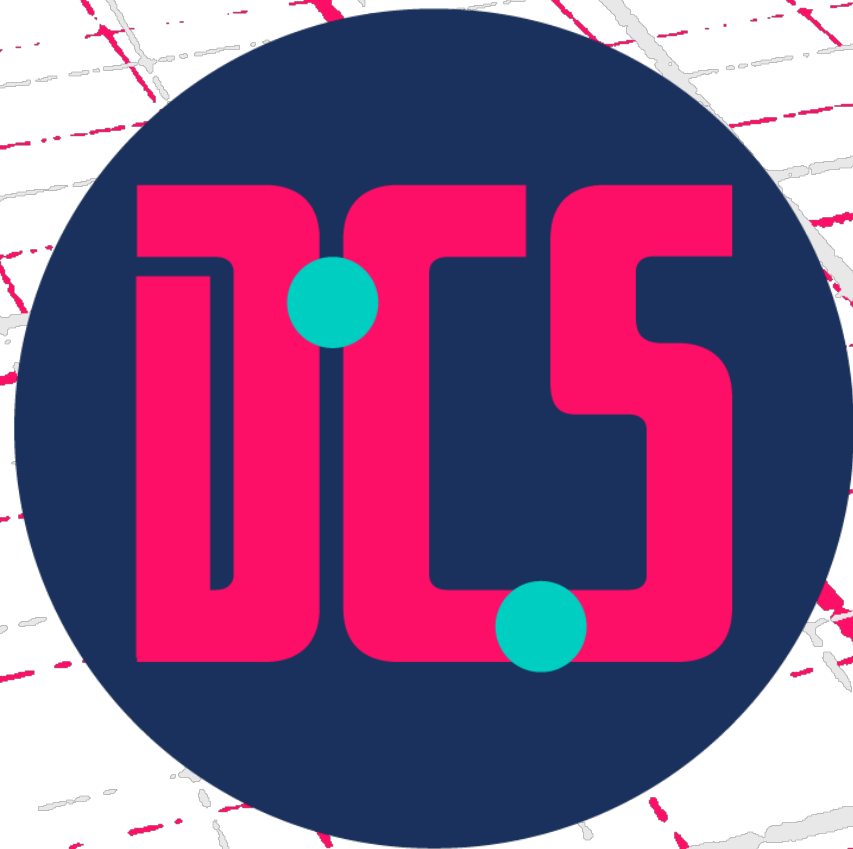




CREATING CUSTOM DATA VISUALISATIONS WITH OBSERVABLE NOTEBOOKS & D3



THE UNIVERSITY of EDINBURGH
Centre for Data, Culture & Society



**DATA
CULTURE
SOCIETY**

@EdCDCS

For all events, news, and support:

cdcs.ed.ac.uk

Welcome



Chris Oldnall



Sarah Schöttler



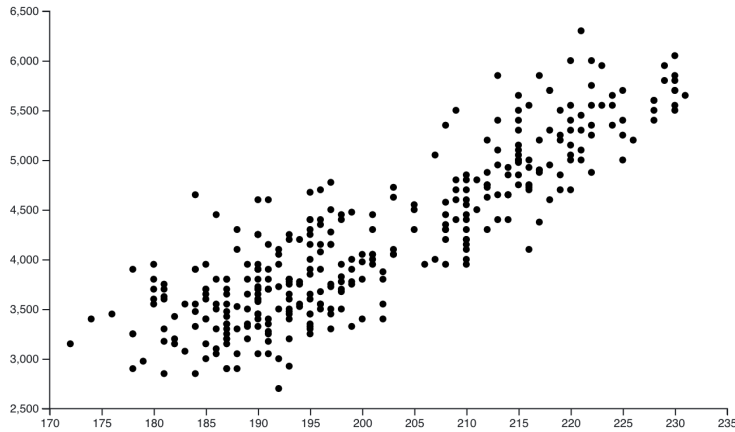
Schedule for Session 1

Find these slides online:
[github.com/DCS-training/
custom-dataviz-observable](https://github.com/DCS-training/custom-dataviz-observable)

| | |
|--------------|---------------------------------------|
| 13:00 | Welcome & Introduction |
| 13:30 | Sketching exercise |
| 14:00 | <i>Break</i> |
| 14:10 | Introduction to Observable & D3 |
| 14:15 | Implement your sketches on Observable |
| 14:55 | Wrap-up |
| 15:00 | Closing |



