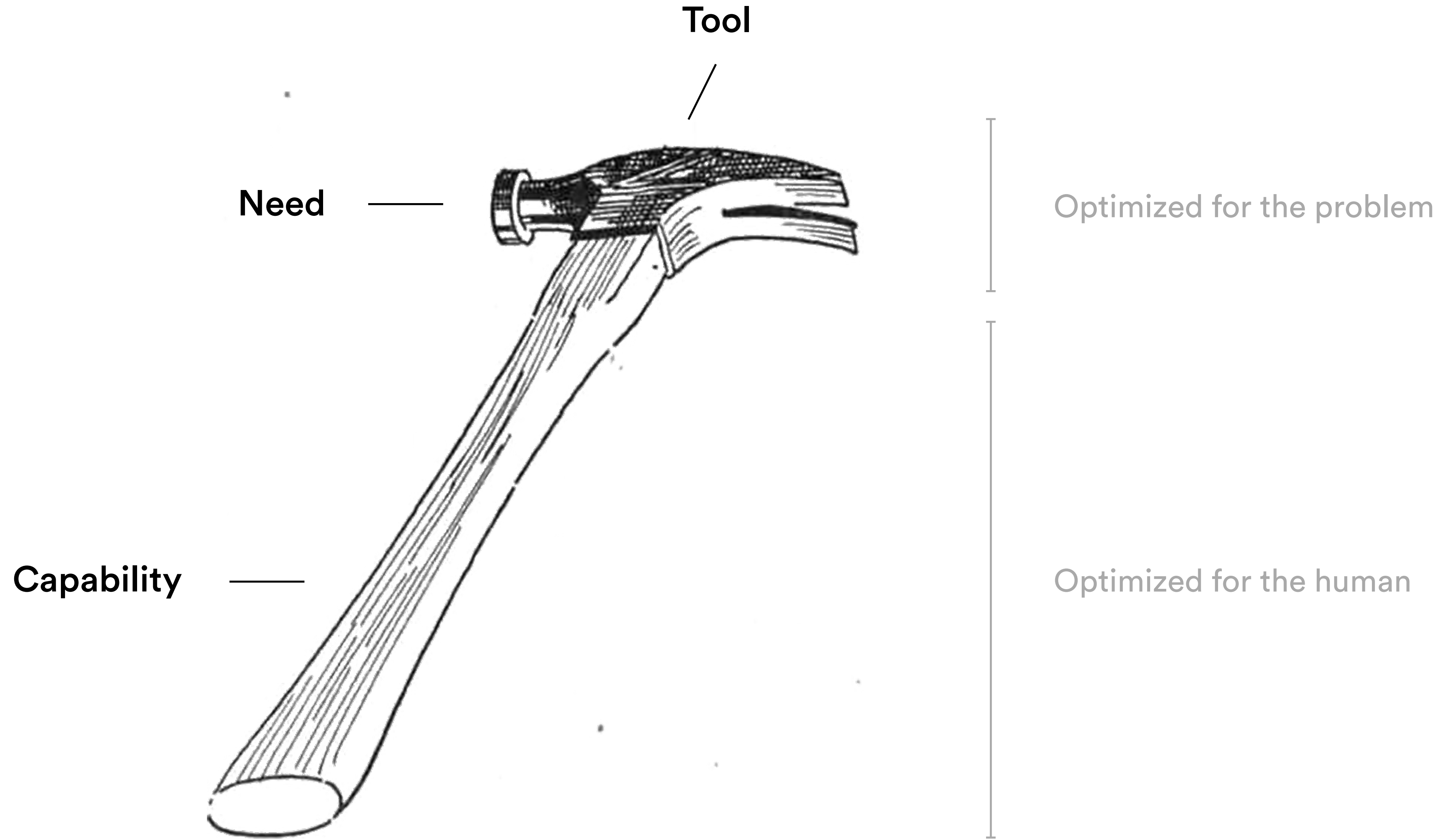
Basic Techniques

2.1 Data Properties

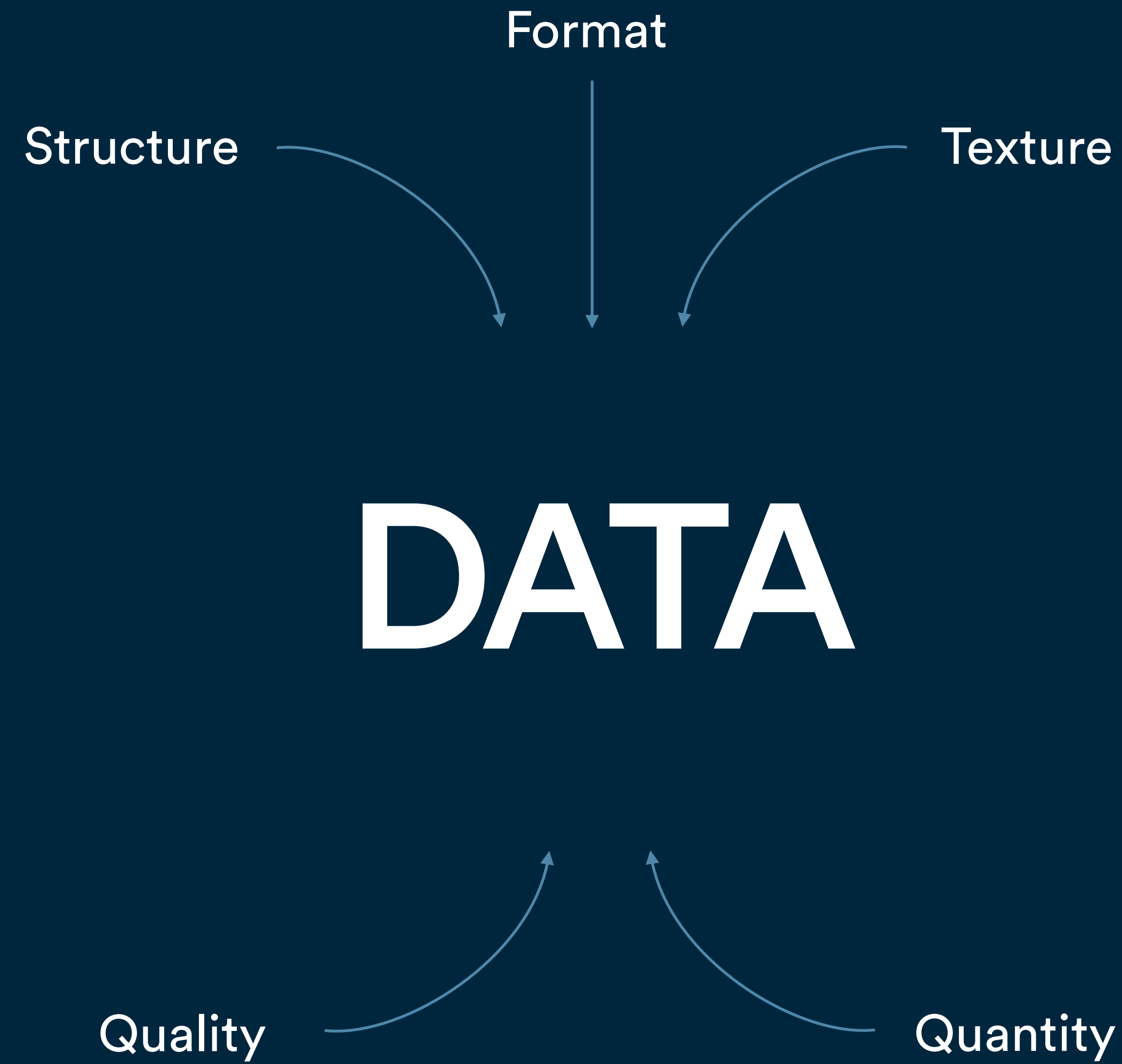
2.2 Human Properties

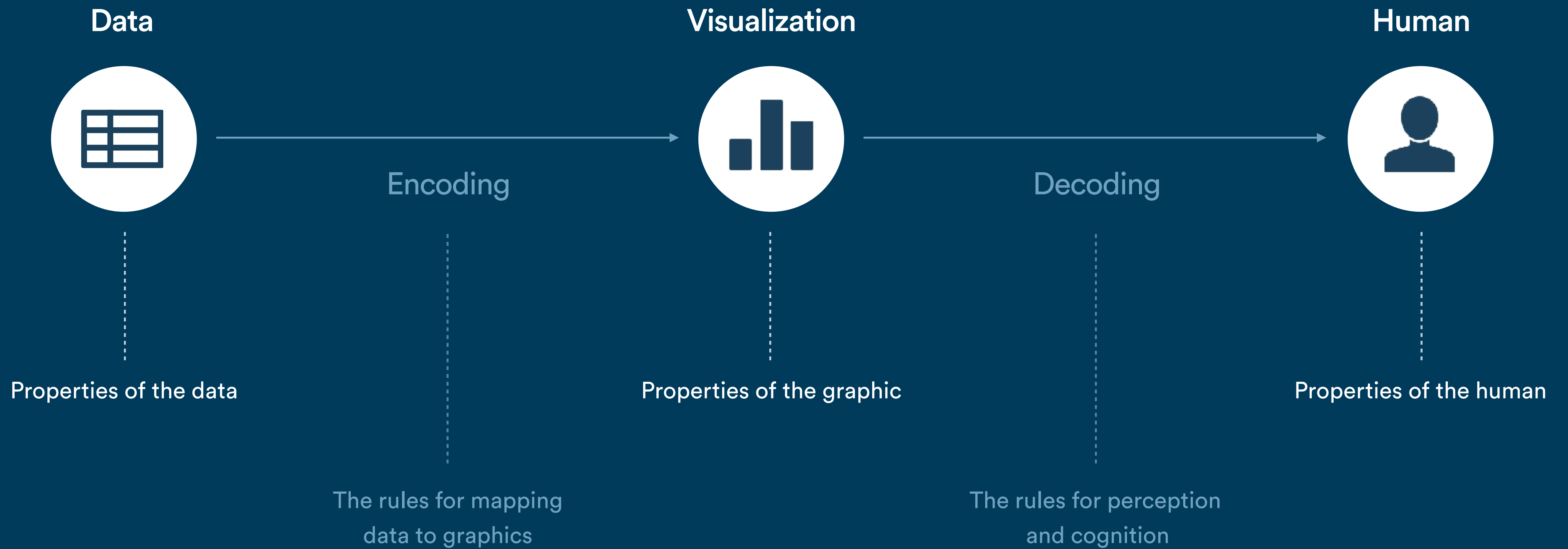
2.3 Graphical Encoding

2.4 Graphical Methods











2.1

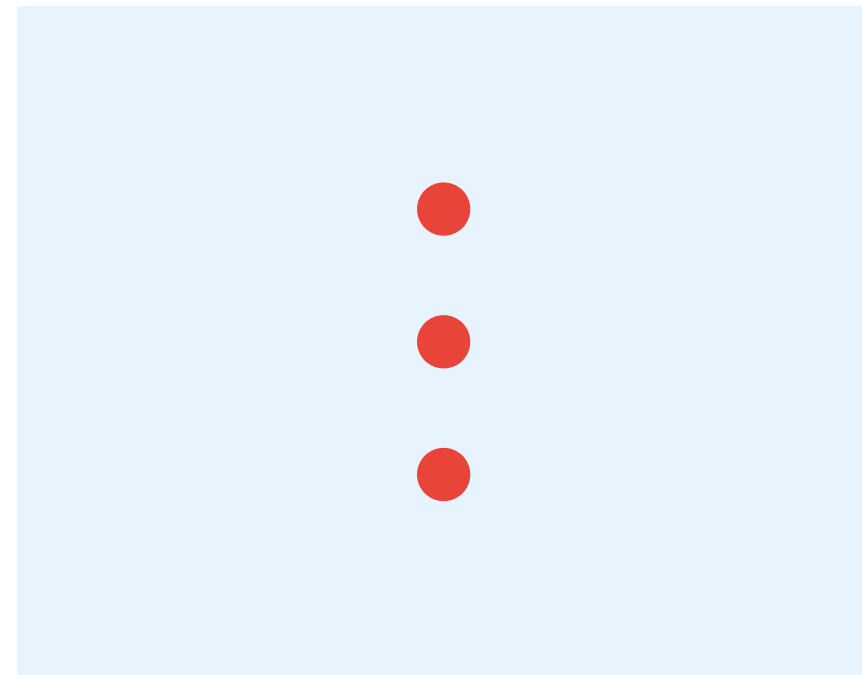
Data Properties

What can be visualized?



Data Types

Items



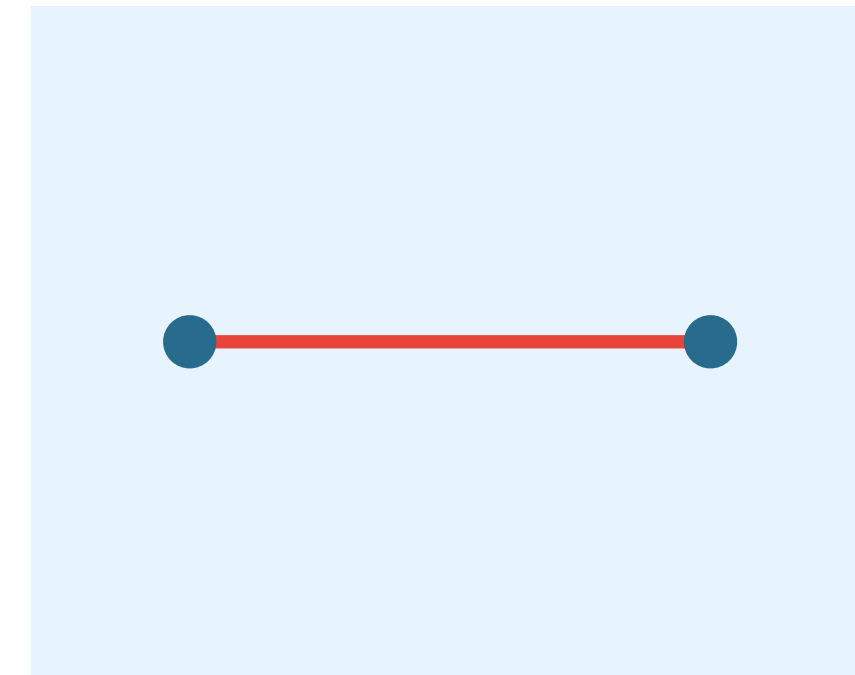
Individual and discrete entity, such as a row in a simple table.

Attributes



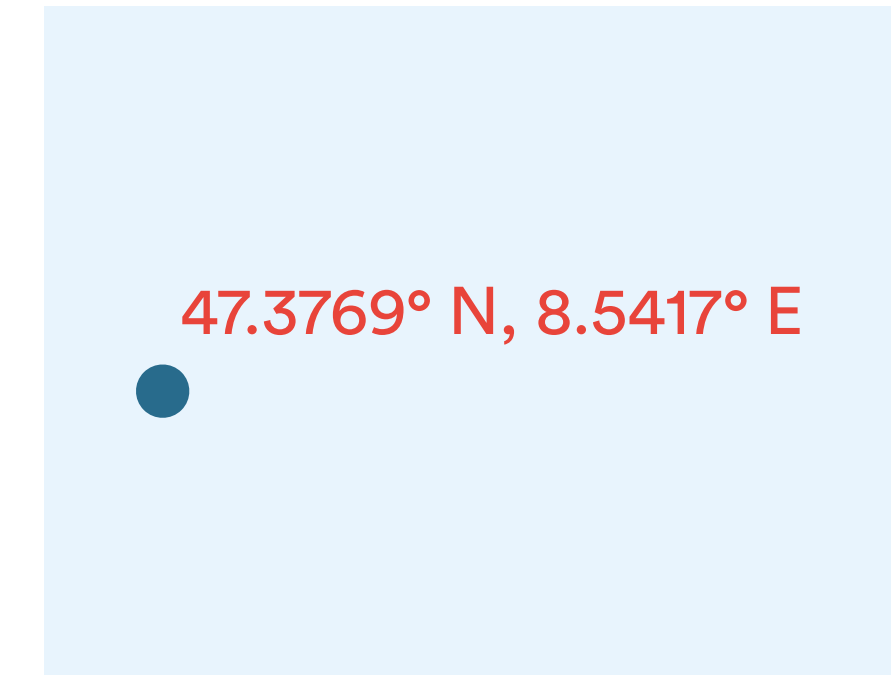
Specific property that can be measured, observed, or logged.

Links



Relationship between items, typically within a network.

Positions

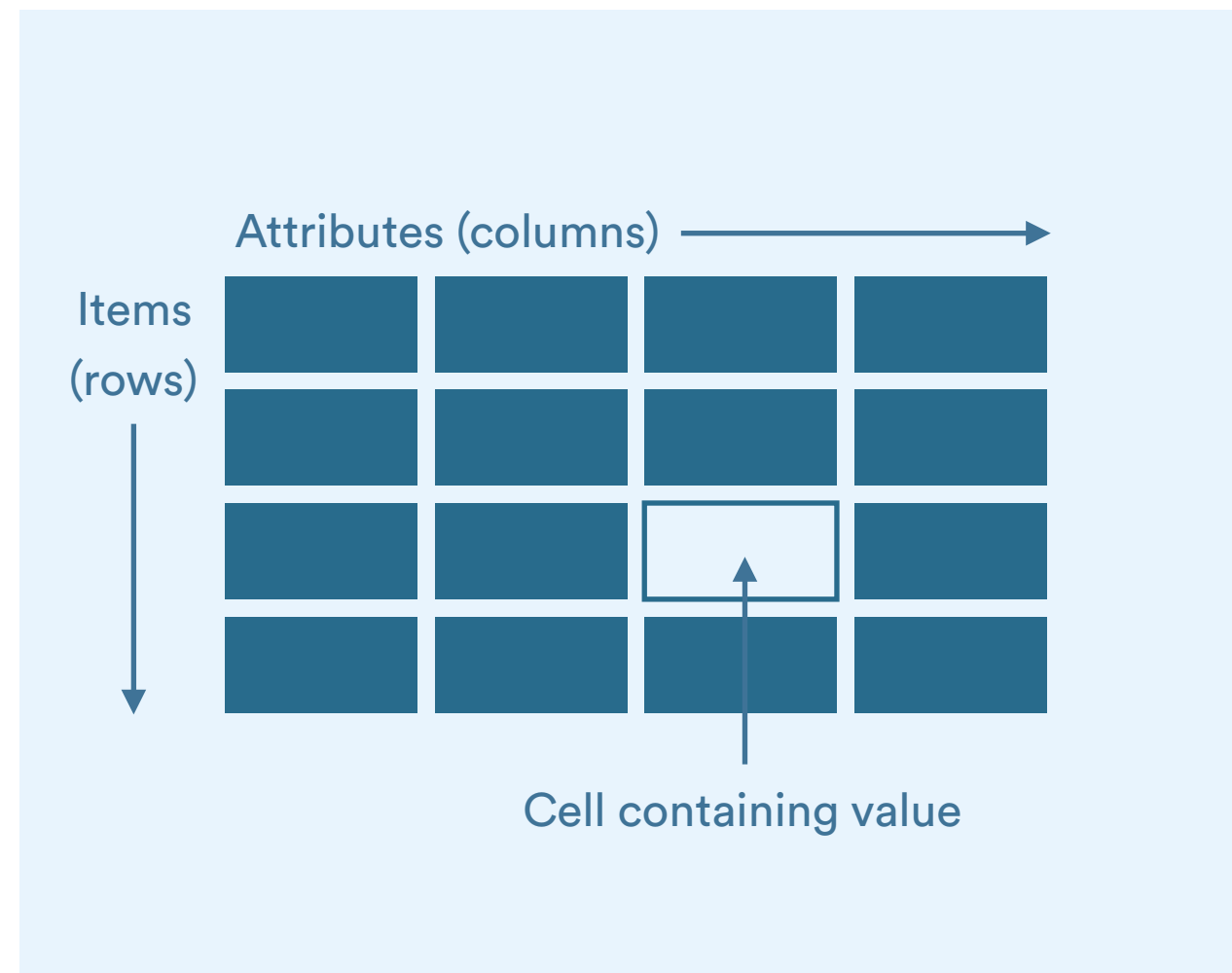


Spatial data providing a location in two- or three-dimensional space.