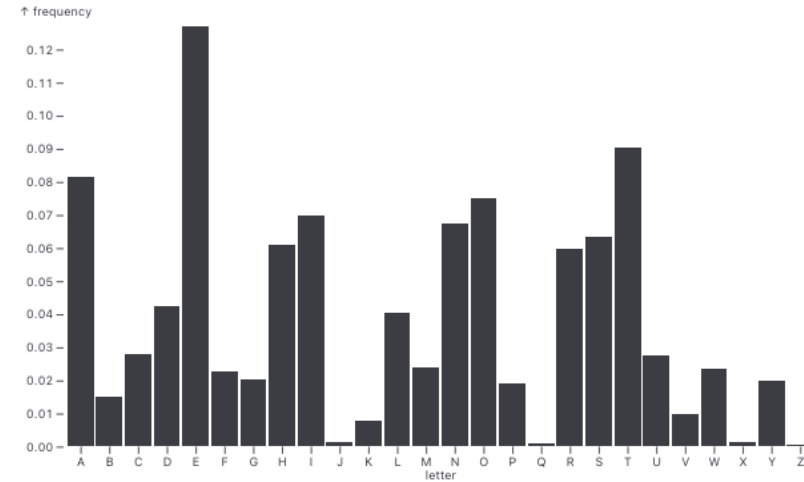
What chart types do you know?



scatterplot



line chart



bar chart

...and probably some others!



But sometimes that's not quite enough!

more
aesthetic

more
eye-catching

unusual
data format

highly specific
analysis goals

complex
multi-variate
patterns



Caveats

- can be time-consuming and challenging to implement
- can require more effort from users to understand