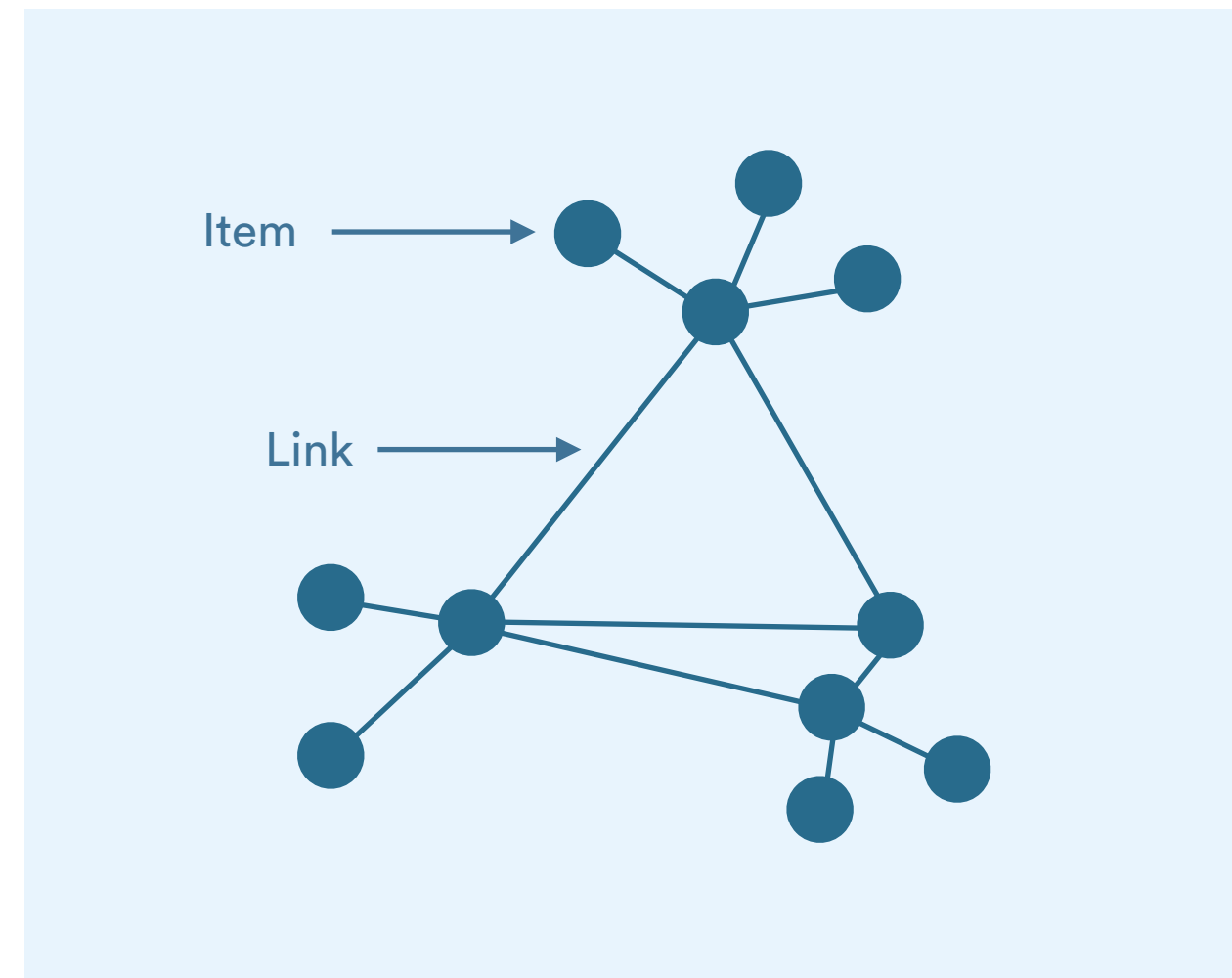


Data Set Types

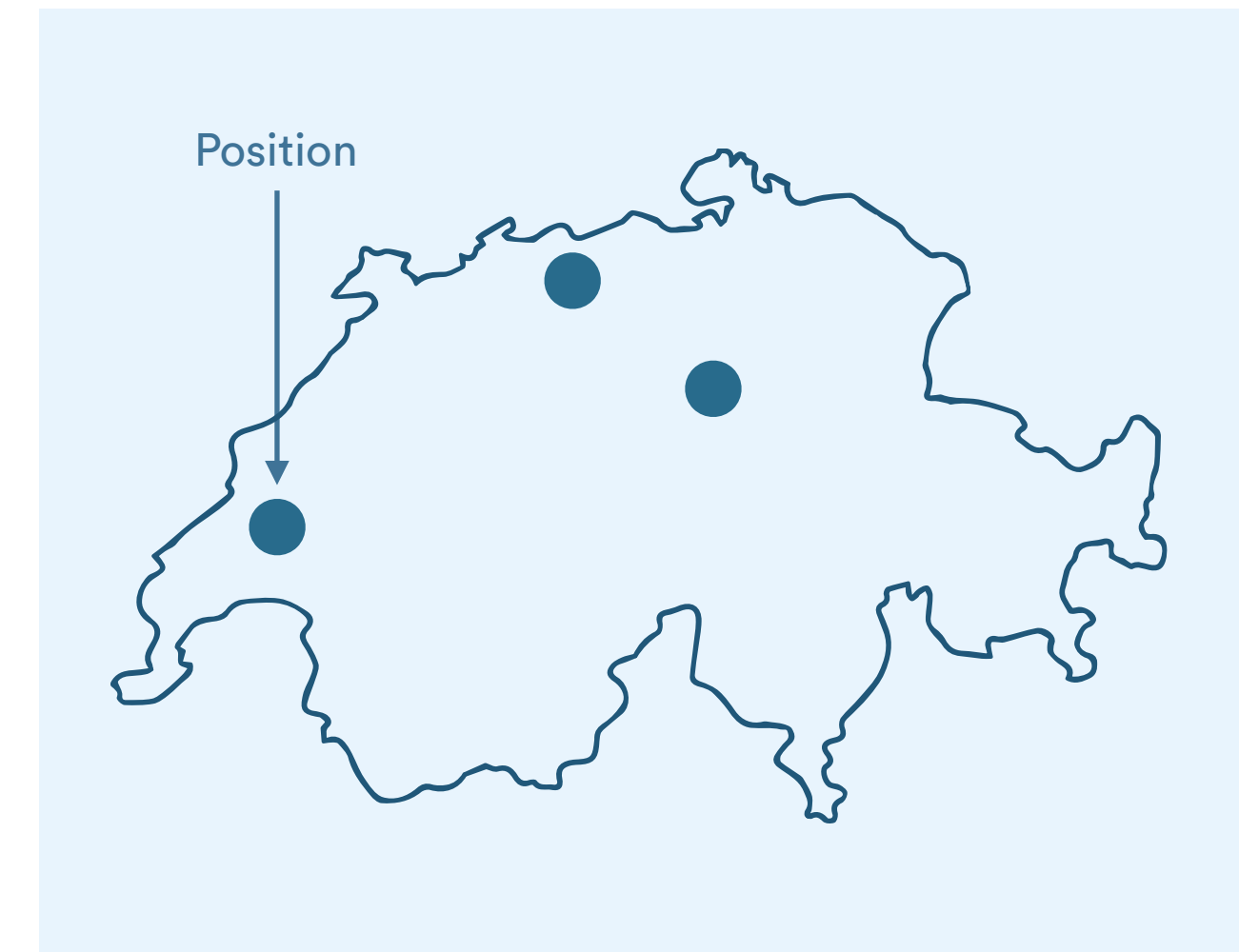
Tables



Networks



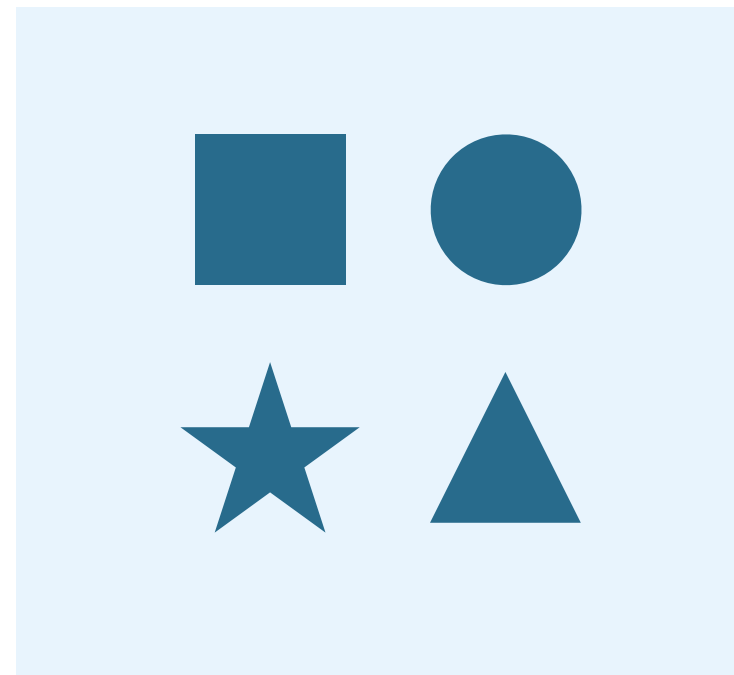
Geometry





Data Attribute Types

Nominal



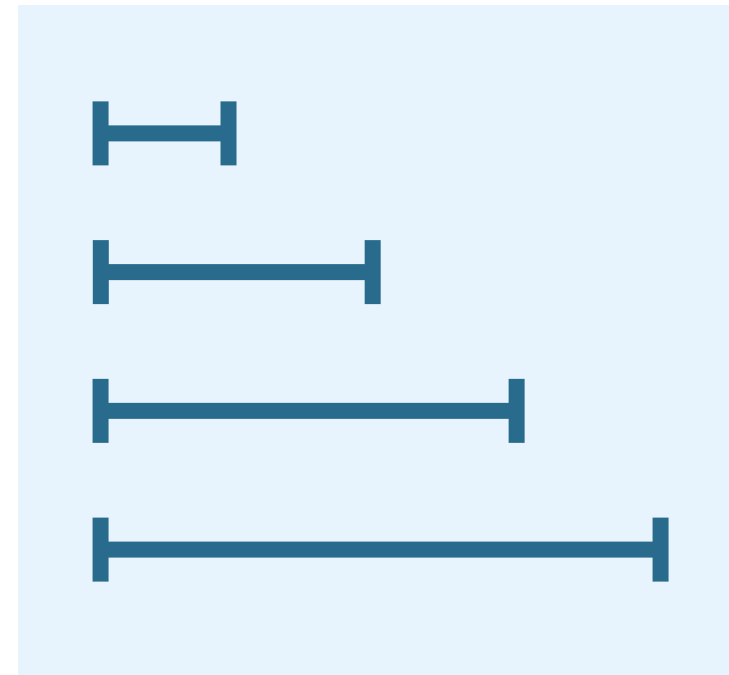
Data with categories of things that have no implicit ordering like song genres or animal families.

Ordinal



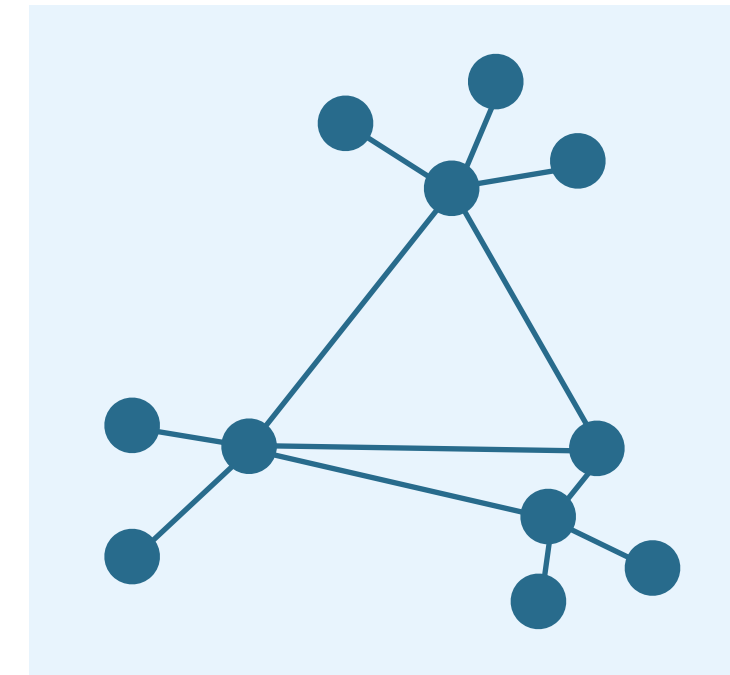
Data with an implicit order and discrete steps like shirt sizes or sport medals.

Quantitative



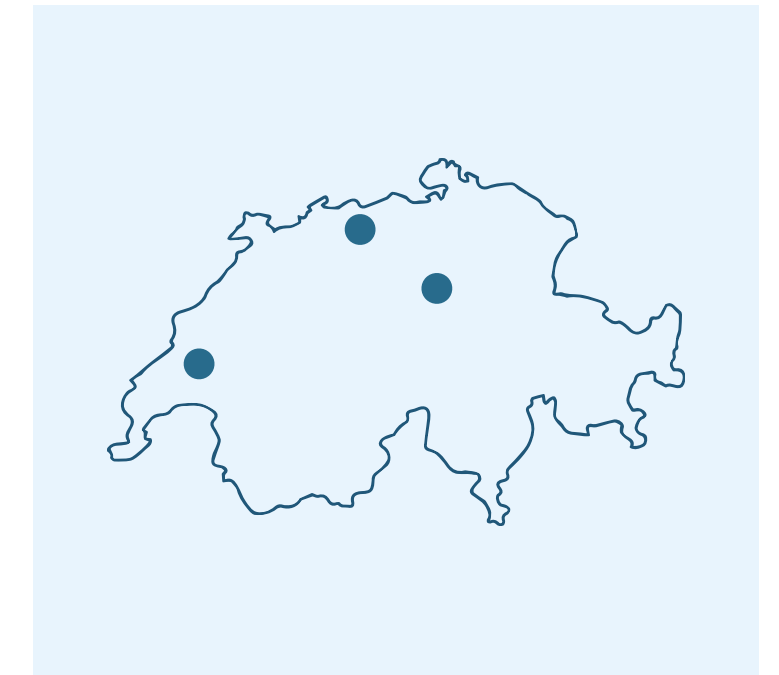
Data with a measure of magnitude like height, weight, temperature or price.

Relational



Data with groups of interconnected items like a social network or gene interaction.

Spatial



Data with specification about the shape of items like a geographical map or a body of mass.



Data Relationships

Nominal Comparison



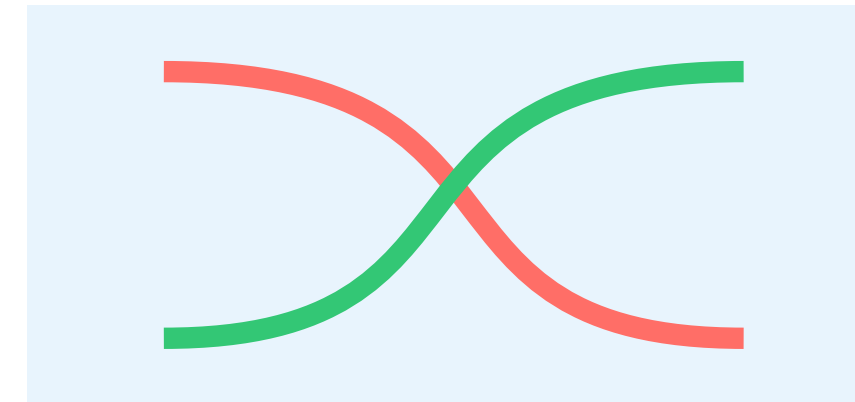
Number of website visitors to various websites.

Time Series



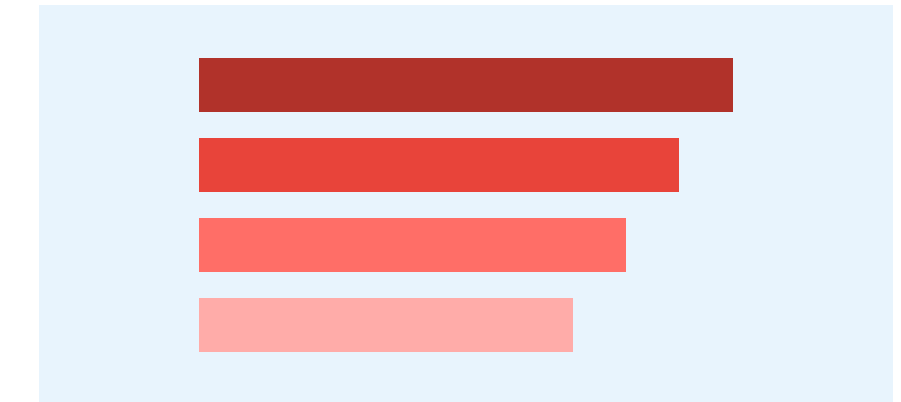
Changes in the national unemployment rate over time.

Correlation



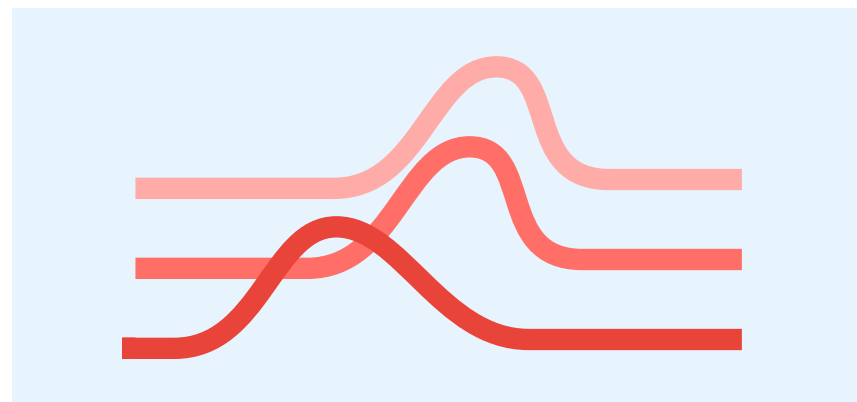
National salaries according to education level.

Ranking



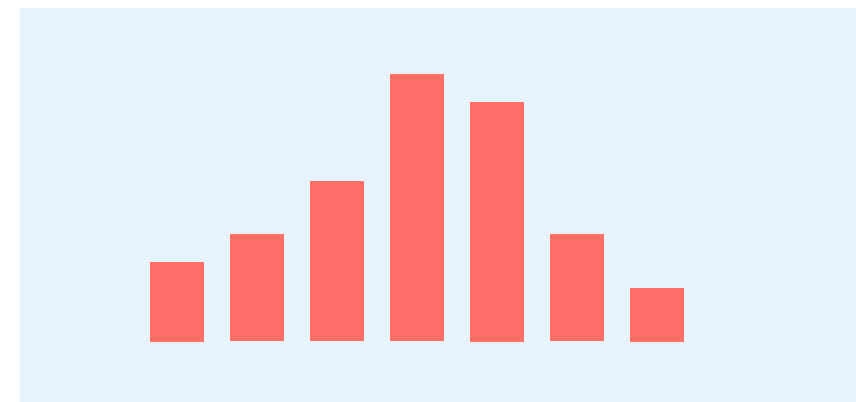
Highest earning football players ranked by salary.

Deviation



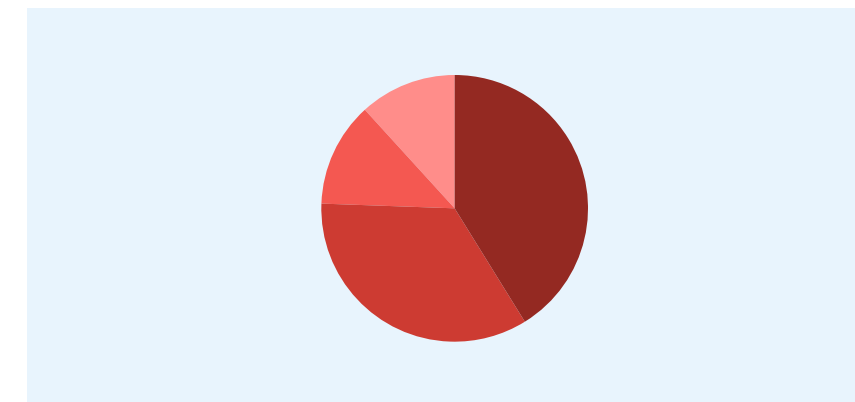
Movie tickets sold on a rainy day vs. a sunny day.

Distributions



Heights of players on a basketball team.

Part-of-Whole

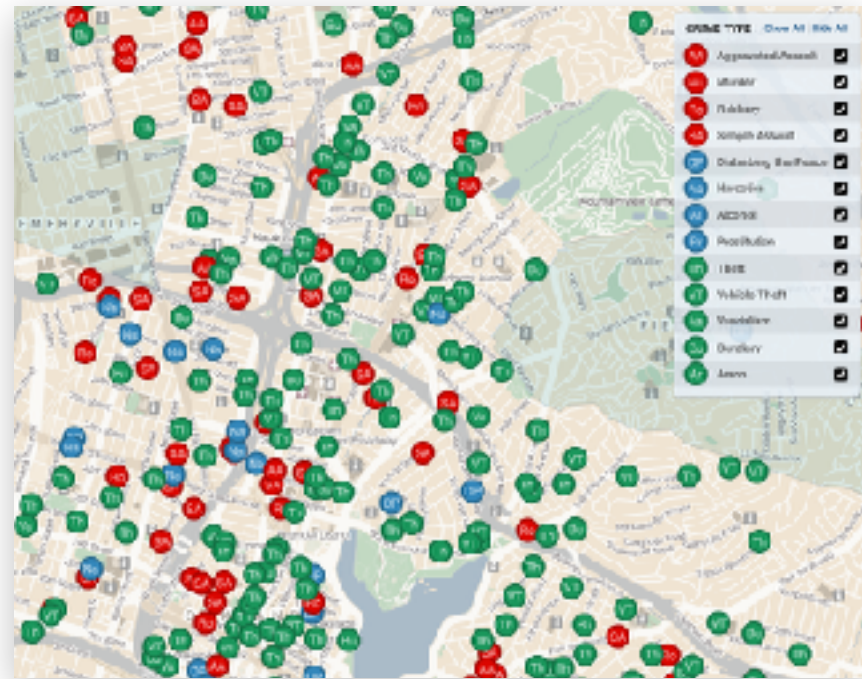


Percentage of browsers accessing a website.



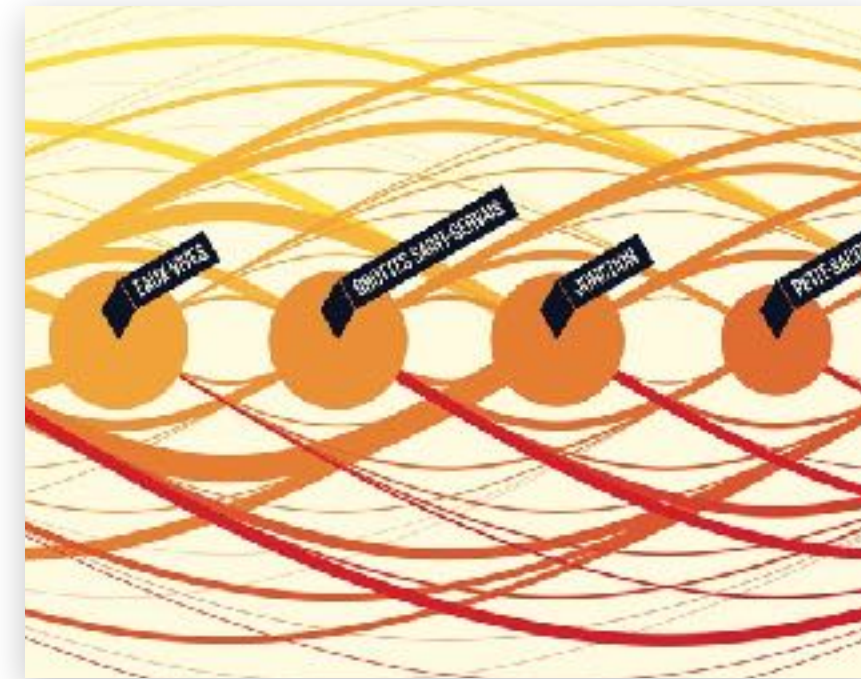
Data Order Types

Location



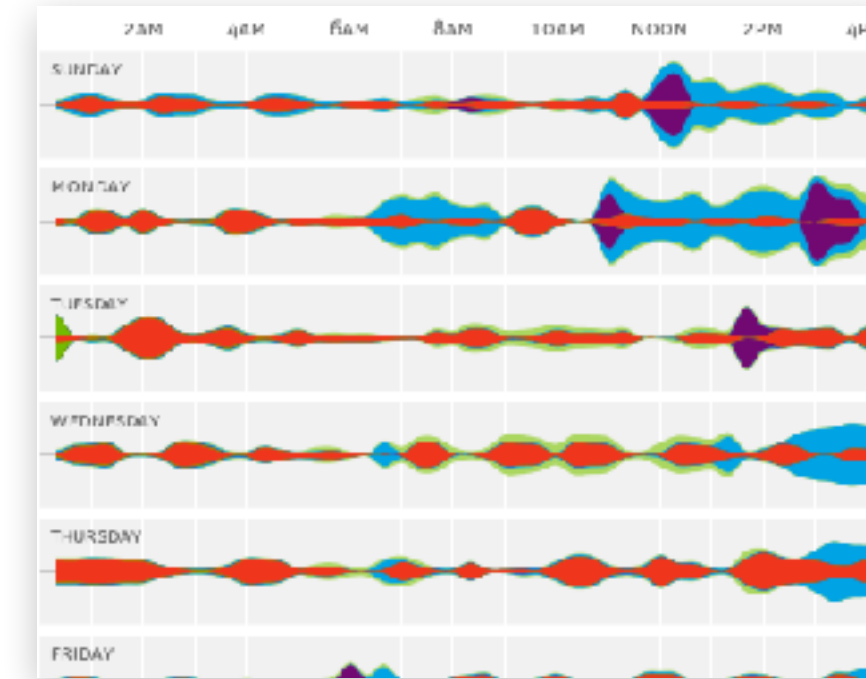
Stamen. Crimespotting

Alphabet



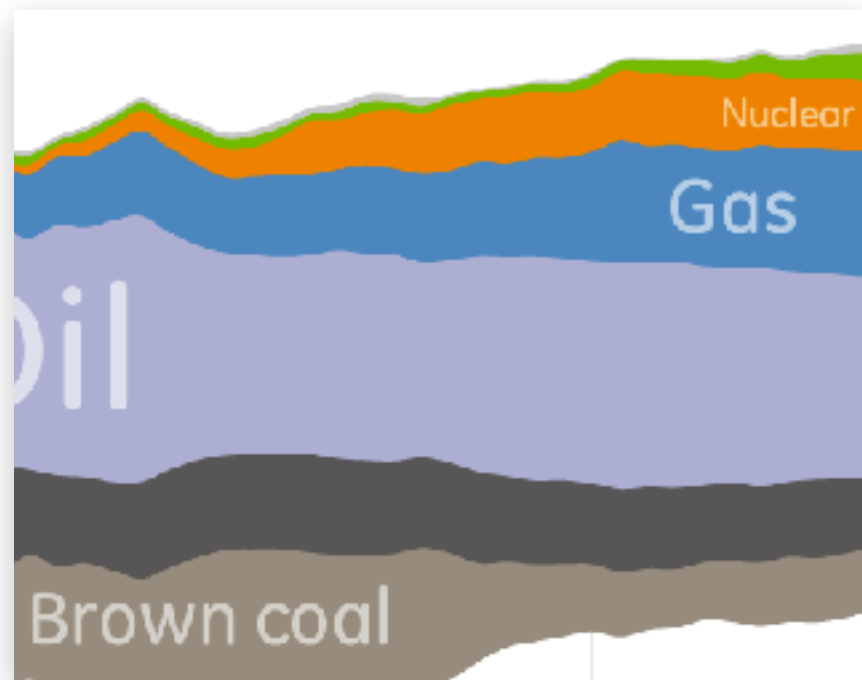
Interactive Things. Ville Vivante

Time



Fathom. Powering the Kitchen

Category



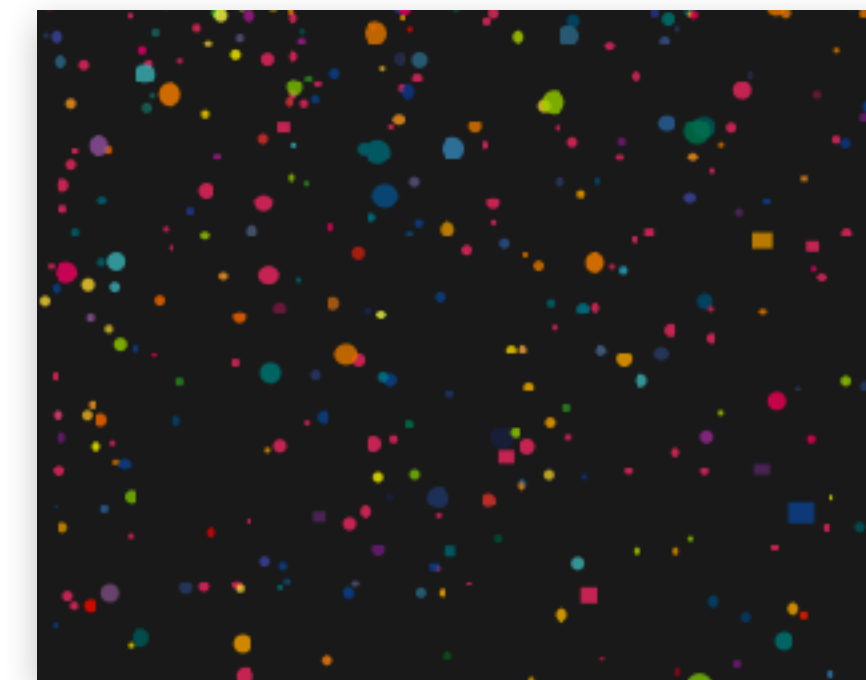
Gregor Aisch. German Energy Landscape

Hierarchy



Chris Harrison. He and She Google Ngram

Random



Jonathan Harris. We Feel Fine



2.2

Human Properties

How are graphics perceived?



How many times do you see the digit 5?

987349790**5**647902894728624002406037070**5**70279072
803208029007302**5**012702370083740820787202720070
24780260270379377**5**7097073779706674620970947027
92797970972309723097**5**927**5**092727979873497260802



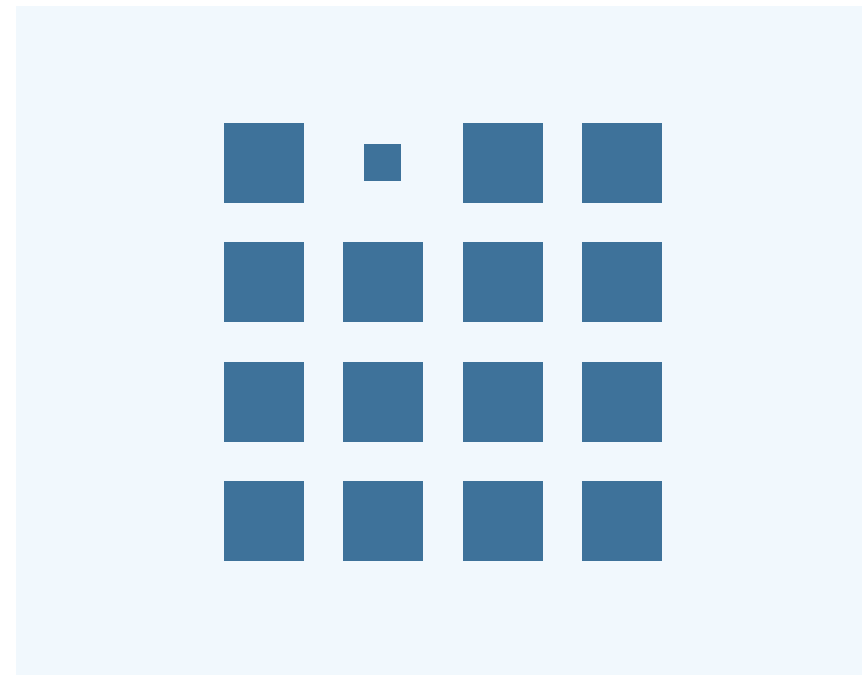
Preattentive Processing: What is it?

- Preattentive Processing is like a small super power.
The ability of the low-level human visual system to rapidly identify certain basic visual properties.
- Preattentive Detection precedes focused attention.
Requires only 200 to 250 ms on large multi-element displays



Preattentive Features

Scale



Position



Direction



Shape



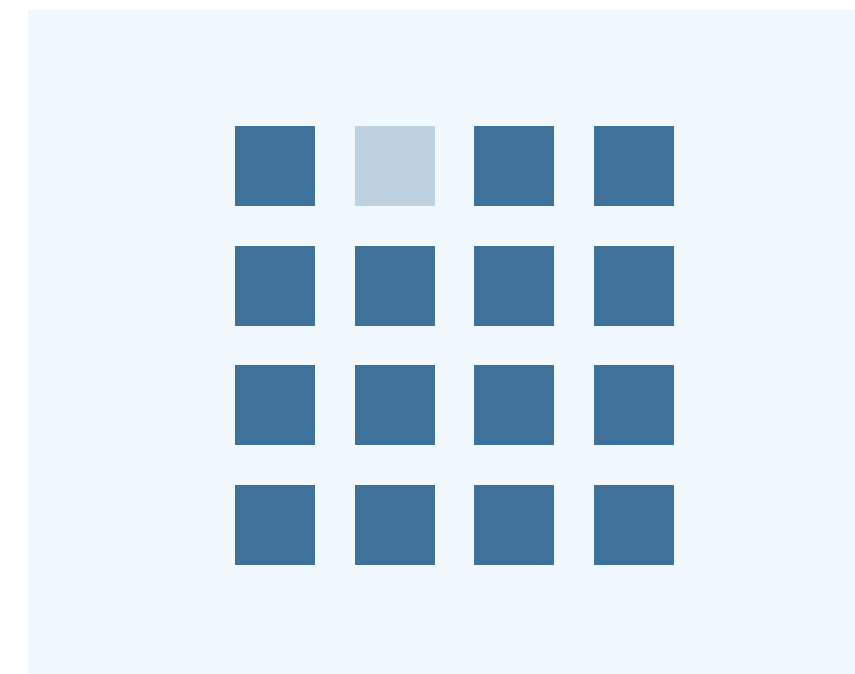
Texture



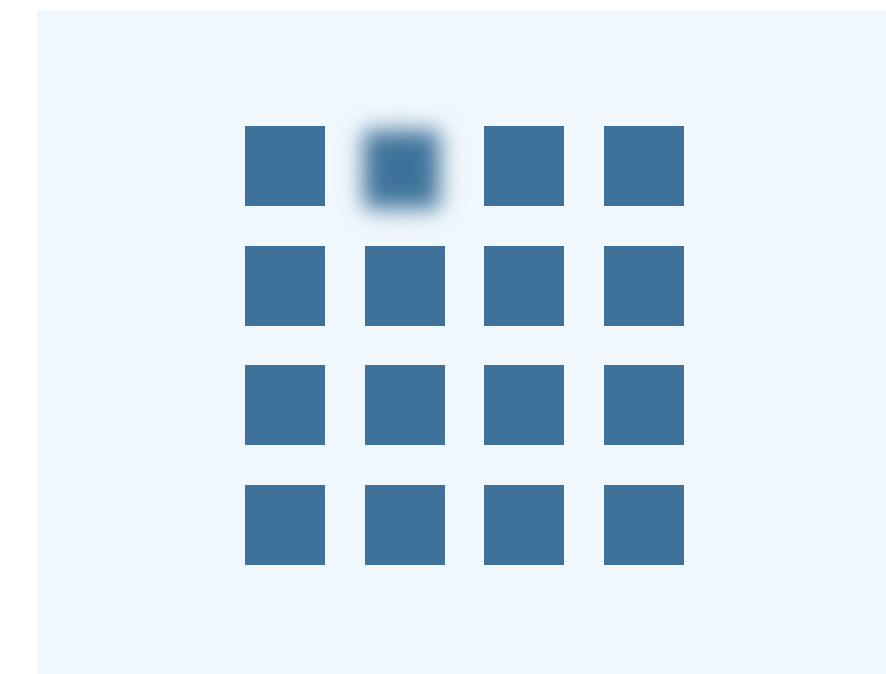
Color (HSB)



Opacity

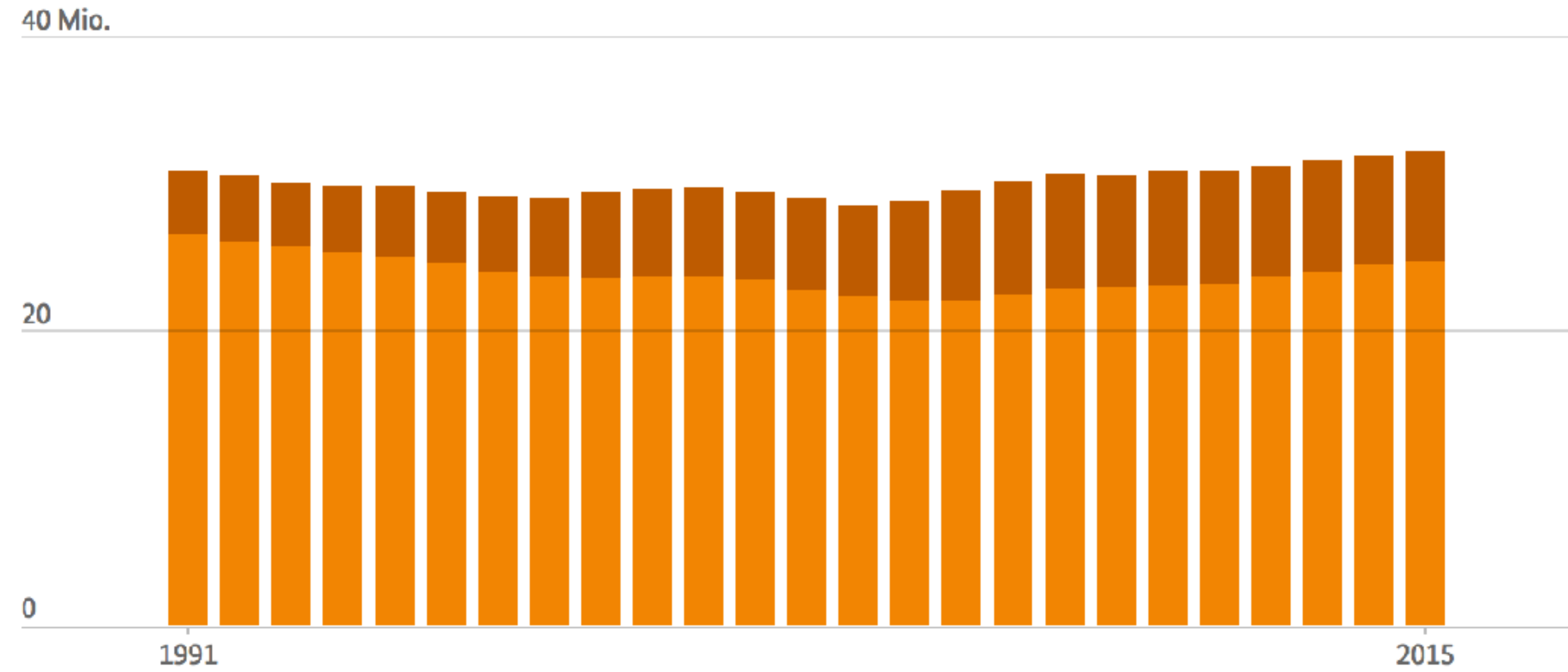


Sharpness





Anzahl atypisch und normal Beschäftigter 1991 bis 2015



● Normalarbeitnehmer/-innen ● Atypisch Beschäftigte insgesamt

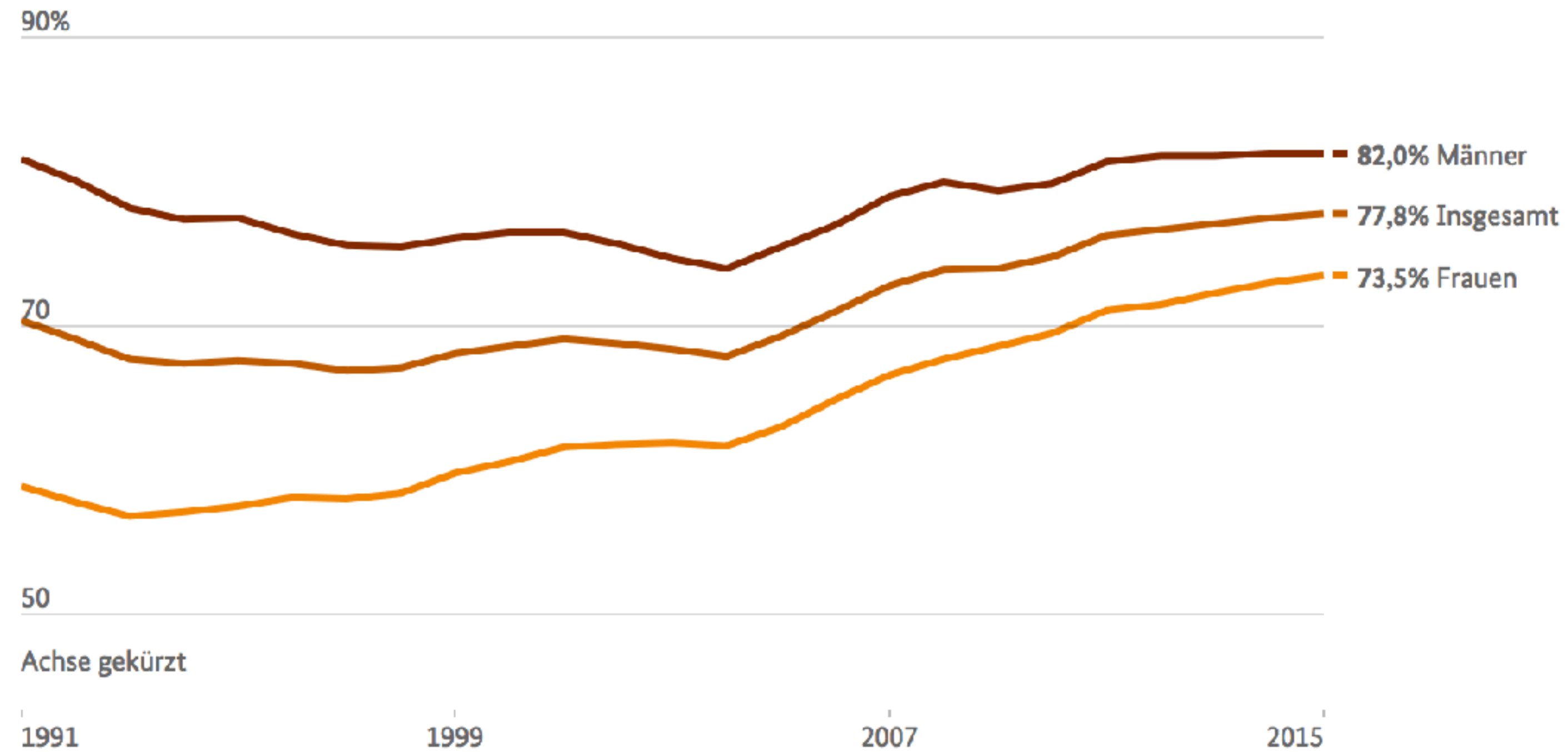
Quelle: Statistisches Bundesamt, Ergebnisse des Mikrozensus
2015.