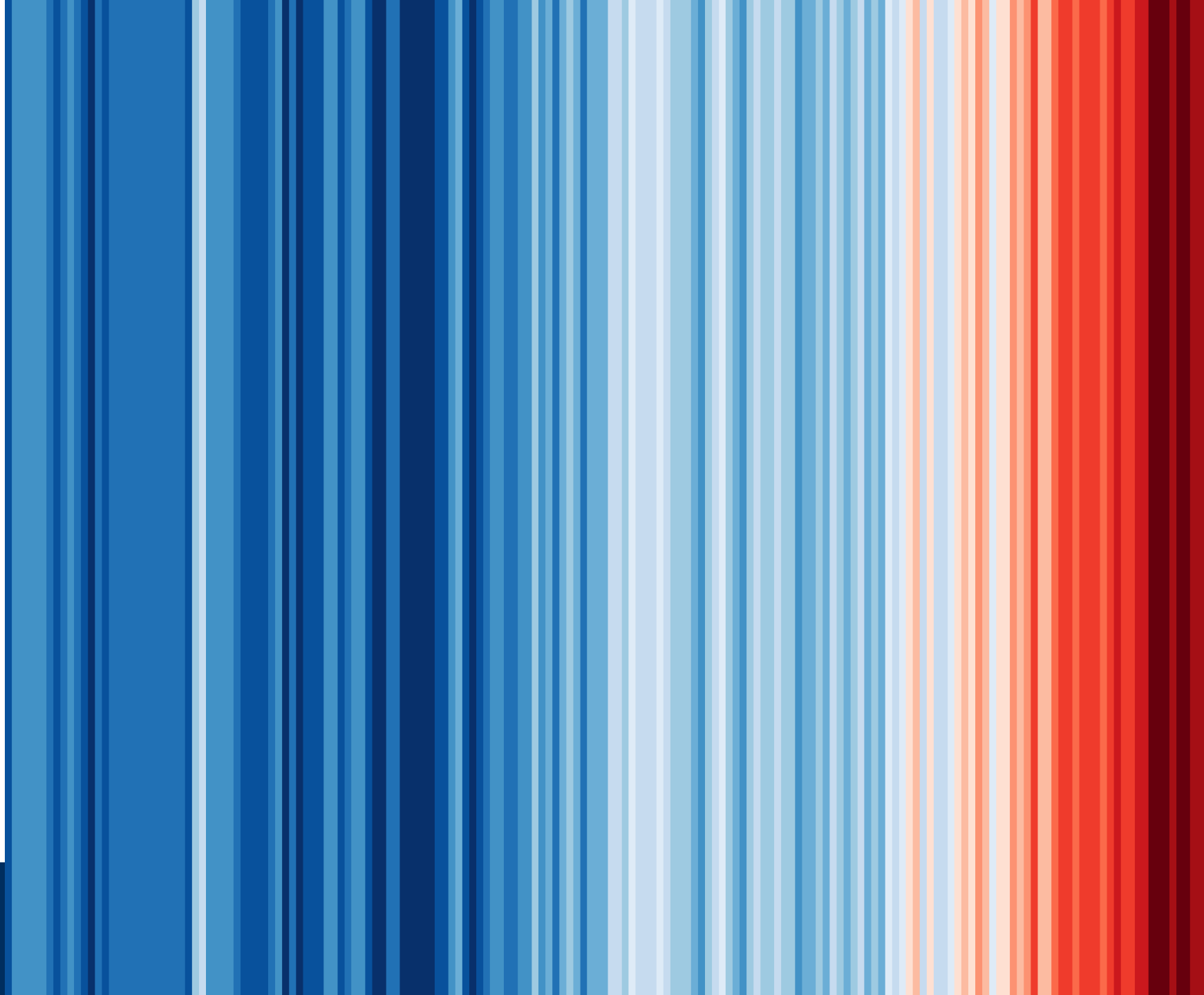
Custom Visualization Examples



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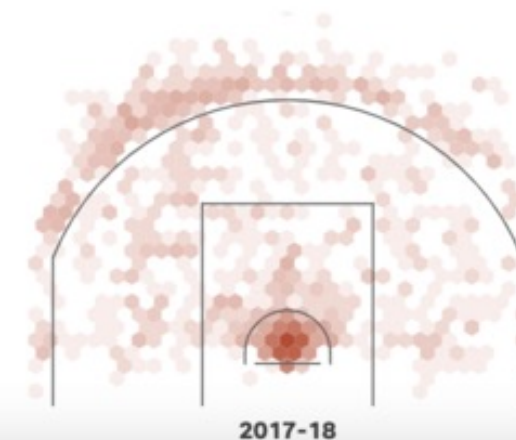
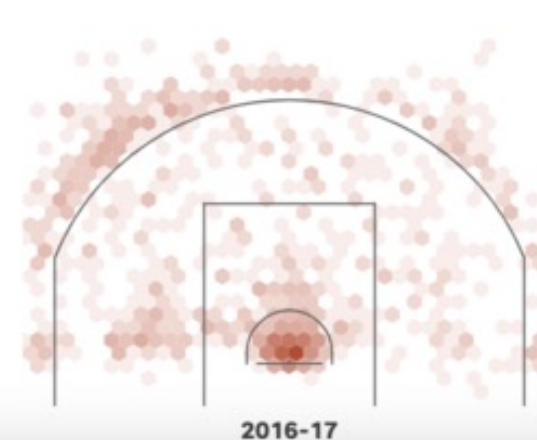
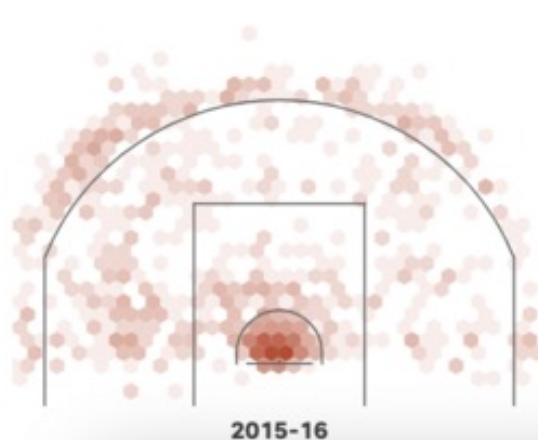
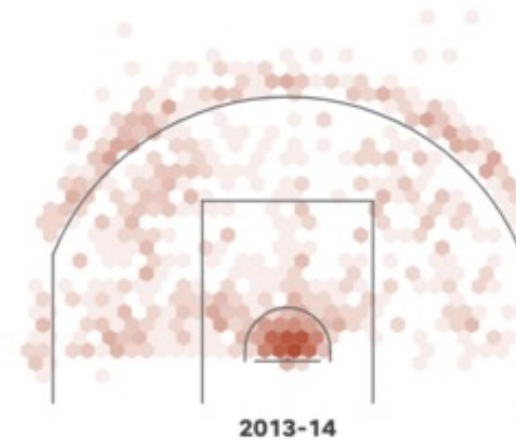
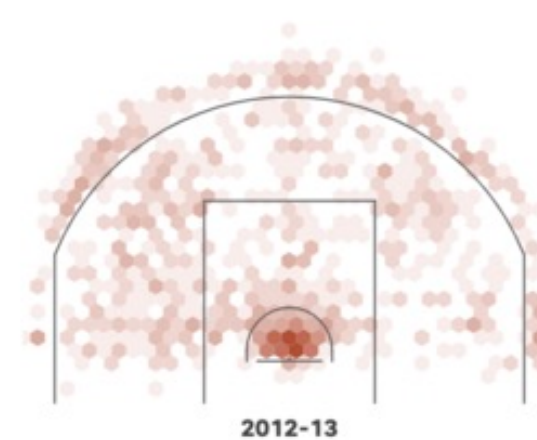