Aktualisierte Daten

CC BY 4.0 Bundesregierung



Entwicklung der Erwerbstätigenquote der 20-64-Jährigen nach Geschlecht



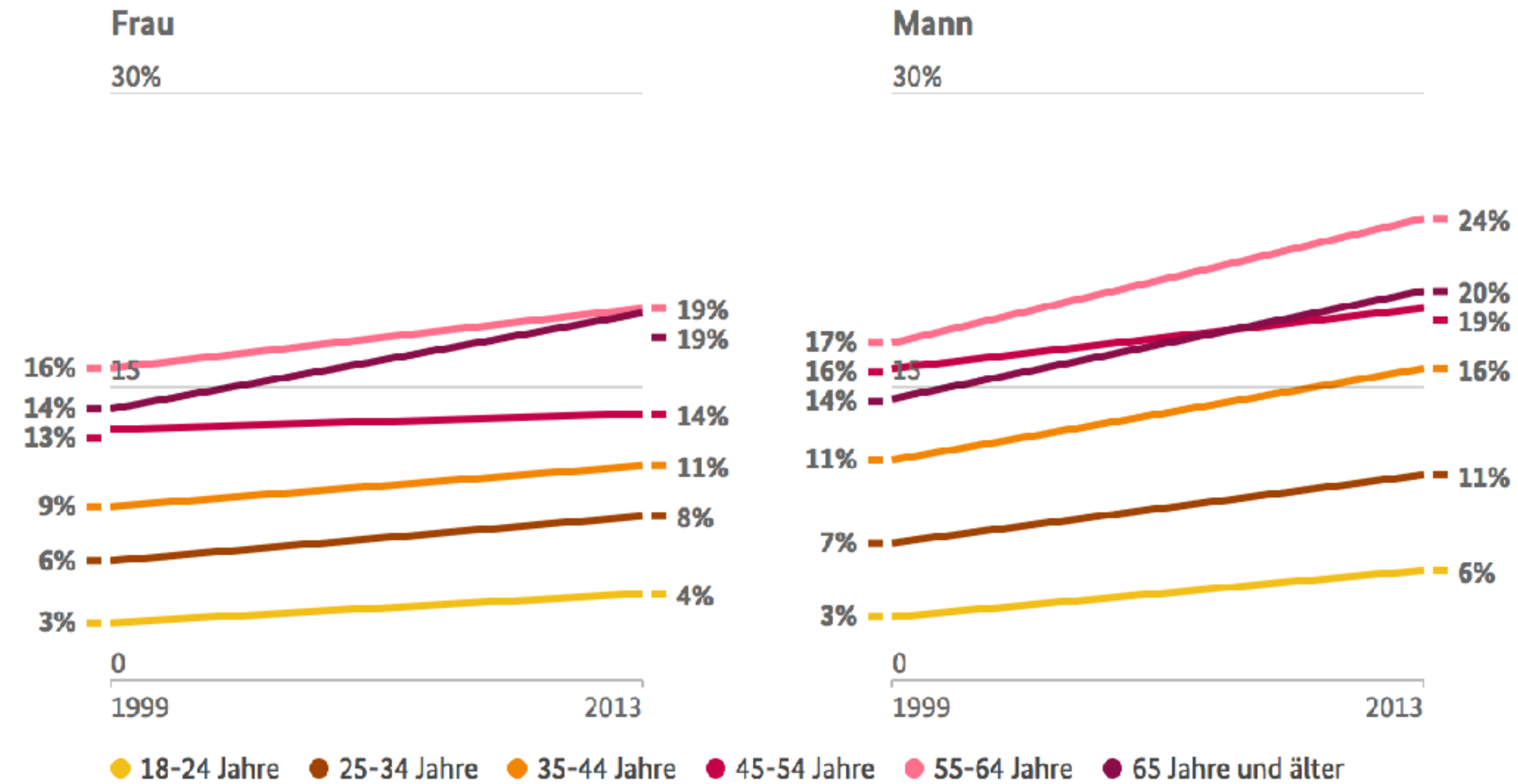
Quelle: Statistisches Bundesamt, Ergebnisse des Mikrozensus 2015.

Aktualisierte Daten

CC BY 4.0 Bundesregierung

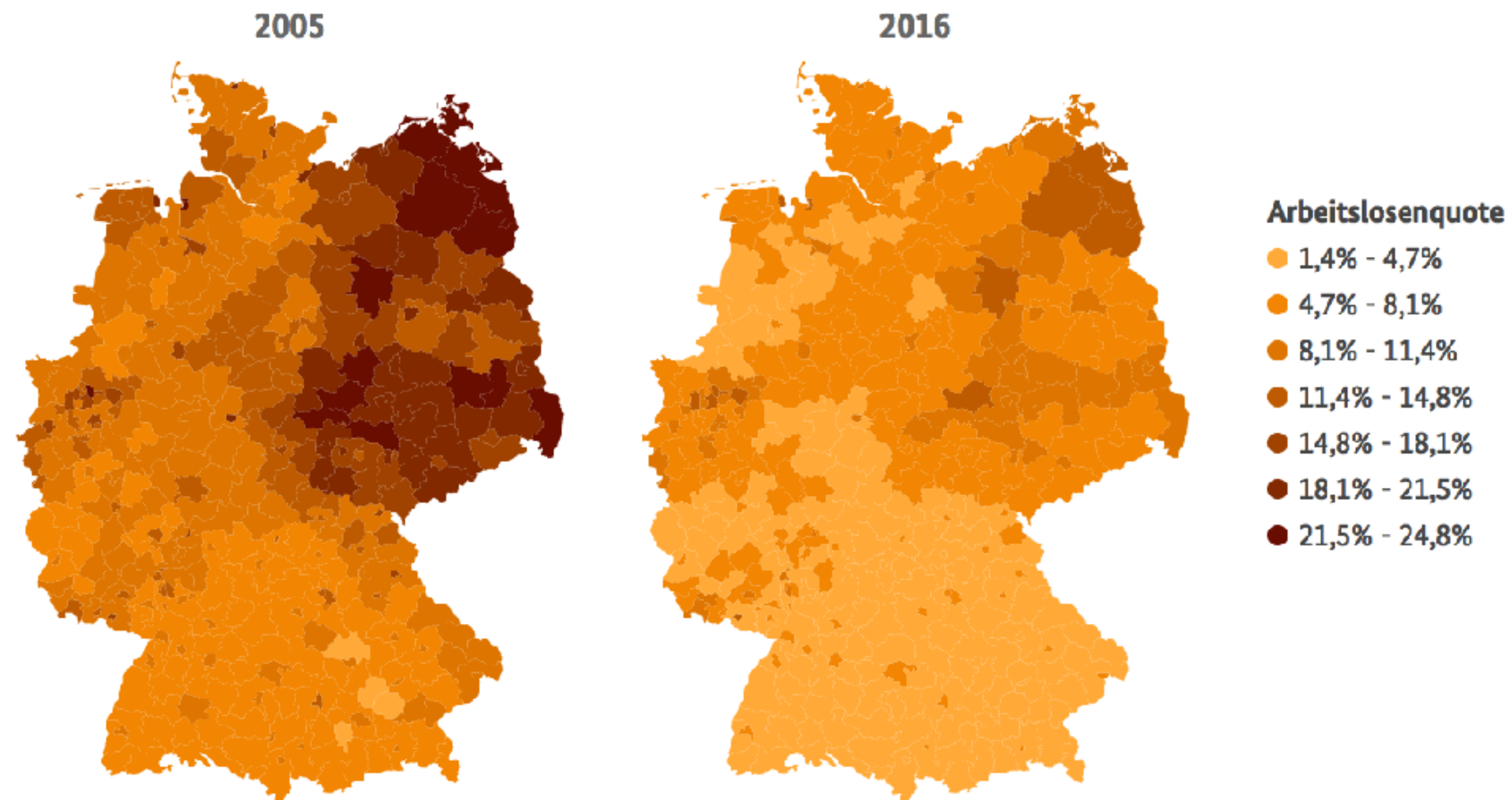


Entwicklung des Anteils an Fettleibigen nach Altersgruppen 1999 und 2013





Regionale Verteilung der Arbeitslosigkeit in Deutschland auf Kreisebene 2005 und 2016



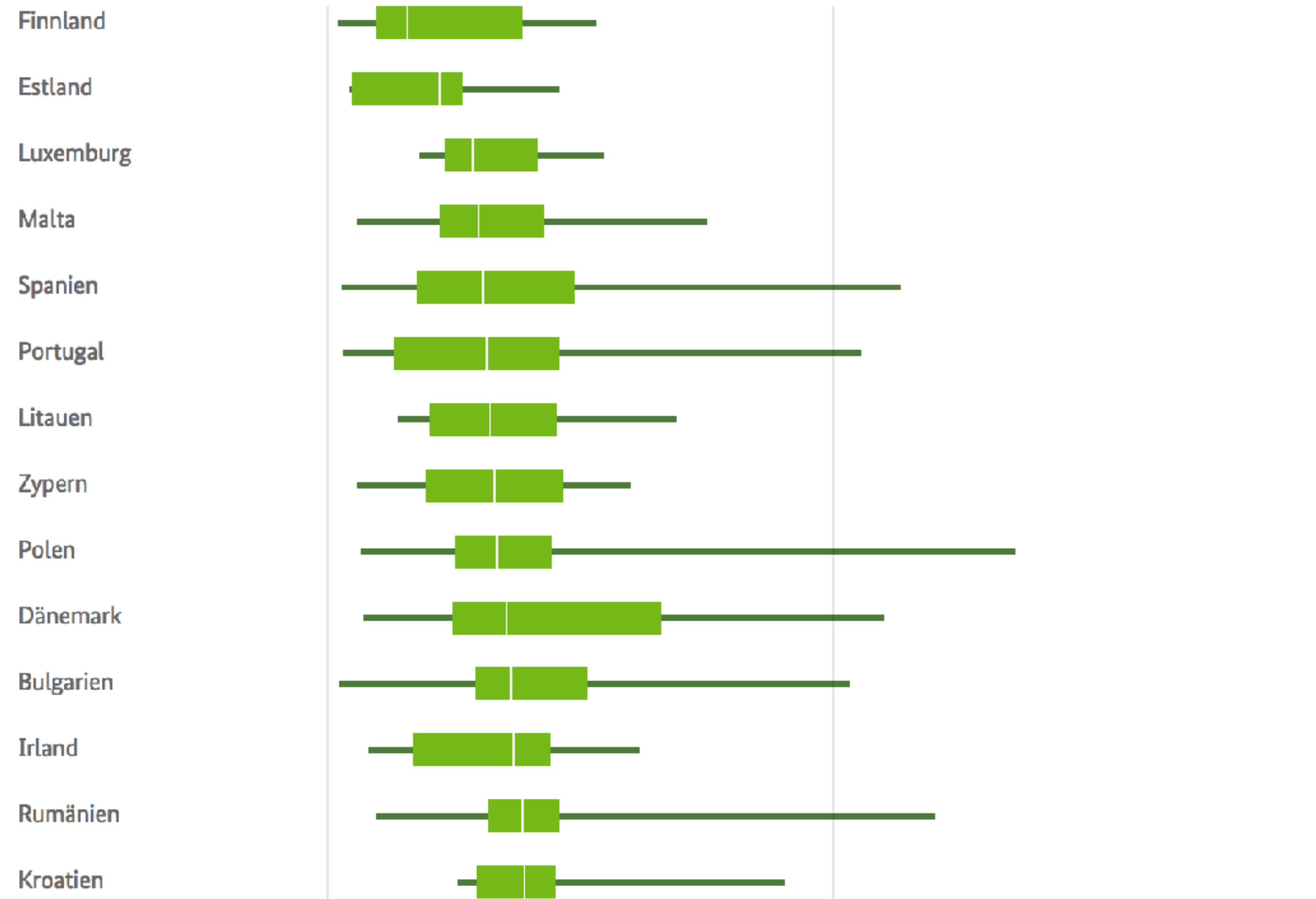
Quelle: Laufende Raumbewertung des BBSR, Bundesagentur für Arbeit.

Geometrische Grundlage: © GeoBasis-DE / BKG 2016.

Aktualisierte Daten



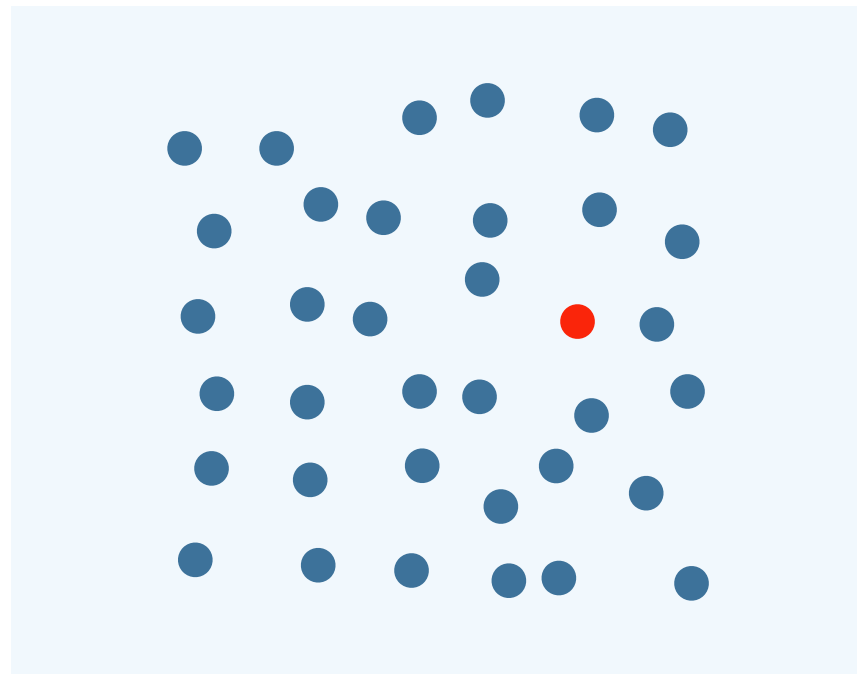
Stickstoffdioxid (NO₂) im EU-Vergleich 2013





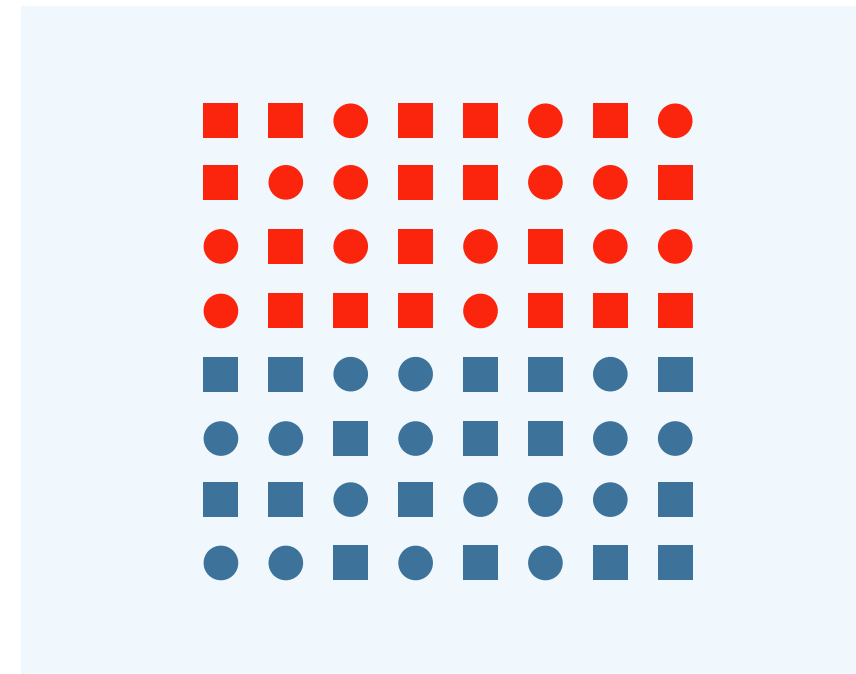
Preattentive Tasks

Target Detection



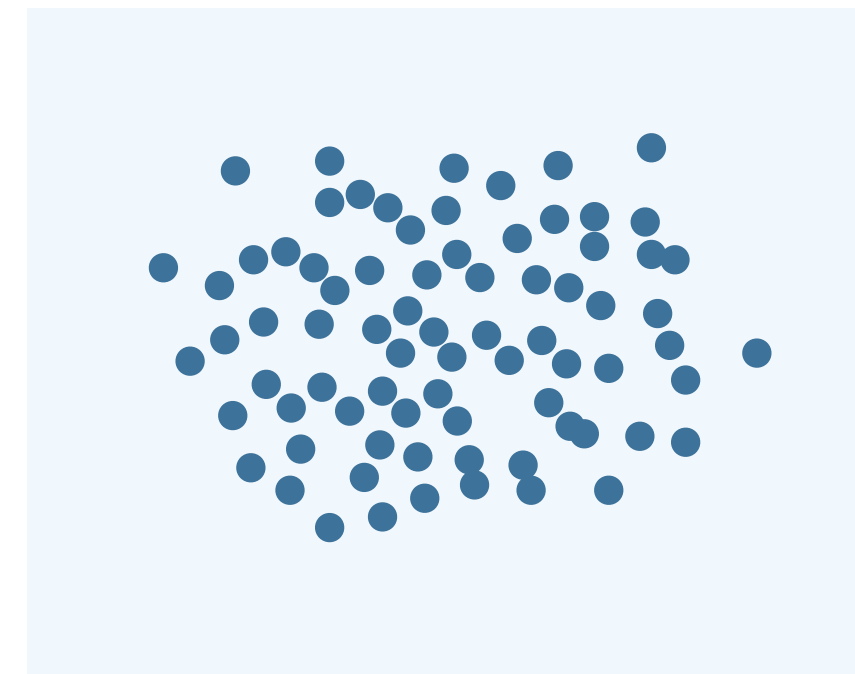
Users rapidly and accurately detect the presence or absence of a "target" element with a unique visual feature within a field of distractor elements.

Boundary Detection



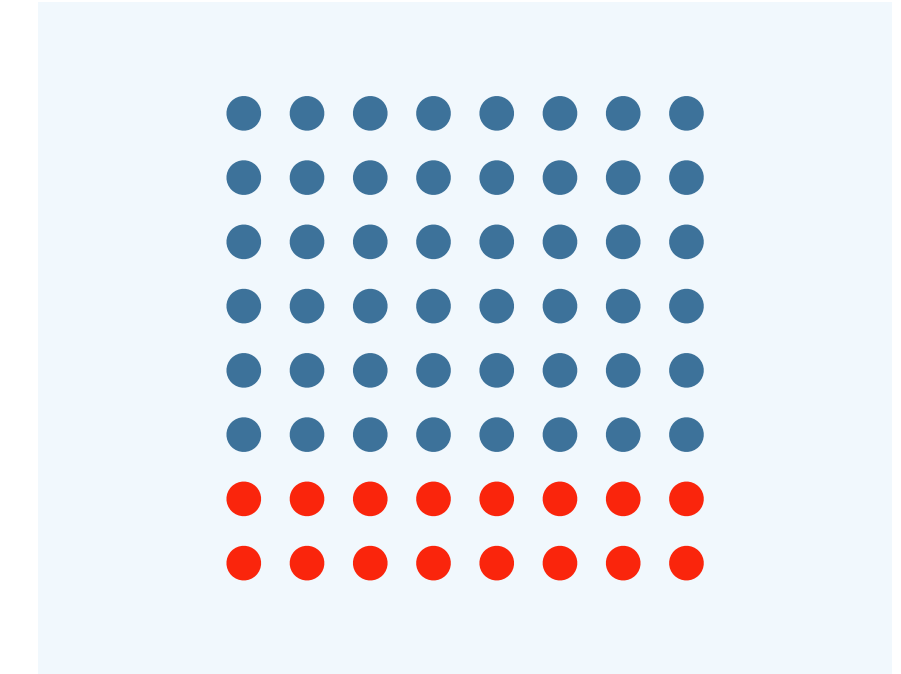
Users rapidly and accurately detect a texture boundary between two groups of elements, where all of the elements in each group have a common visual property.

Region Tracking



Users track one or more elements with a unique visual feature as they move in time and space.

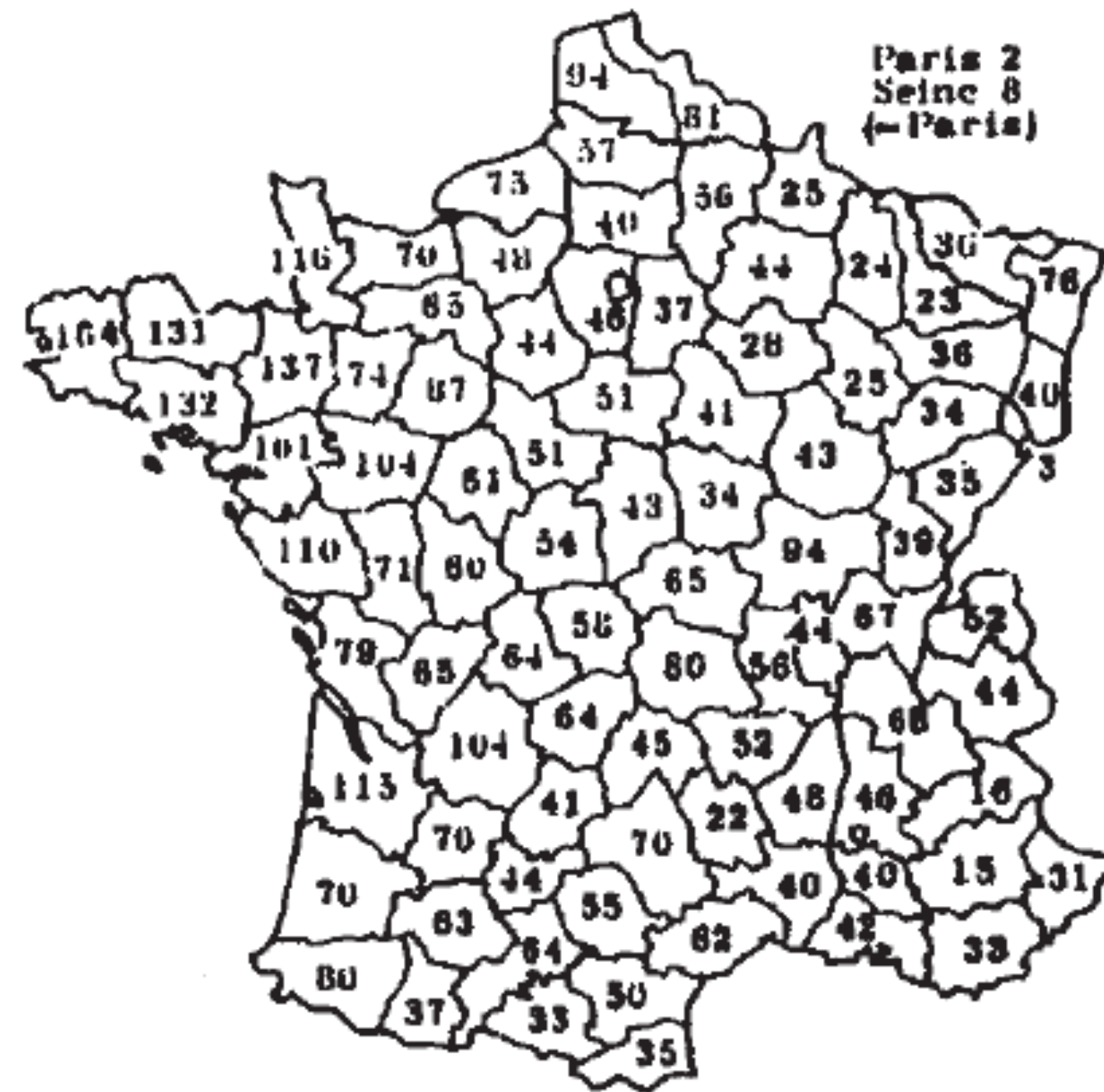
Counting & Estimation

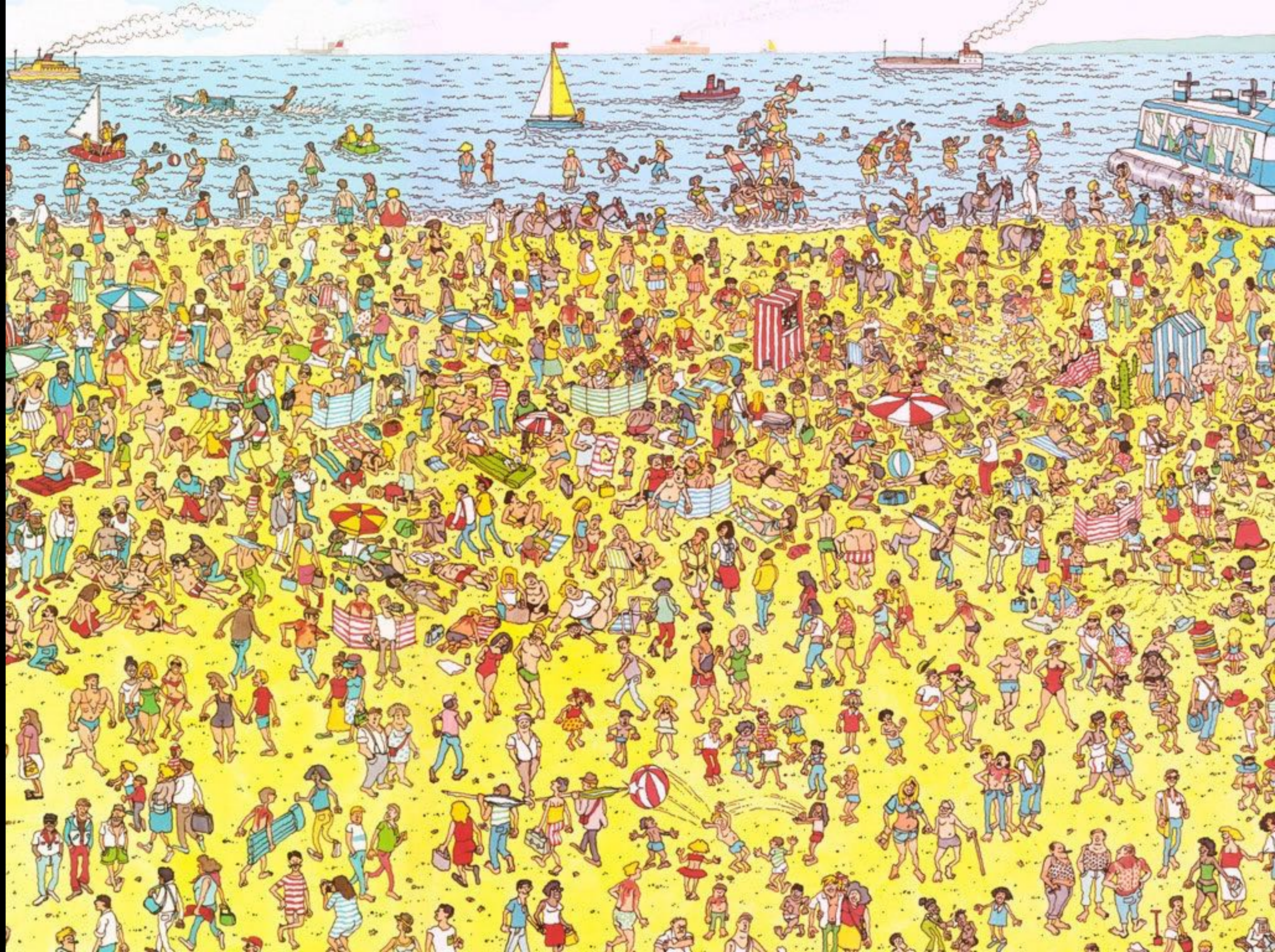


Users count or estimate the number of elements with a unique visual feature.



Where are the highest values located?







Preattentive Processing: What is it good for?

1. Certain tasks that depend on preattentive features can sometimes be done **for free** by our brains.
2. The low-level visual system can be harnessed during visualization to **draw attention** to areas of potential interest in a display.
3. The more of our visualization we can tell using preattentive features, the faster and better our viewer will **get it**.



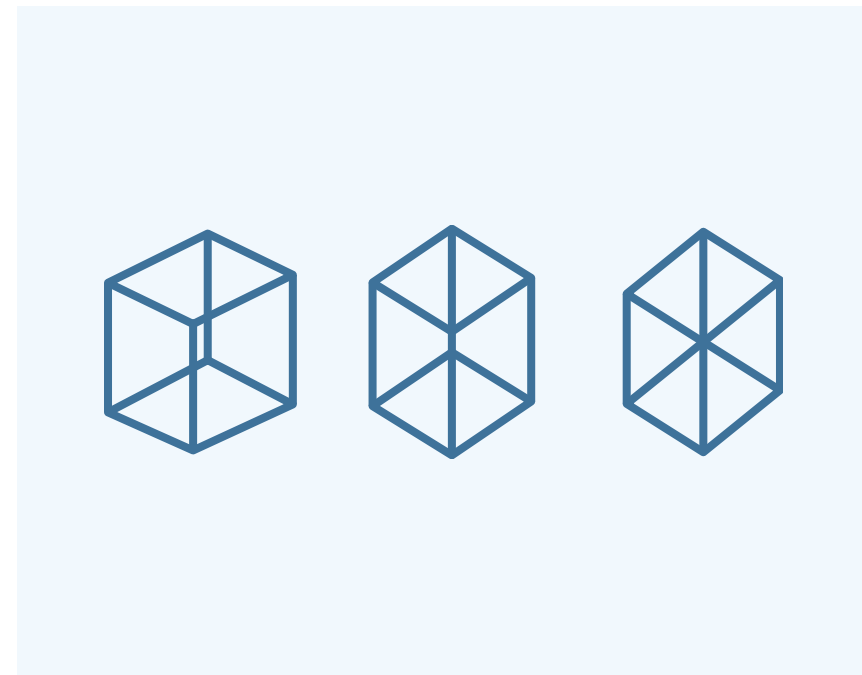
Gestalt Principles: What is it?

- Our brain is optimized for higher-level constructs.
Our perception operates less on individual visual features like points, lines, and areas.
- Gestalt is the interplay between the parts and the whole.
The whole is “other” than the sum of its parts.
—Kurt Koffka
- Gestalt Principles are heuristics.
Our brain uses them to make sense of the world around us.

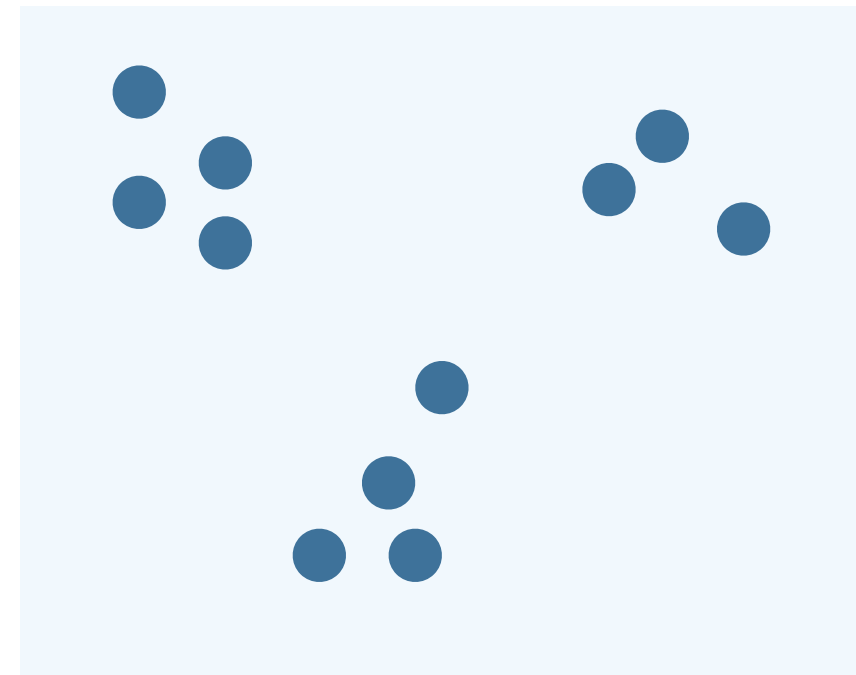


Gestalt Principles

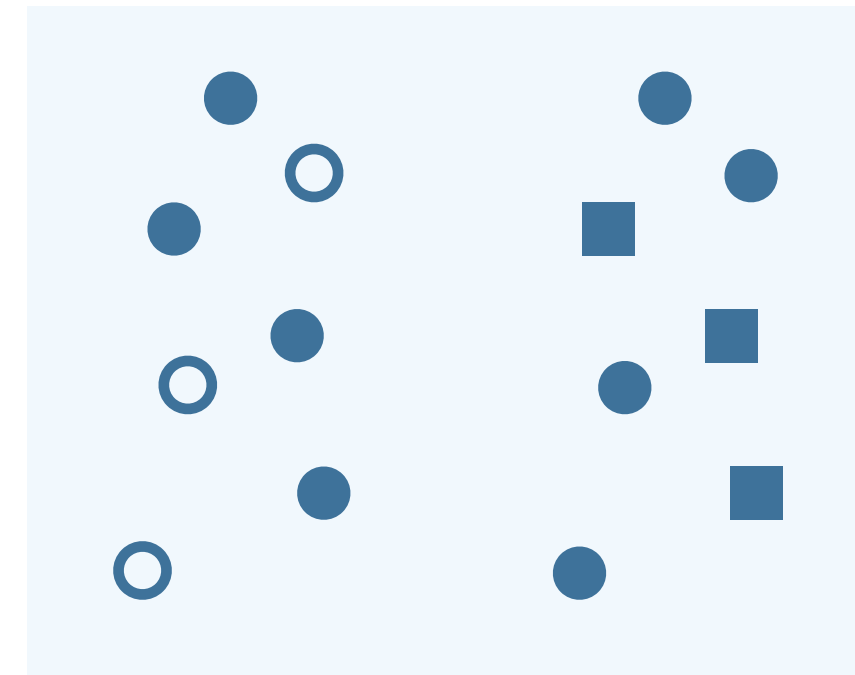
Simplicity



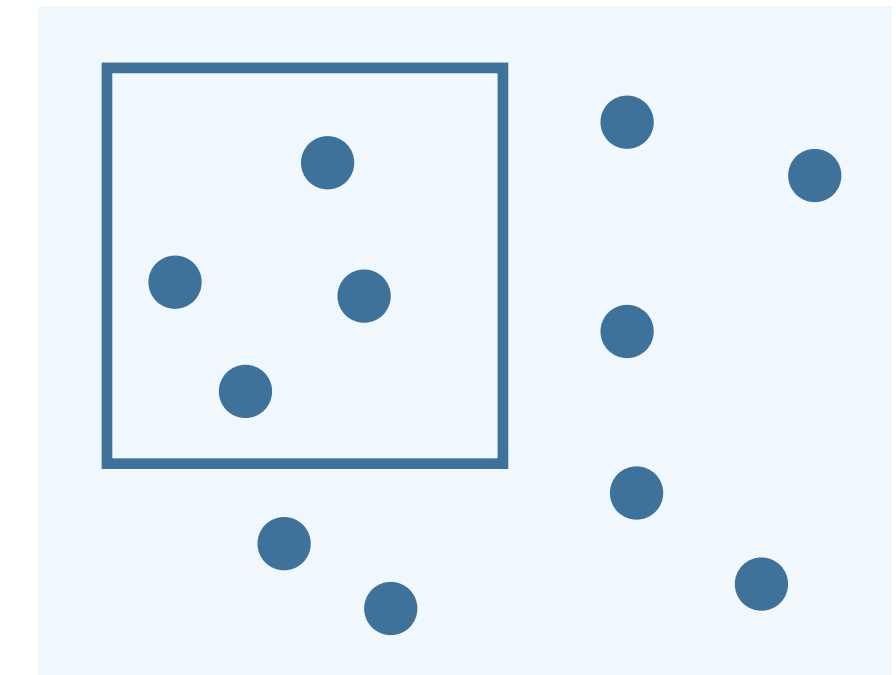
Proximity



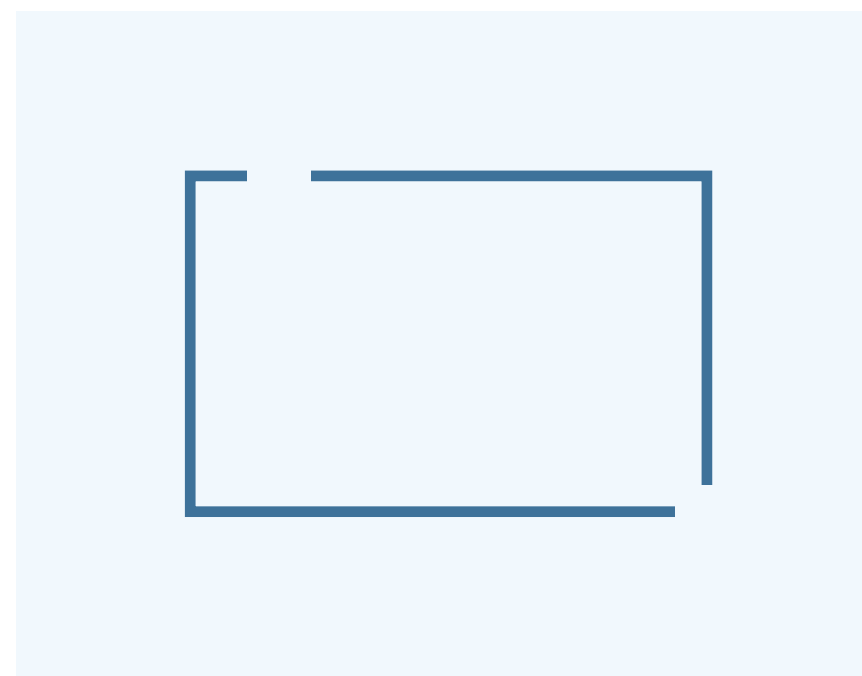
Similarity



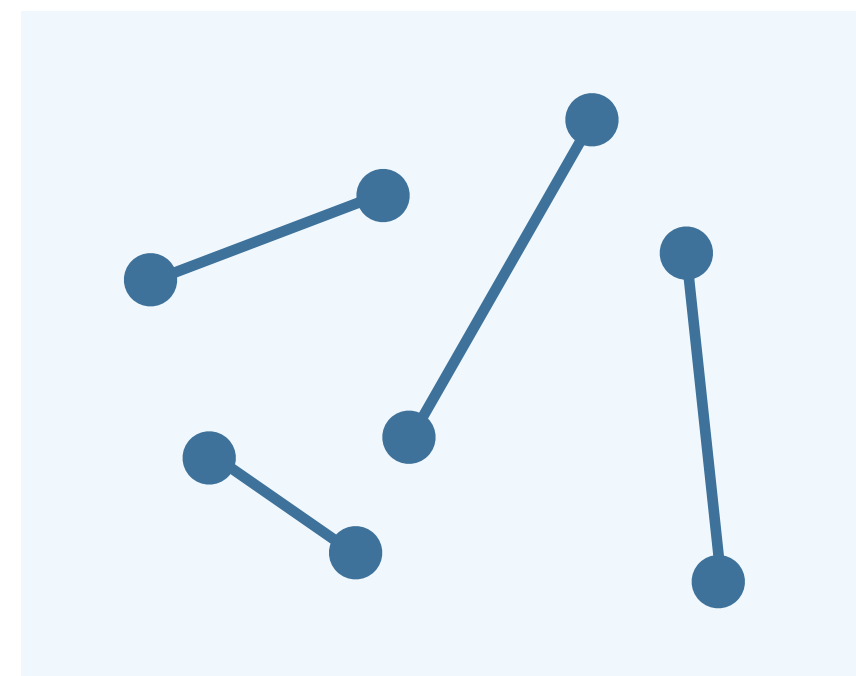
Enclosure



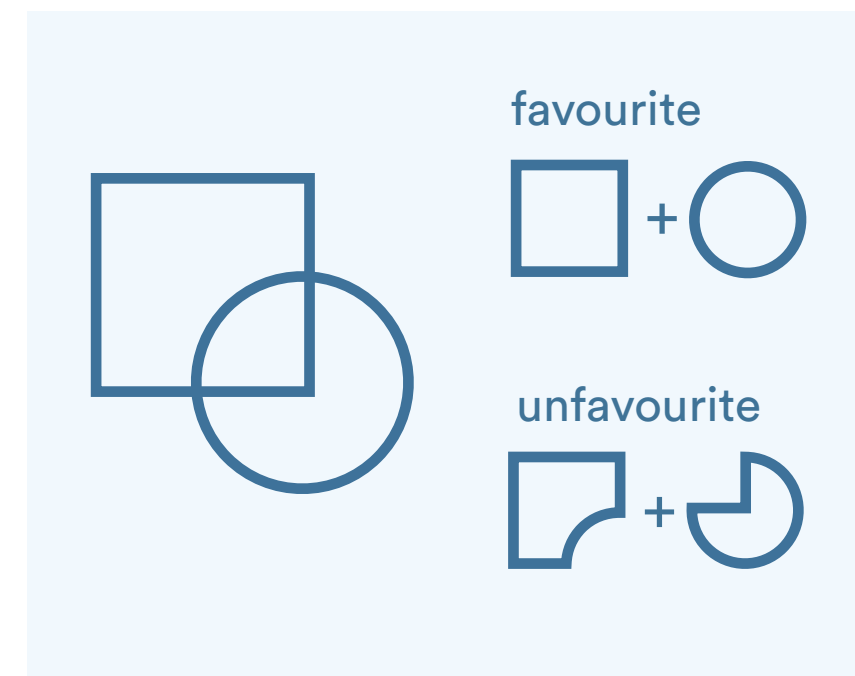
Closure



Connection



Continuity



Familiarity





Gestalt Principles: What is it good for?

1. Our brains has the incredible ability to take lots of perceptual **shortcuts** when confronted with a stimuli.
2. We need to consider these potentially taken shortcuts as they can either **help or harm** our visualizations.



User Empathy

Audience Questionnaire

- Who is the target audience and what is their relationship to my data?
- In which context will the audience receive the information I present?
- What information does the audience need to be successful?
- How much detail does the audience need to see or has time for?
- What learned or cultural assumptions might the audience have?
- What key message or insights should the audience take away?
- ...

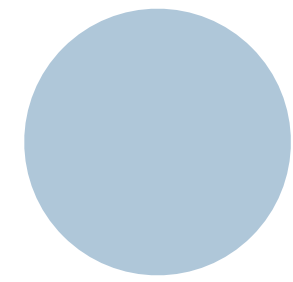


2.3

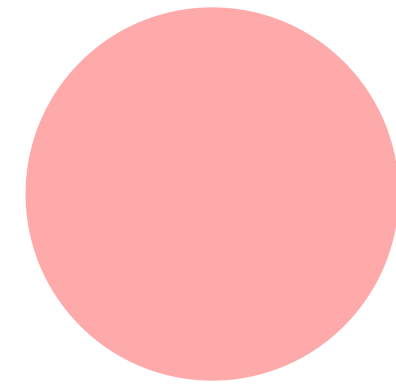
Graphical Encoding

How can we turn data into graphics?