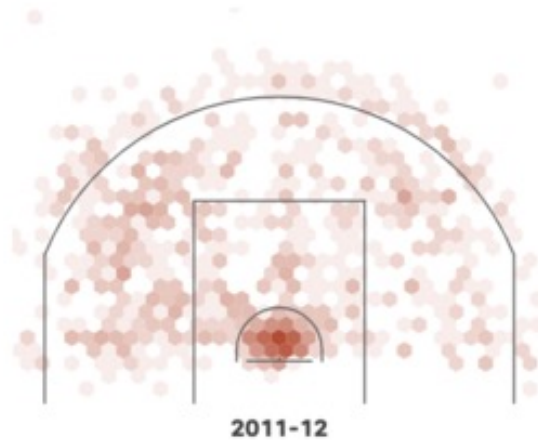
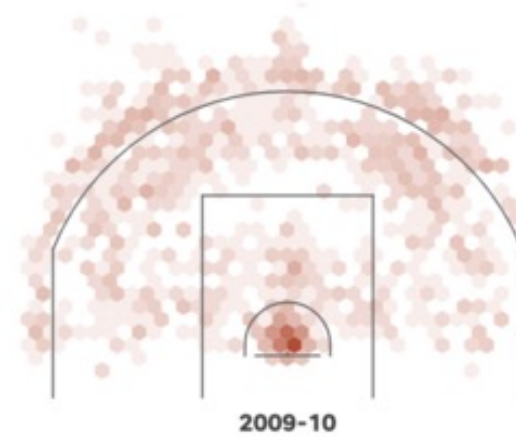
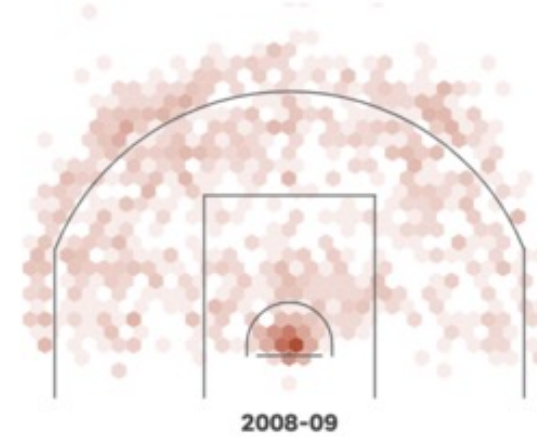
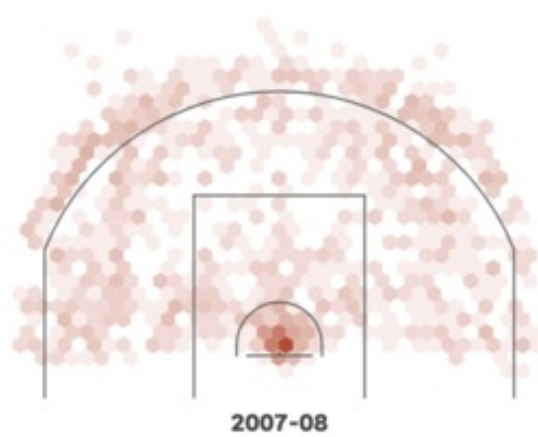
Warming Stripes