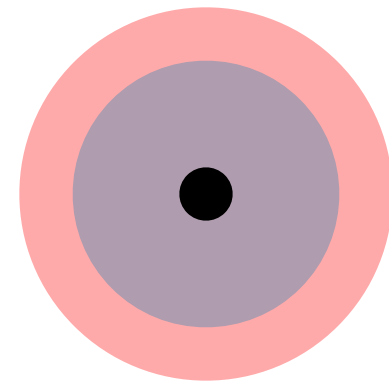




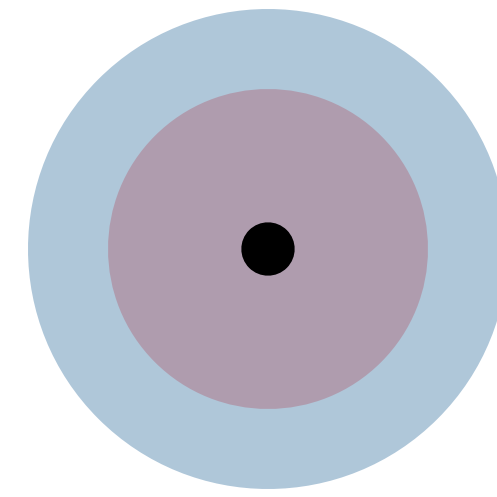
Billable



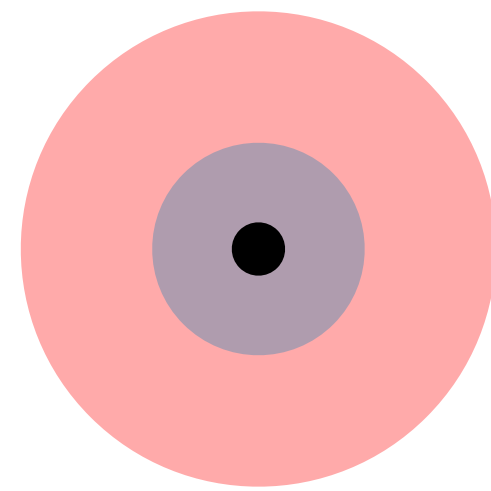
Unbillable



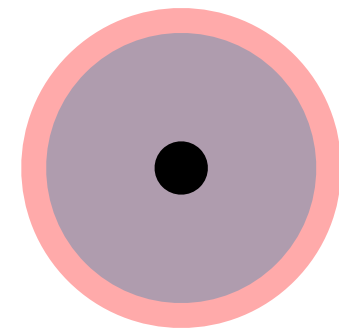
Loss



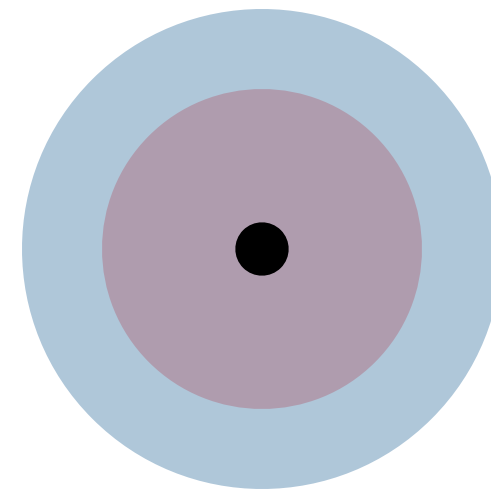
Profit



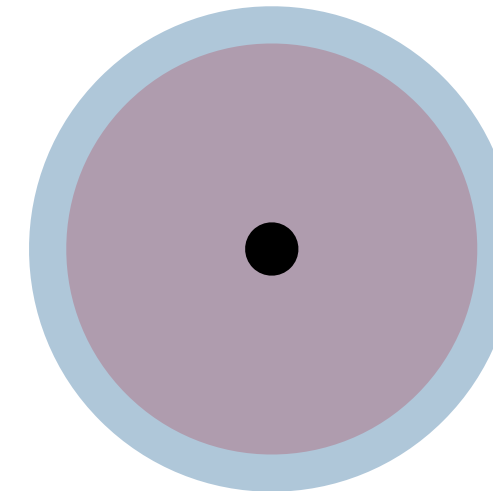
Project-1



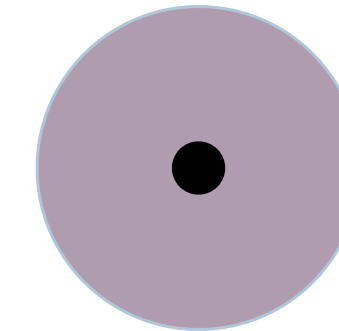
Project-2



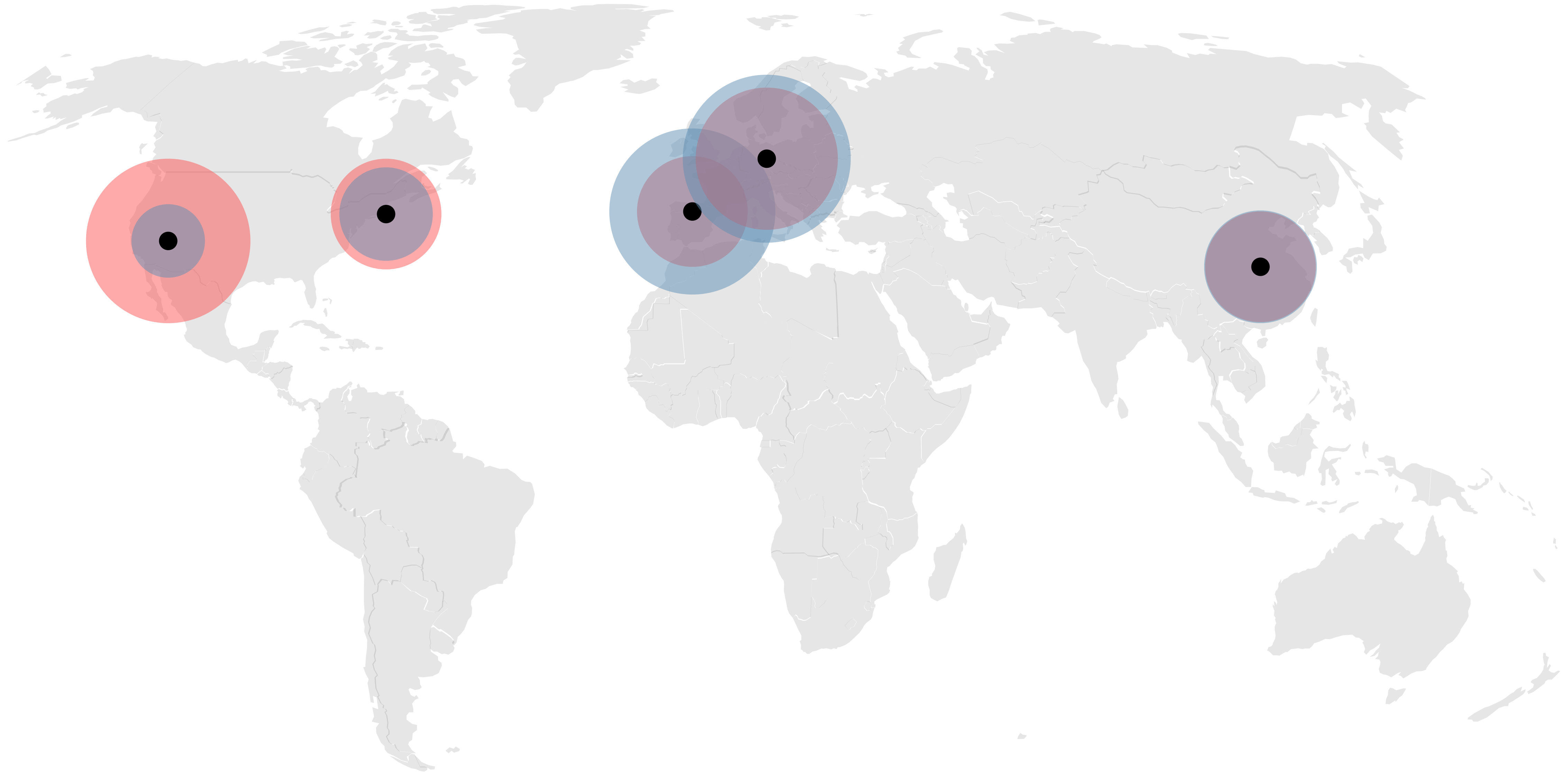
Project-3



Project-4

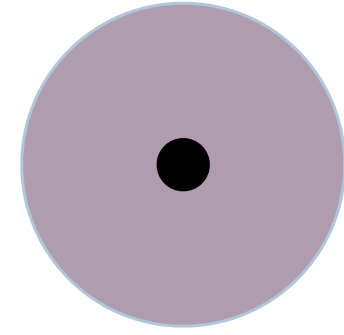
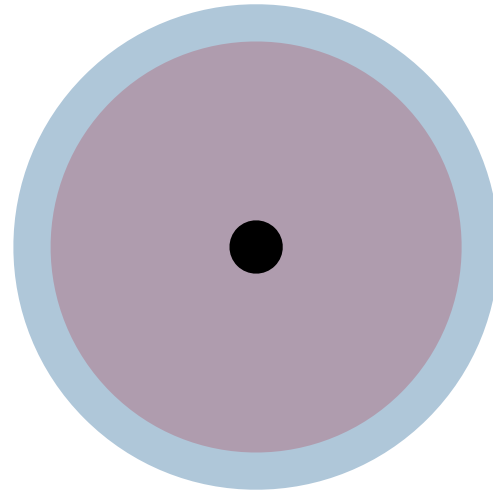
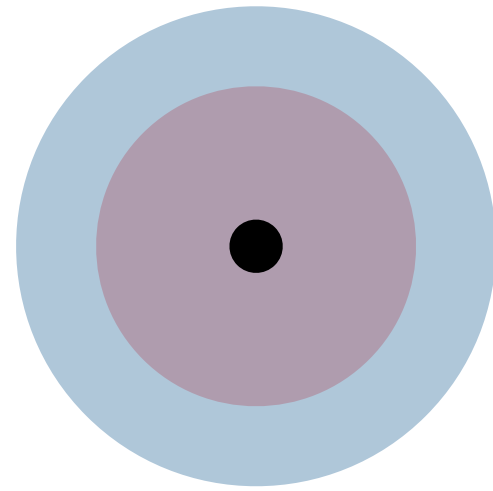
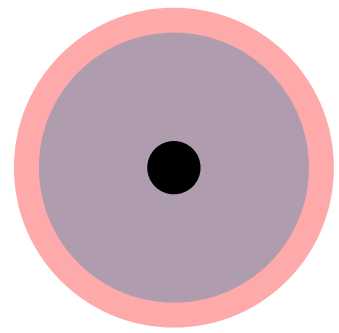
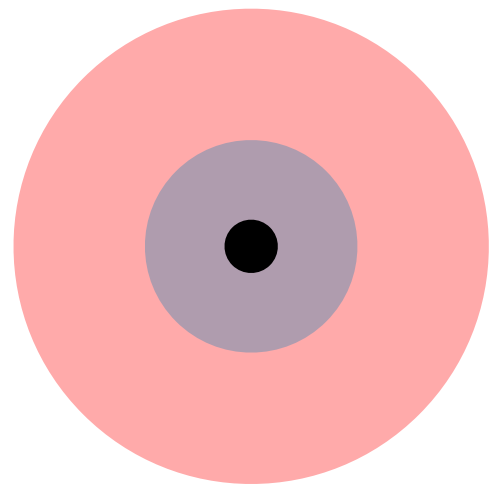


Project-5





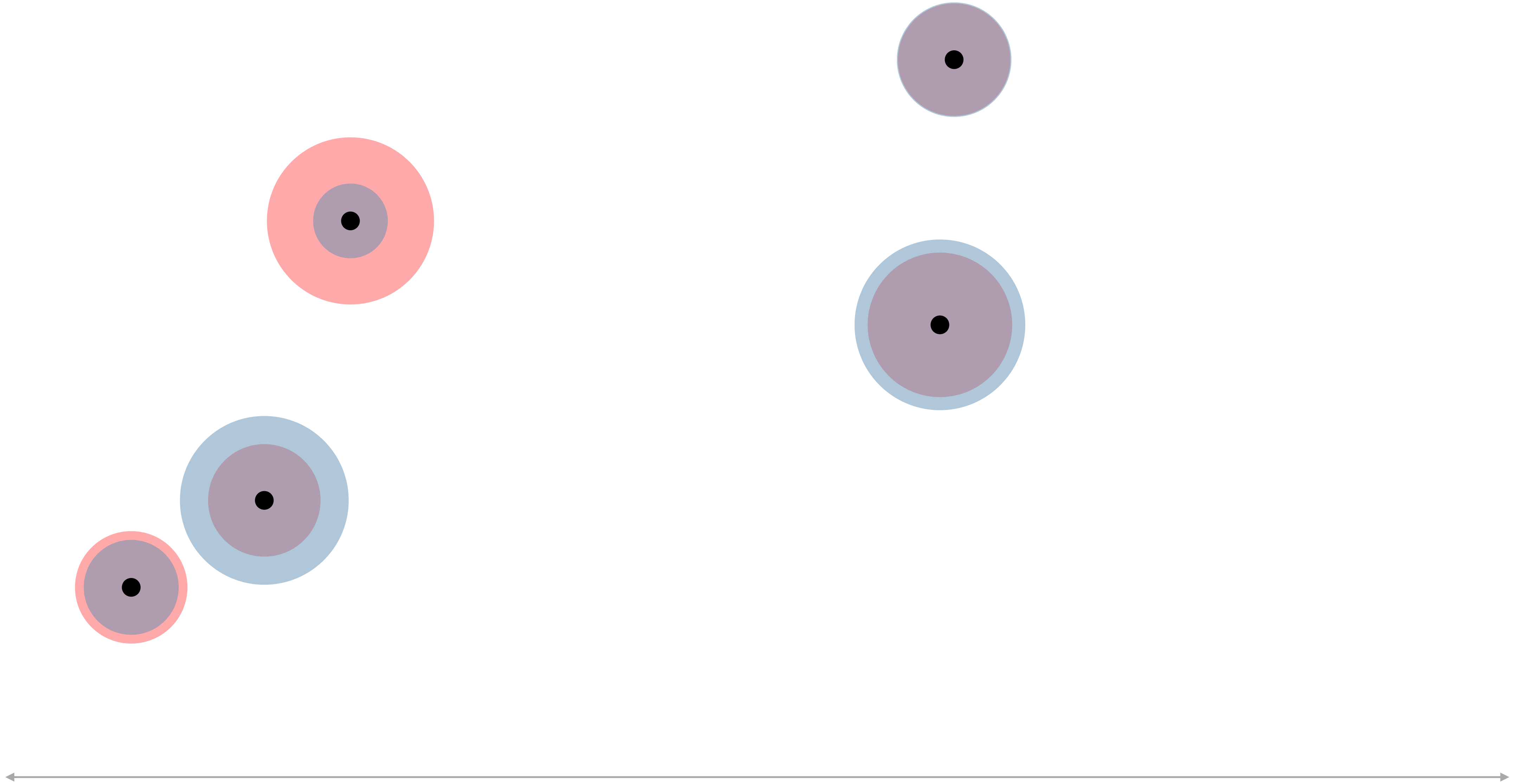
FUN





FUN

FAME

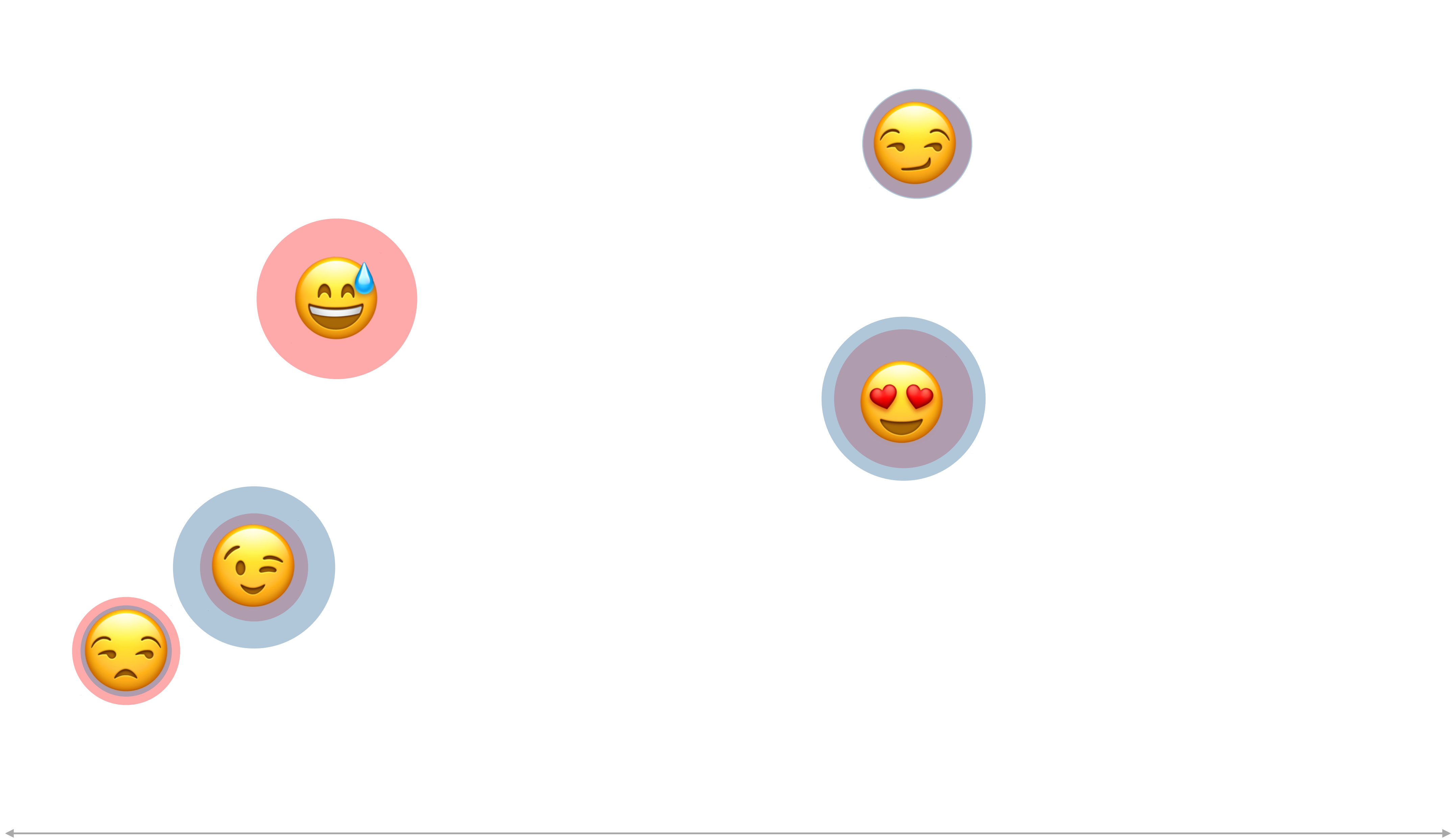




FUN

FAME

85

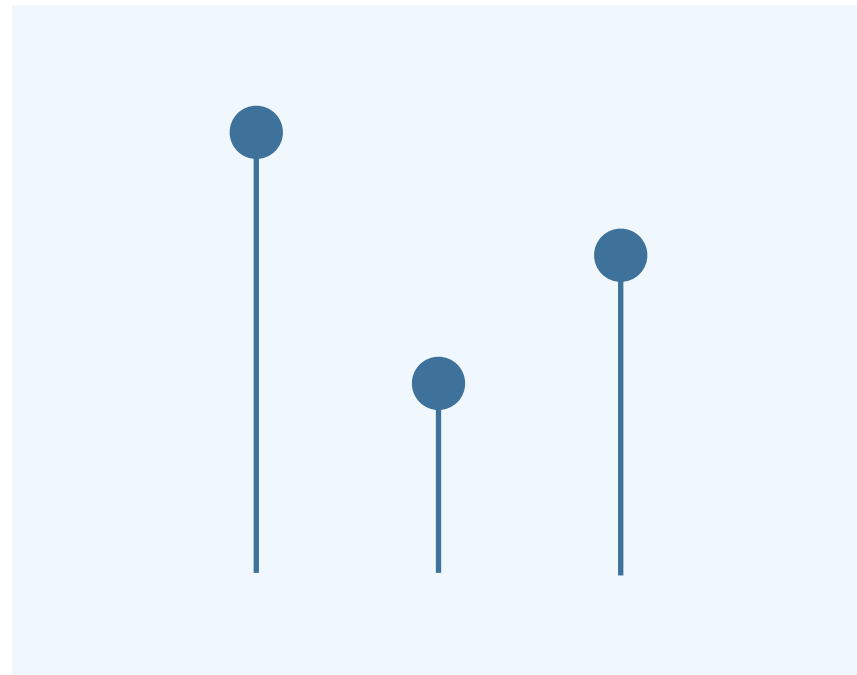


Example	Visual Variable	Ordered	Useful Values	Quantitative	Ordinal	Categorical	Relational
	Position, Placement	✓	Infinite	✓	✓	✓	✓
1, 3, 4; A, B, C	Text Labels	Alphabetical or Numerical	Infinite	✓	✓	✓	✓
	Length	✓	Many	✓	✓	✗	✗
	Size, Area	✓	Many	✓	✓	✗	✗
	Angle	✓	Medium	✓	✓	✗	✗
	Pattern Density	✓	Few	✓	✓	✗	✗
	Weight, Boldness	✓	Few	✗	✓	✗	✗
	Saturation, Brightness	✓	Few	✗	✓	✗	✗
	Color Hue	✓	Few	✗	✗	✓	✗
	Shape, Icon		Medium	✗	✗	✓	✗
	Pattern Texture		Medium	✗	✗	✓	✗
	Enclosure, Connection		Infinite	✗	✗	✓	✓
	Line Pattern		Few	✗	✗	✗	✓
	Line Ending		Few	✗	✗	✗	✓