- Average temperature of each year encoded using color
- <https://showyourstripes.info/>
- Created by Ed Hawkins
- intuitive to understand for most people
- powerful visual
- easy to use in different designs
- breaks some visualization rules, e.g. lack of axis labels/legend



LeBron James has captured the scoring title. We visualized every shot.

- By USA Today
- <https://www.informationisbeautifulawards.com/showcase/6293-lebron-james-has-captured-the-scoring-title-we-visualized-every-shot>
- unique data with specific spatial information
- relatively easy to understand because the lines of the basketball field are shown



Visualizing Multiple Variables Across Scale and Geography

Goodwin, S., Dykes, J., Slingsby, A. and Turkay, C. (2015). Visualizing Multiple Variables Across Scale and Geography. IEEE Transactions on Visualization and Computer Graphics (Proceedings of the Visual Analytics Science and Technology / Information Visualization / Scientific Visualization 2015), 22(1), pp. 599-608. doi: 10.1109/TVCG.2015.2467199

- powerful analysis tool that shows correlations between multiple variables in space, at different scales
- challenging to learn how to read patterns – but very powerful when you can

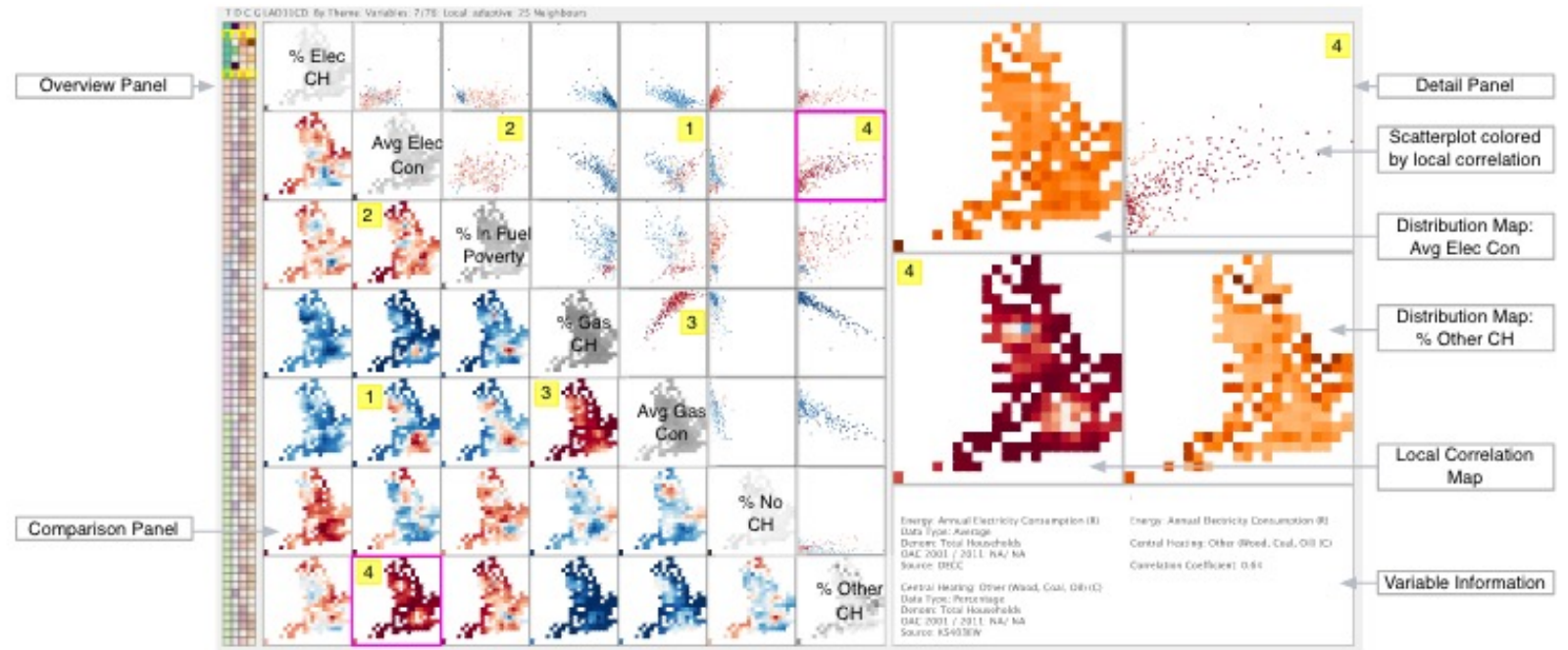


Fig. 9: Software prototype showing all three panels and *MicroMulti* information in an asymmetrical matrix. Seven energy – consumption (Con), fuel poverty and central heating (CH) – variables displaying locality information, based on an adaptive moving window with 25 neighbors ($N=25$). Pairwise correlation examples 1-4 are highlighted and discussed in the text.



Fig. 11: Five forms of scale sensitivity as SR increases from fine resolution to generalized using the scale mosaic design. Color refers to the degree of positive (red) or negative (blue) correlation.



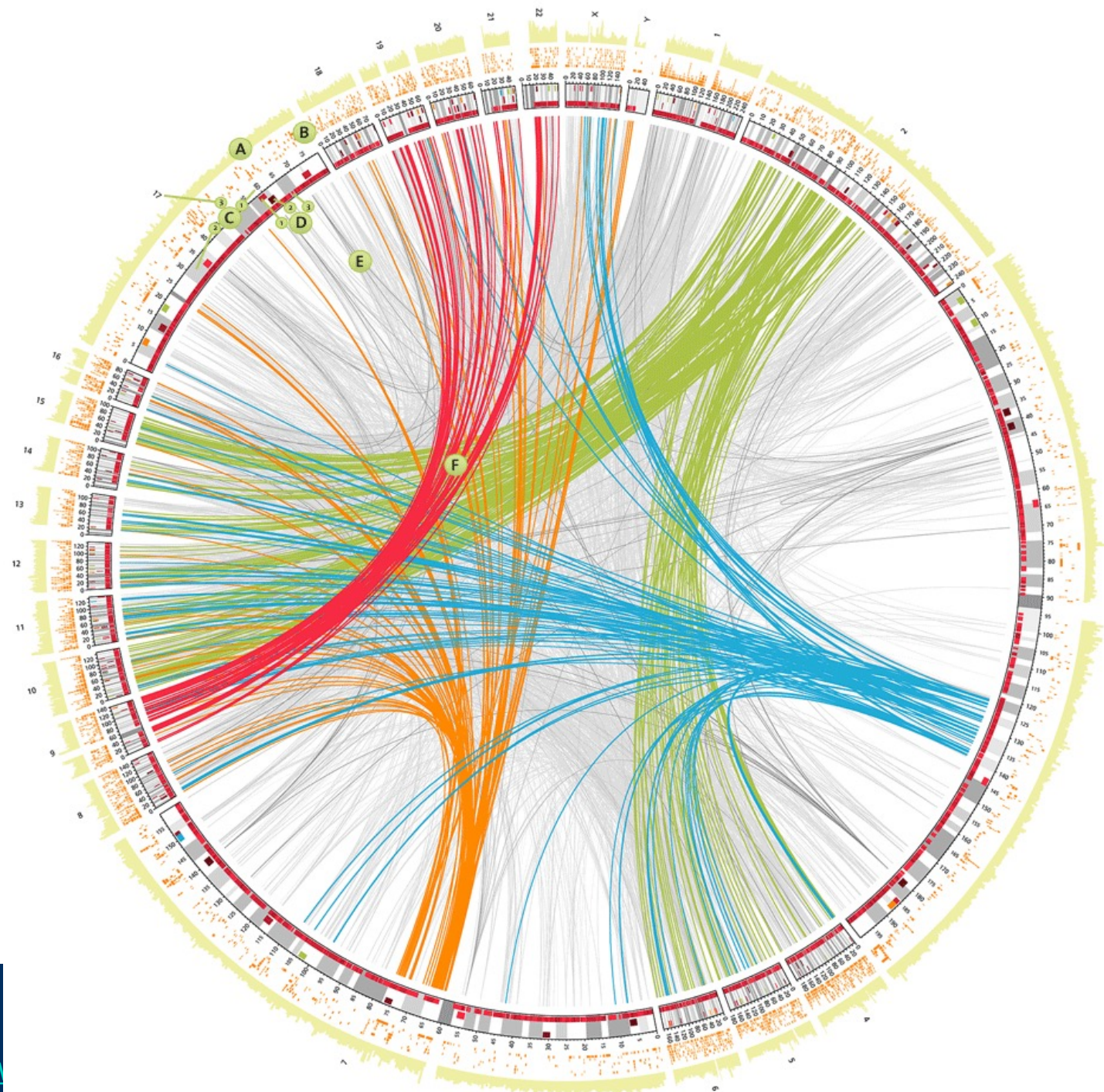
Updating Happiness: Wellcome Collection

- by Stefanie Posavec
- <https://www.stefanieposavec.com/updating-happiness>
- participative installation where museum visitors filled in a survey and provided quotes on what makes them happy
- colors and shapes represent survey responses
- possible to read this visualization when given a legend, but this work is less about precise data communication and more about playfulness and drawing attention to the topic



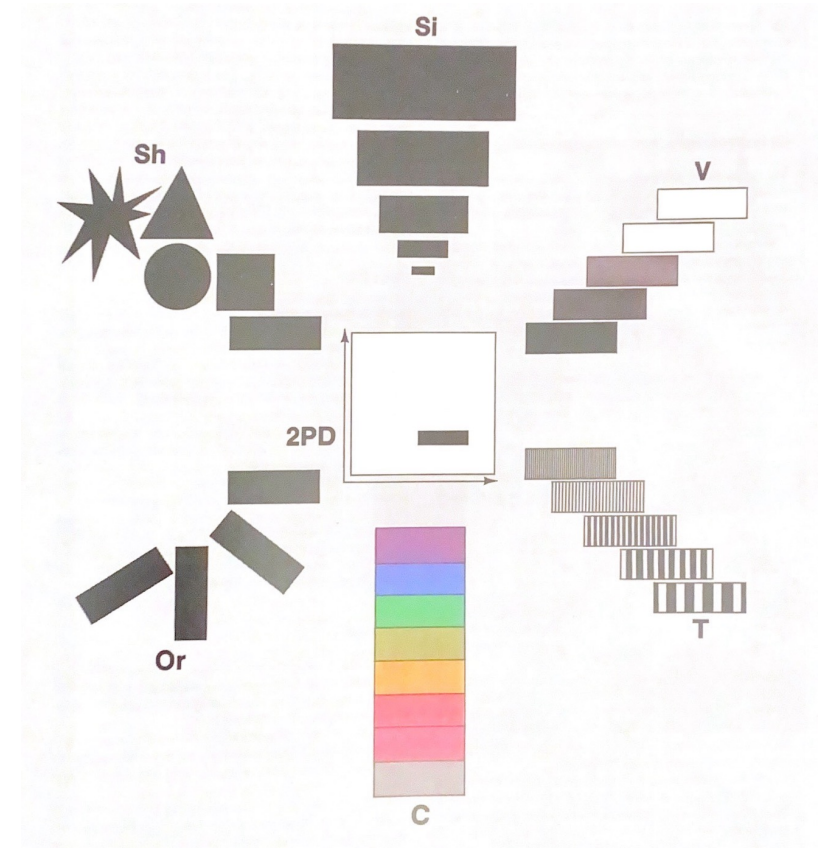
CIRCOS Plots

- first introduced in 2009
- now commonly used in genomics
- https://circos.ca/intro/genomic_data/
- complex visualization combining many different encodings
- requires training to learn how to read
- very powerful when you know how to read it