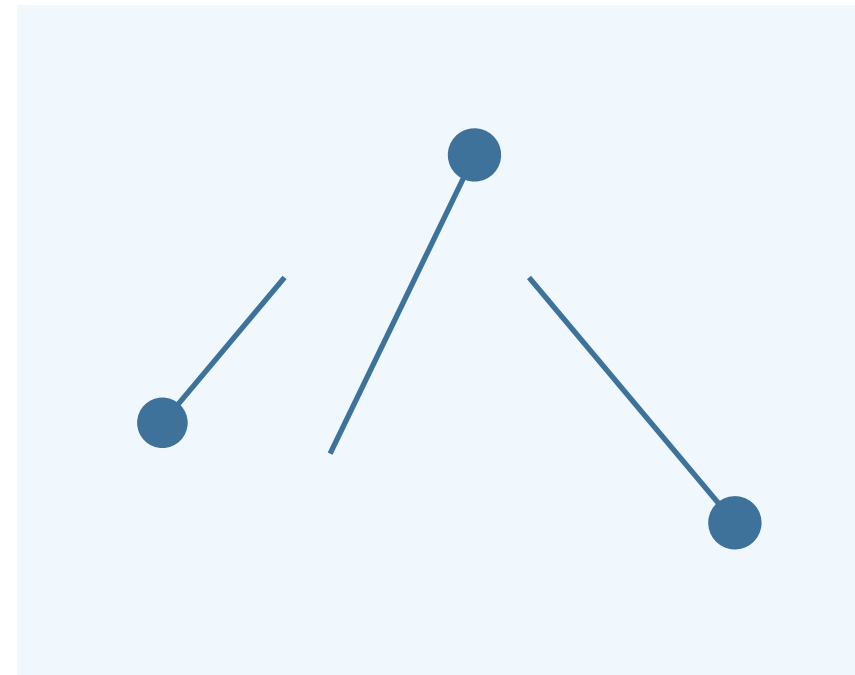


Accuracy of Quantitative Perceptual Tasks

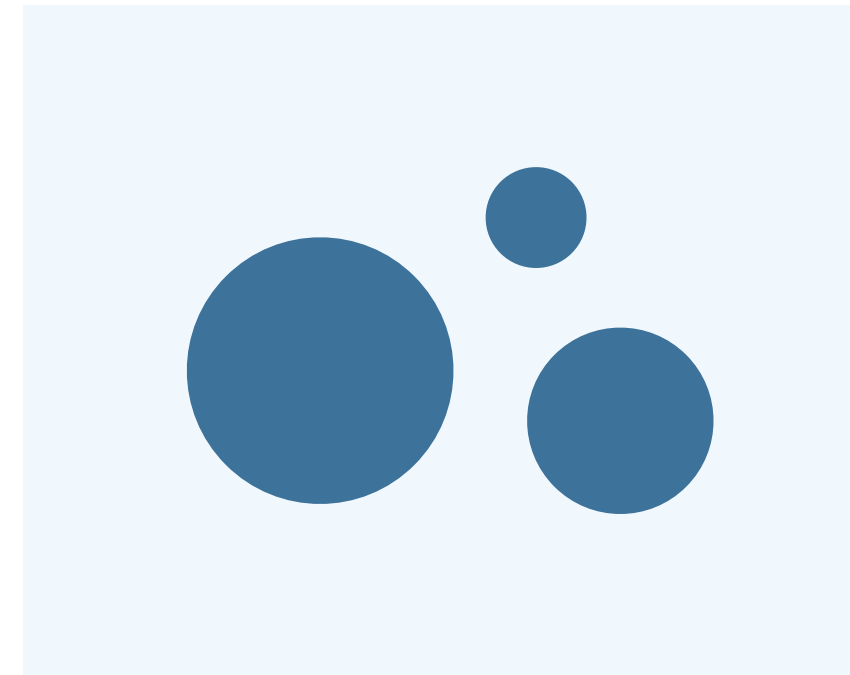
Position



Direction



Area



Shading



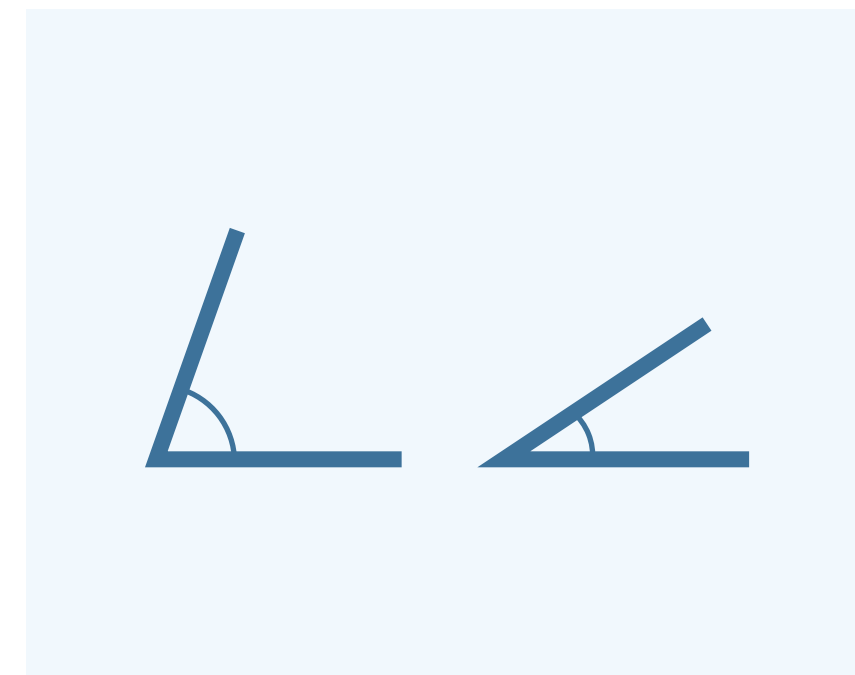
More accurate ←

→ Less accurate

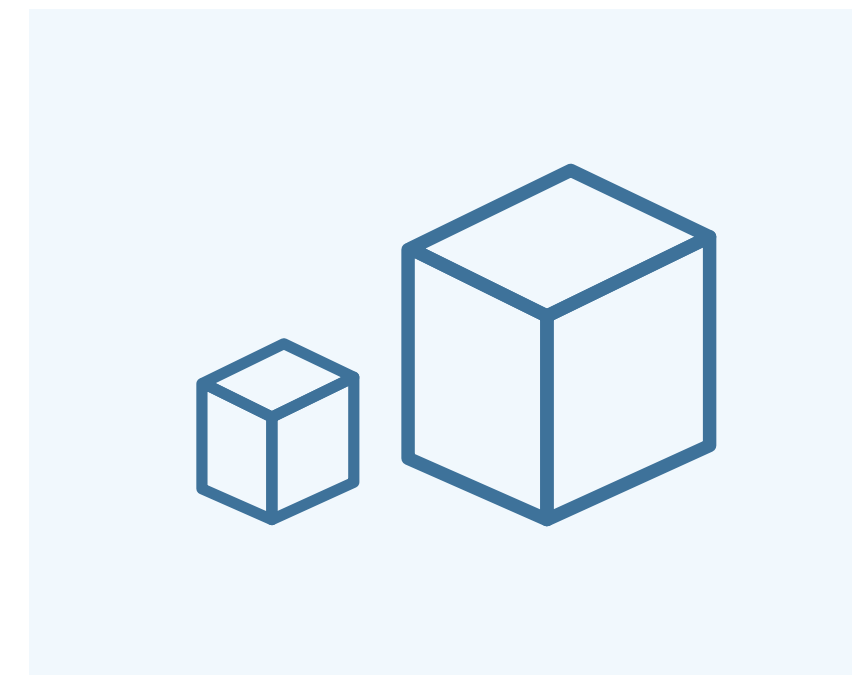
Length



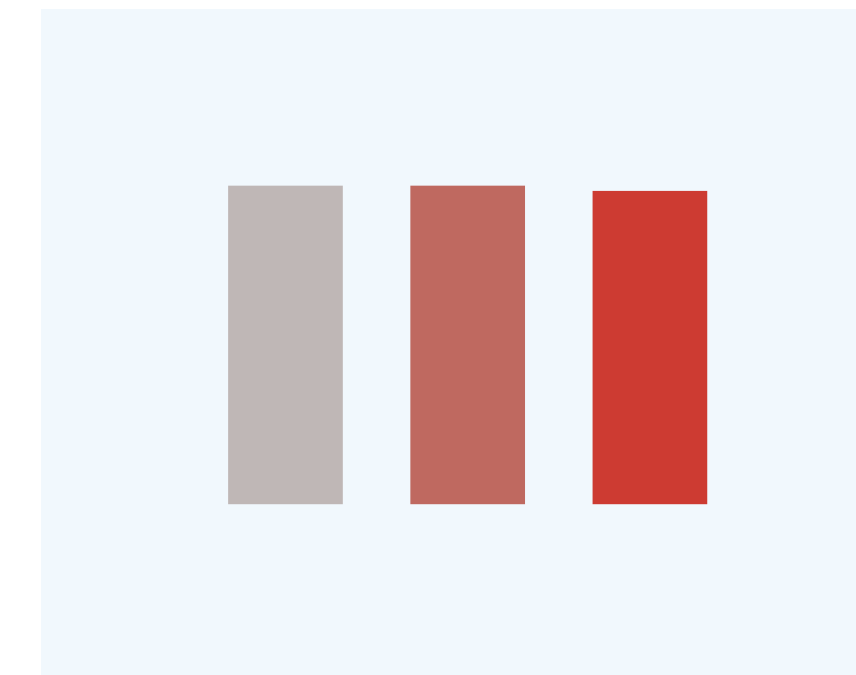
Angle



Volume



Saturation





Best Practices for Encoding

1. Importance

Encode the most important property of the data in the most effective way.

2. Consistency

Encode the property of the data accurately with the property of the representation.

3. Redundancy

Avoid using more than one encoding to communicate the same information.

4. Independence

Avoid using visually similar encodings for independent variables.



Exercise

Encoding Two (yes, two) Values

Tools: Pen & Paper

Duration: 10 Minutes



Encoding Two Values

- Find different ways to visualize 75 and 37.
- The visualization will depend directly on the unit, meaning, and context of the values.
- You have 10 minutes to come up with 5 ideas.
- Let's go!

75

Value 1

37

Value 2

<p>Number Notation</p> <p>75, 37</p>	<p>Bars</p>	<p>Percentages Bars</p>	<p>Spliced Bar</p>	<p>Proportion</p>	<p>Interval</p>	<p>Line Graph</p>	<p>Tens and Units</p>
<p>Squares Merged</p>	<p>Squares</p>	<p>Icon Surfaces</p>	<p>Icon Height</p>	<p>Number Notation</p>	<p>Percentages / Density</p>	<p>Horizontal/Vertical Proportions</p>	<p>Geometric Proportions</p>
<p>Color Scale</p>	<p>Nodes and Connections</p>	<p>Gray Tones</p>	<p>Dashed</p>	<p>Density</p>	<p>Coordinates</p>	<p>Angles</p>	<p>Semi-circle Areas</p>
<p>Pie Chart</p>	<p>Donut Chart</p>	<p>Circle and External Ring</p>	<p>Co-centered Circles</p>	<p>Shape Surfaces</p>	<p>Different Shape Surfaces</p>	<p>Parameters of a Mathematical Function</p> <p>$y = \cos(75x)\cos(37x)$</p>	<p>Harmonic Frequencies</p>
<p>Special Metaphors</p>	<p>Shape Divided</p>	<p>Square Divided</p>	<p>Volumes</p>	<p>Values Associated to Countries</p>	<p>Geographic Coordinates</p>	<p>Square Surfaces</p>	<p>Circle Areas</p>



2.4

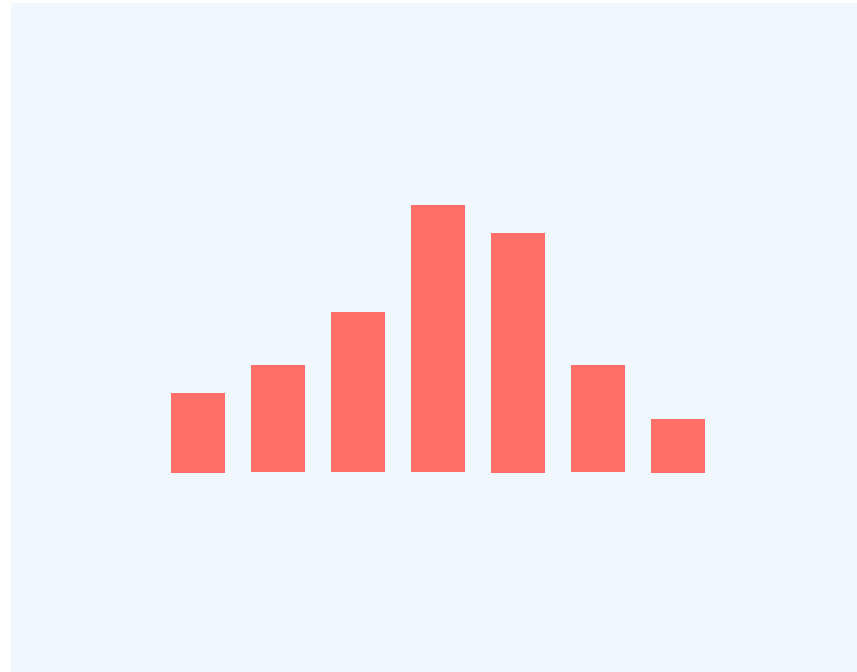
Graphical Methods

How to pick the right chart, graph, or diagram.



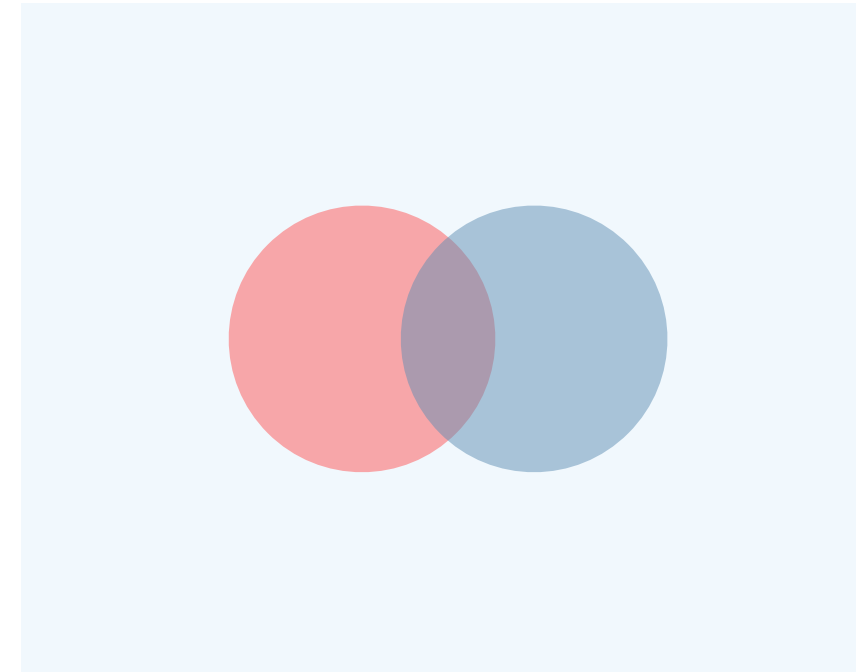
Taxonomy

Chart



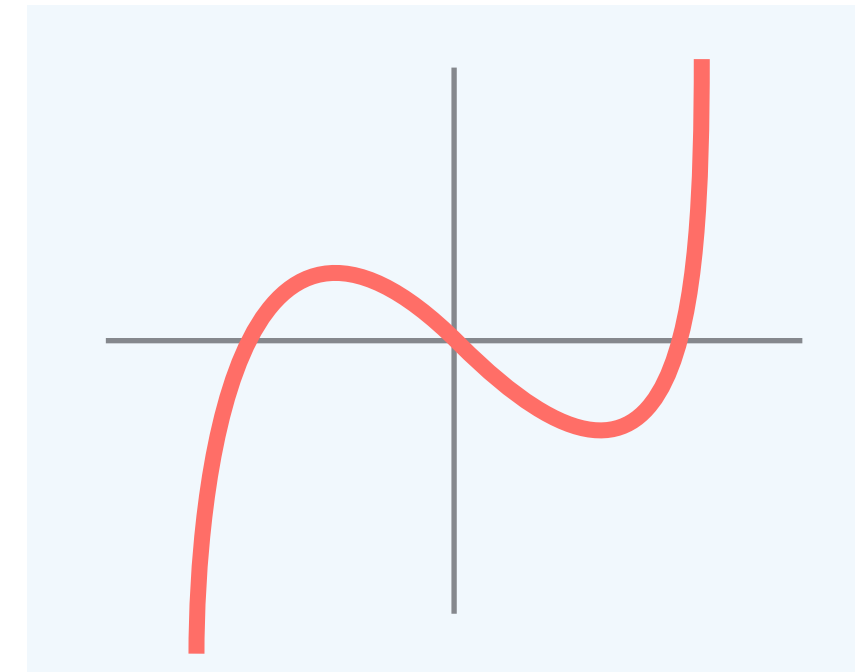
A chart represents tabular numeric data with marks like bar charts, line charts, pie charts or histograms.

Diagram



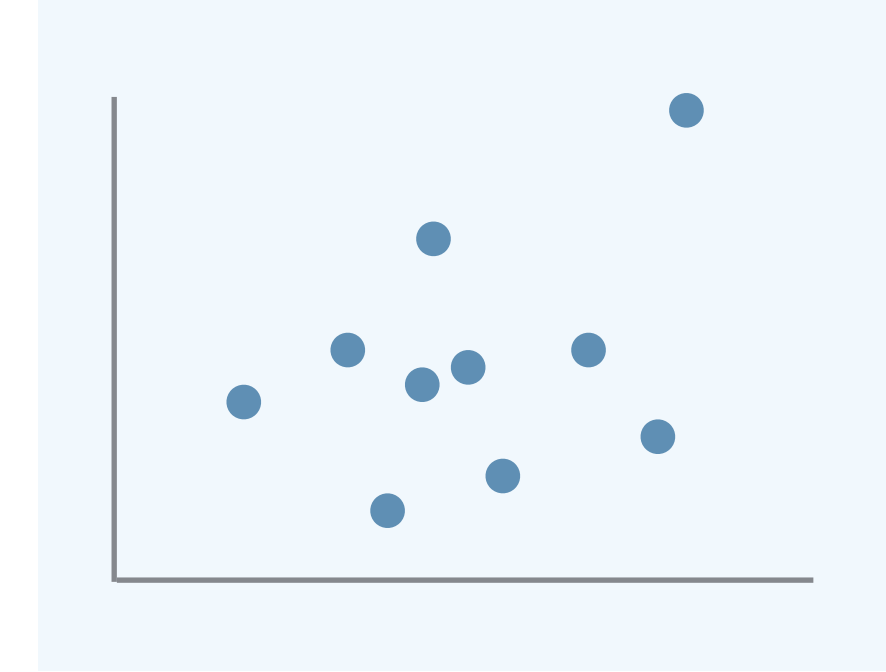
A diagram is a symbolic representation of data like a venn diagram, flow diagram, or organigram.

Graph



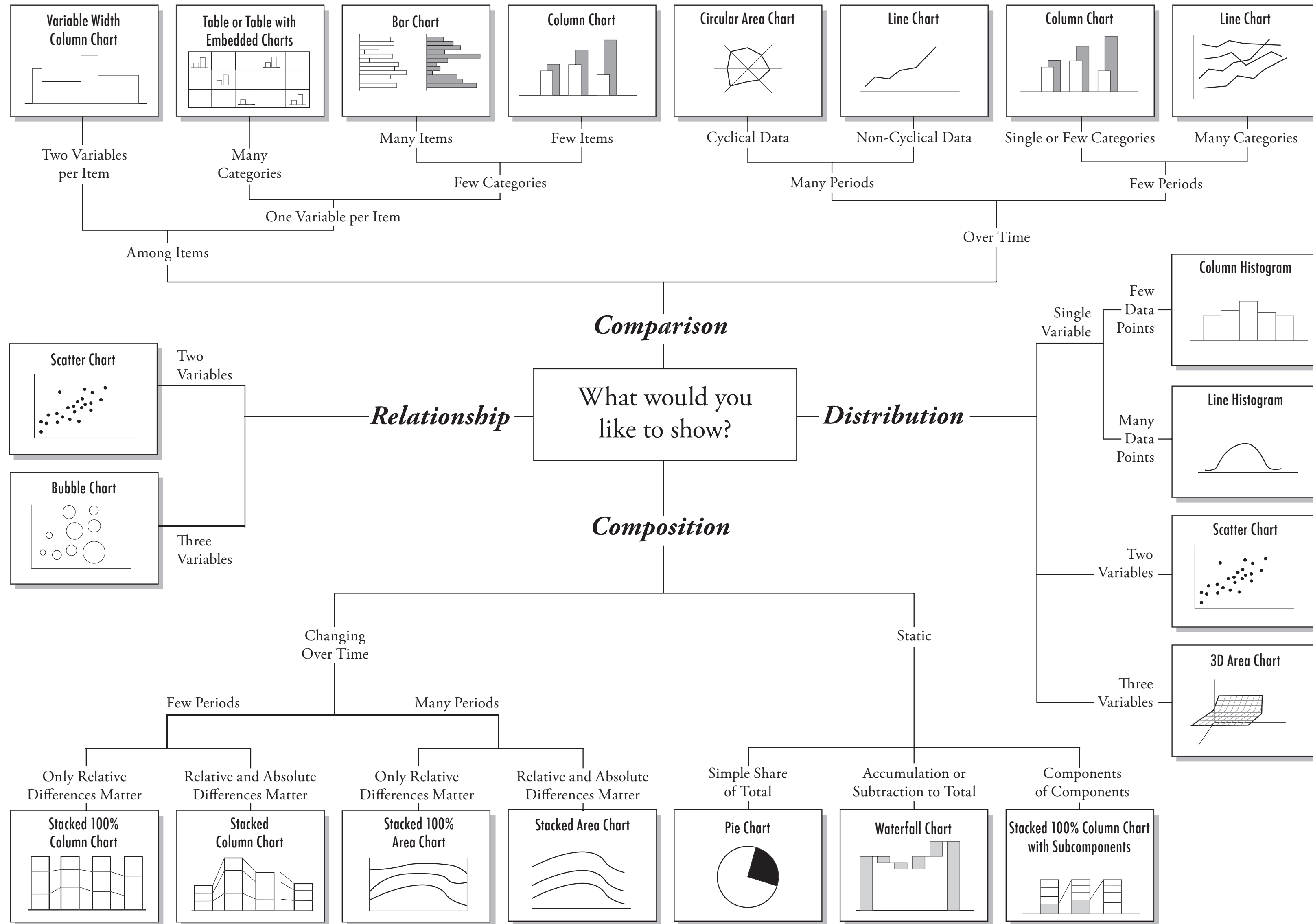
A graph is a visual representation of a mathematical function in 2d or 3d.

Plot



A plot represents the relationship between two or more variables like a scatter plot, box plot, or carpet plot.

Chart Suggestions—A Thought-Starter



THE GRAPHIC CONTINUUM

The Graphic Continuum shows several ways that data can be illustrated individually or combined to show relationships. Use of various shapes, chart types, and colors can help identify patterns, tell stories, and reveal relationships between different axes and types of data. Bar charts, or histograms, for example, can illustrate a distribution of data over time, but they also can show categorical or geographic differences. Scatterplots can illustrate data from a single instance or for a period, but they also can be used to identify a distribution around a mean.

This set of charts does not constitute an exhaustive list, nor do the connections represent every possible pathway for linking data and ideas. Instead, the Graphic Continuum identifies some presentation methods, and it illustrates some of the connections that can bind different representations together. The six groups do not define all possibilities: Many other useful, overlapping data types and visualization techniques are possible.

This chart can guide graphic choices, but your imagination can lead the way to other effective ways to present data.

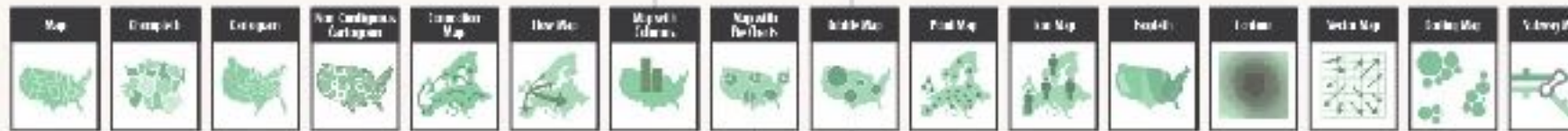
COMPARING CATEGORIES

Compare values across categories



GEOSPATIAL

Relate data to its geography



PART-TO-WHOLE

Visualizations that show the part of a variable to its total



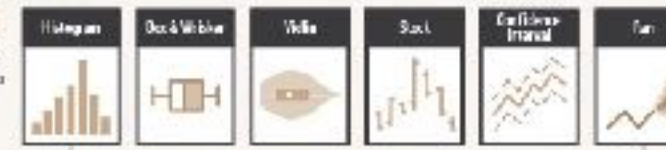
RELATIONSHIP

Illustrate correlations or relationships between variables



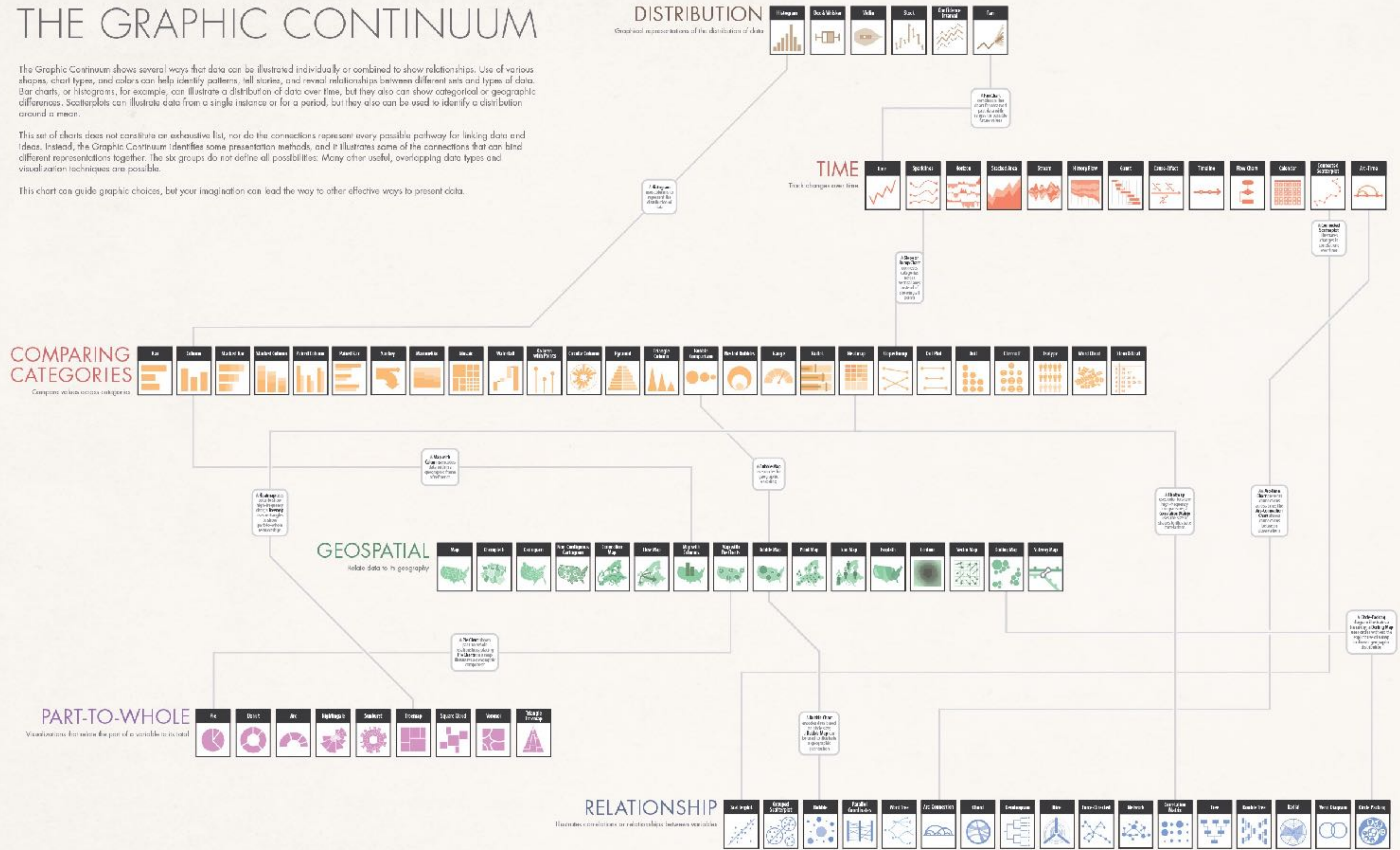
DISTRIBUTION

Graphical representations of the distribution of data



TIME

Track changes over time



<h3>Deviation</h3> <p>Emphasize variations (+/-) from a fixed reference point. Typically the reference point is zero but it can also be a target or a long-term average. Can also be used to show sentiment (positive/neutral/negative).</p> <p>Example FT uses Trade surplus/deficit, climate change</p>	<h3>Correlation</h3> <p>Show the relationship between two or more variables. Be mindful that, unless you list them otherwise, many readers will assume the relationship you show them to be causal (i.e. one causes the other).</p> <p>Example FT uses Inflation & unemployment, income & life expectancy</p>	<h3>Ranking</h3> <p>Use where an item's position in an ordered list is more important than its absolute or relative value. Don't be afraid to highlight the points of interest.</p> <p>Example FT uses Wages, deprivation, league tables, social issues by election results</p>	<h3>Distribution</h3> <p>Show values in a dataset and how often they occur. The shape (or 'skew') of a distribution can be a memorable way of highlighting the lack of uniformity or equality in the data.</p> <p>Example FT uses Income distribution, population (Gaussian) distribution</p>	<h3>Change over Time</h3> <p>Give emphasis to changing trends. These can be short (intra-day) movements or extended series (seasonal fluctuations). Choosing the correct time period is important to provide suitable context for the reader.</p> <p>Example FT uses Share price movements, economic time series</p>	<h3>Magnitude</h3> <p>Show size comparisons. These can be relative (just being able to see larger/smaller) or absolute (need to see how different). Usually these show a 'counted' number (for example, barrels, dollars or people) rather than a calculated rate or per cent.</p> <p>Example FT uses Consumer products, consumer market capitalisation</p>	<h3>Part-to-whole</h3> <p>Show how a single entity can be broken down into its component elements. If the reader's interests solely in the size of the components, consider a magnitude-type chart instead.</p> <p>Example FT uses Fiscal budgets, company structures, national defence results</p>	<h3>Spatial</h3> <p>Avoid from location maps only used when precise locations or geographical patterns in data are more important to the reader than anything else.</p> <p>Example FT uses Population density, natural resource locations, natural disaster risk/impact, urbanised areas, vaccination levels, fire results</p>	<h3>Flow</h3> <p>Show the order, volume or intensity of movement between two or more states or conditions. These might be logical sequences or geographical locations.</p> <p>Example FT uses Movement of funds, trade, migrants, lawsuits, information, relationship graphs</p>
<h4>Diverging bar</h4> <p>A simple standard bar chart that can handle both negative and positive magnitude values.</p>	<h4>Scatterplot</h4> <p>The standard way to show the relationship between two continuous variables, each of which has its own axis.</p>	<h4>Ordered bar</h4> <p>Standard bar charts display the series of values read more easily when sorted in order.</p>	<h4>Histogram</h4> <p>The standard way to show a statistical distribution: keep the axes consistent, consider markers to represent the 'shape' of the data.</p>	<h4>Line</h4> <p>The standard way to show a changing time series. If data are irregular, consider markers to represent data points.</p>	<h4>Column</h4> <p>The standard way to compare the size of things, those elements start at 0 on the axis.</p>	<h4>Stacked column</h4> <p>A simple way of showing part-to-whole relationships but can be difficult to read with more than a few components.</p>	<h4>Basic choropleth (rate/ratio)</h4> <p>The standard approach for putting data on a map - should always be rates rather than totals and use a sensible base geography.</p>	<h4>Sanky</h4> <p>Shows changes in flow from one condition to at least one other, good for tracing the eventual outcome of a complex process.</p>
<h4>Diverging stacked bar</h4> <p>Perfect for presenting survey results which involve sentiment (eg disagree/neutral/agree)</p>	<h4>Line + Column</h4> <p>A good way of showing the relationship between an amount (columns) and a rate (line).</p>	<h4>Ordered column</h4> <p>See above.</p>	<h4>Boxplot</h4> <p>Summarise multiple distributions by showing the median (center) and range of the data.</p>	<h4>Column</h4> <p>Columns work well for showing change over time - but usually best with only one series of data at a time.</p>	<h4>Bar</h4> <p>See above. Good either when data are not time series and labels have long category names.</p>	<h4>Marimekko</h4> <p>A good way of showing the size and proportion of data at the same time - as long as the data are not too complicated.</p>	<h4>Proportional symbol (Quantitative)</h4> <p>Use for maps rather than rates - for areas that small differences in data will be hard to see.</p>	<h4>Waterfall</h4> <p>Designed to show the accumulation of data through a flow process, typically budgets. Can include +/- components.</p>
<h4>Spine</h4> <p>Splits a single value into two contrasting components (eg male/female).</p>	<h4>Connected scatterplot</h4> <p>Usually used to show how the relationship between 2 variables has changed over time.</p>	<h4>Ordered proportional symbol</h4> <p>Use when there are big variations between values and/or seeing differences between data is not so important.</p>	<h4>Violin plot</h4> <p>Similar to a box plot but more effective with complex distributions. Data that cannot be summarised with simple averages.</p>	<h4>Line + column</h4> <p>A good way of showing the relationship over time between Column and a rate Line.</p>	<h4>Paired column</h4> <p>As per standard column but allows for multiple series. Can become tricky to read with more than 2 series.</p>	<h4>Pie</h4> <p>A common way of showing part-to-whole data - but be aware that it's difficult to accurately compare the size of the segments.</p>	<h4>Flowmap</h4> <p>For showing unambiguous movement across a map.</p>	<h4>Chord</h4> <p>A complex but powerful diagram which can illustrate 2-way flows (and not winner) in a matrix.</p>
<h4>Surplus/deficit fillline</h4> <p>The shaded area of these charts allows a balance to be shown - either against a baseline or between two series.</p>	<h4>Bubble</h4> <p>Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.</p>	<h4>Dot strip plot</h4> <p>Data placed in order on a strip are a space-efficient method of trying out ranks across multiple categories.</p>	<h4>Population pyramid</h4> <p>A standard way for showing the age and sex breakdown of a population distribution, effective back to back histograms.</p>	<h4>Stock price</h4> <p>Usually focused on day-to-day activity, these charts show opening/closing and high/low points of each day.</p>	<h4>Paired bar</h4> <p>See above.</p>	<h4>Donut</h4> <p>Similar to a pie chart - but the centre can be a good way of making space to include more information about the data (eg total).</p>	<h4>Centourmap</h4> <p>For showing areas of equal value on a map. Can use deviation colour schemes for showing +/- values.</p>	<h4>Network</h4> <p>Used for showing the strength and inter-connectedness of relationships of varying types.</p>
<h4>Xf heatmap</h4> <p>A good way of showing the patterns between 2 categories of data, less good at showing fine differences in amounts.</p>	<h4>Slope</h4> <p>Perfect for showing how rates have changed over time or vary between categories.</p>	<h4>Dot strip plot</h4> <p>Good for showing individual values in a distribution, can be a problem when too many data have the same value.</p>	<h4>Dot plot</h4> <p>A simple way of showing the change or range (minimum) of data across multiple categories.</p>	<h4>Slope</h4> <p>Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of the story.</p>	<h4>Madmecko</h4> <p>A good way of showing the size and proportion of data at the same time - as long as the data are not too complicated.</p>	<h4>Treemap</h4> <p>Use for hierarchical part-to-whole relationships, can be difficult to read when there are many small segments.</p>	<h4>Equalised cartogram</h4> <p>Converting each unit on a map to a regular and equally-sized shape - good for representing varying regions with equal value.</p>	
<h4>Lollipop</h4> <p>Lollipop charts draw more attention to the data value than standard bar/columns and can also show rank and value effectively.</p>	<h4>Area chart</h4> <p>Use with care - these are good at showing changes in total, but seeing change in components can be very difficult.</p>	<h4>Dot plot</h4> <p>A simple way of showing the change or range (minimum) of data across multiple categories.</p>	<h4>Area chart</h4> <p>Use with care - these are good at showing changes in total, but seeing change in components can be very difficult.</p>	<h4>Area chart</h4> <p>Use with care - these are good at showing changes in total, but seeing change in components can be very difficult.</p>	<h4>Droptail symbol</h4> <p>Use when there are big variations between values and/or seeing fine differences between data is not so important.</p>	<h4>Vertical</h4> <p>A way of turning points into areas - any point within each area is closer to the central point than any other centroid.</p>	<h4>Scald cartogram (value)</h4> <p>Stretching and shrinking a map so that each area is sized according to a particular value.</p>	
<h4>Bump</h4> <p>Effective for showing changing rankings across multiple data. For large datasets, consider grouping lines using colour.</p>	<h4>Far chart (Projection)</h4> <p>Use to show the use fairly in future projections - usually risk grows the further forward in projection.</p>	<h4>Barcode plot</h4> <p>Like dot strip plots, good for displaying all the data at once, they work best when highlighting individual values.</p>	<h4>Barcode plot</h4> <p>Like dot strip plots, good for displaying all the data at once, they work best when highlighting individual values.</p>	<h4>Far chart (Projection)</h4> <p>Use to show the use fairly in future projections - usually risk grows the further forward in projection.</p>	<h4>Isotype (gintogram)</h4> <p>Excellent solution in some instances - use only with whole numbers (do not slice off or use to represent a decimal).</p>	<h4>Arc</h4> <p>A semi-circle, often used for visualising political results in parliaments.</p>	<h4>Dot density</h4> <p>Used to show the location of individual events/locations - make sure to annotate any patterns the reader should see.</p>	
<h4>Cumulative curve</h4> <p>A good way of showing how unequal a distribution is - y axis is always cumulative frequency, x axis is always a measure.</p>	<h4>Connected scatterplot</h4> <p>A good way of showing changing data for two variables whenever there is a relatively deep pattern of progression.</p>	<h4>Cumulative curve</h4> <p>A good way of showing how unequal a distribution is - y axis is always cumulative frequency, x axis is always a measure.</p>	<h4>Frequency polygons</h4> <p>A great way of showing multiple distributions of data like a regular line chart, best limited to a maximum of 3 or 4 datasets.</p>	<h4>Connected scatterplot</h4> <p>A good way of showing changing data for two variables whenever there is a relatively deep pattern of progression.</p>	<h4>Lollipop</h4> <p>Lollipop charts draw more attention to the data value than standard bar/column - does not have to start at zero (but preferable).</p>	<h4>Gridplot</h4> <p>Good for showing information, they work best when used on whole numbers and work well in multiple dimensions.</p>	<h4>Heatmap</h4> <p>Grid-based data values mapped with an intensity colour scale. As choropleth map - but not mapped to an administrative unit.</p>	
<h4>Calendar heatmap</h4> <p>A great way of showing temporal patterns (day, week, monthly) - at the expense of showing season in clarity.</p>	<h4>Circle timeline</h4> <p>Good for showing discrete values or varying size across multiple categories (eg earthquakes by continent).</p>	<h4>Frequency polygons</h4> <p>A great way of showing multiple distributions of data like a regular line chart, best limited to a maximum of 3 or 4 datasets.</p>	<h4>Calendar heatmap</h4> <p>A great way of showing temporal patterns (day, week, monthly) - at the expense of showing season in clarity.</p>	<h4>Circle timeline</h4> <p>Good for showing discrete values or varying size across multiple categories (eg earthquakes by continent).</p>	<h4>Radar</h4> <p>A space-efficient way of showing value of multiple variables - but make sure they are separated in a way that makes sense to reader.</p>	<h4>Venn</h4> <p>Generally only used for schematic representation.</p>		
<h4>Pristly timeline</h4> <p>Great when date and duration are key elements of the story in the data.</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Pristly timeline</h4> <p>Great when date and duration are key elements of the story in the data.</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Parallel coordinates</h4> <p>An alternative to radar charts - again, the arrangement of the variables is important. Usually benefits from highlighting values.</p>	<h4>Natural</h4> <p>Can be useful for showing part-to-whole relationships where some of the components are negative.</p>		
<h4>Circle timeline</h4> <p>Good for showing discrete values or varying size across multiple categories (eg earthquakes by continent).</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Circle timeline</h4> <p>Good for showing discrete values or varying size across multiple categories (eg earthquakes by continent).</p>	<h4>Vertical timeline</h4> <p>Presents time on the Y axis. Good for displaying detailed time series that work especially well when reading on mobile.</p>	<h4>Butter</h4> <p>Good for showing a measurement against the context of a target or performance range.</p>	<h4>Grouped symbol</h4> <p>An alternative to bar/column charts when being able to split data or highlight individual elements is useful.</p>		
<h4>Seismogram</h4> <p>Another alternative to the circle timeline for showing areas where there are big variations in the data.</p>	<h4>Seismogram</h4> <p>Another alternative to the circle timeline for showing areas where there are big variations in the data.</p>	<h4>Seismogram</h4> <p>Another alternative to the circle timeline for showing areas where there are big variations in the data.</p>	<h4>Seismogram</h4> <p>Another alternative to the circle timeline for showing areas where there are big variations in the data.</p>	<h4>Seismogram</h4> <p>Another alternative to the circle timeline for showing areas where there are big variations in the data.</p>	<h4>Grouped symbol</h4> <p>An alternative to bar/column charts when being able to split data or highlight individual elements is useful.</p>	<h4>Natural</h4> <p>Can be useful for showing part-to-whole relationships where some of the components are negative.</p>		

Visual vocabulary

Designing with data

There are so many ways to visualise data - how do we know which one to pick? Use the categories across the top to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations.

FT graphics: Alan Smith, Peter Campbell, Ian Bell, Iain Evans, Graham Rowley, Billy Bremner, Paul Moxley, Alan Martin, Steve. Inspired by The Graphic Continuum by Jon Schwabish and Severino Tiberti.





Sankey Diagram

Alluvial Diagram

Matrix Diagram

	1	2	3
A	●		●
B		○	●
C	○		

Matrix Diagram (Roof Shaped)

Donut Chart

Radial Bar Chart

Radial Histogram

Sorted Stream Graph

Fishbone Diagram

Isoline Map

Pictorial fraction chart

Exploded View Drawing

Arc Diagram

Flow Map

Hive Plot

Word Cloud

Violin Plot

Hexagonal Binning

Pictorial Stacked Chart

Sunburst Diagram



Many Thanks!

Don't hesitate to get in touch.

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Interactive Things

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