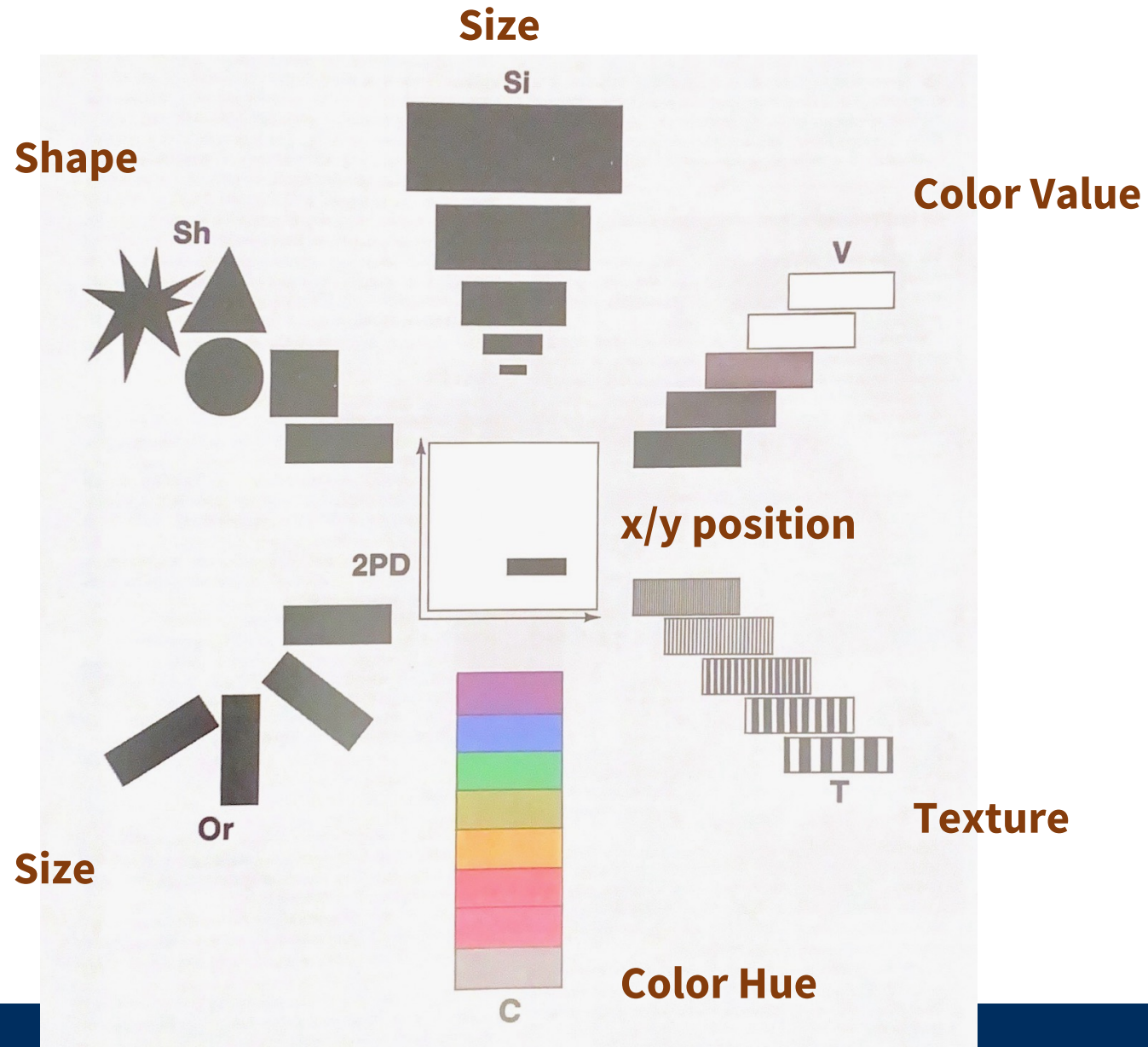


A different way of thinking about visualizations: Visual variables

- Jacques Bertin (1918-2010), French cartographer and theorist
- Book: *Sémiologie Graphique* (Semiology of Graphics), 1967

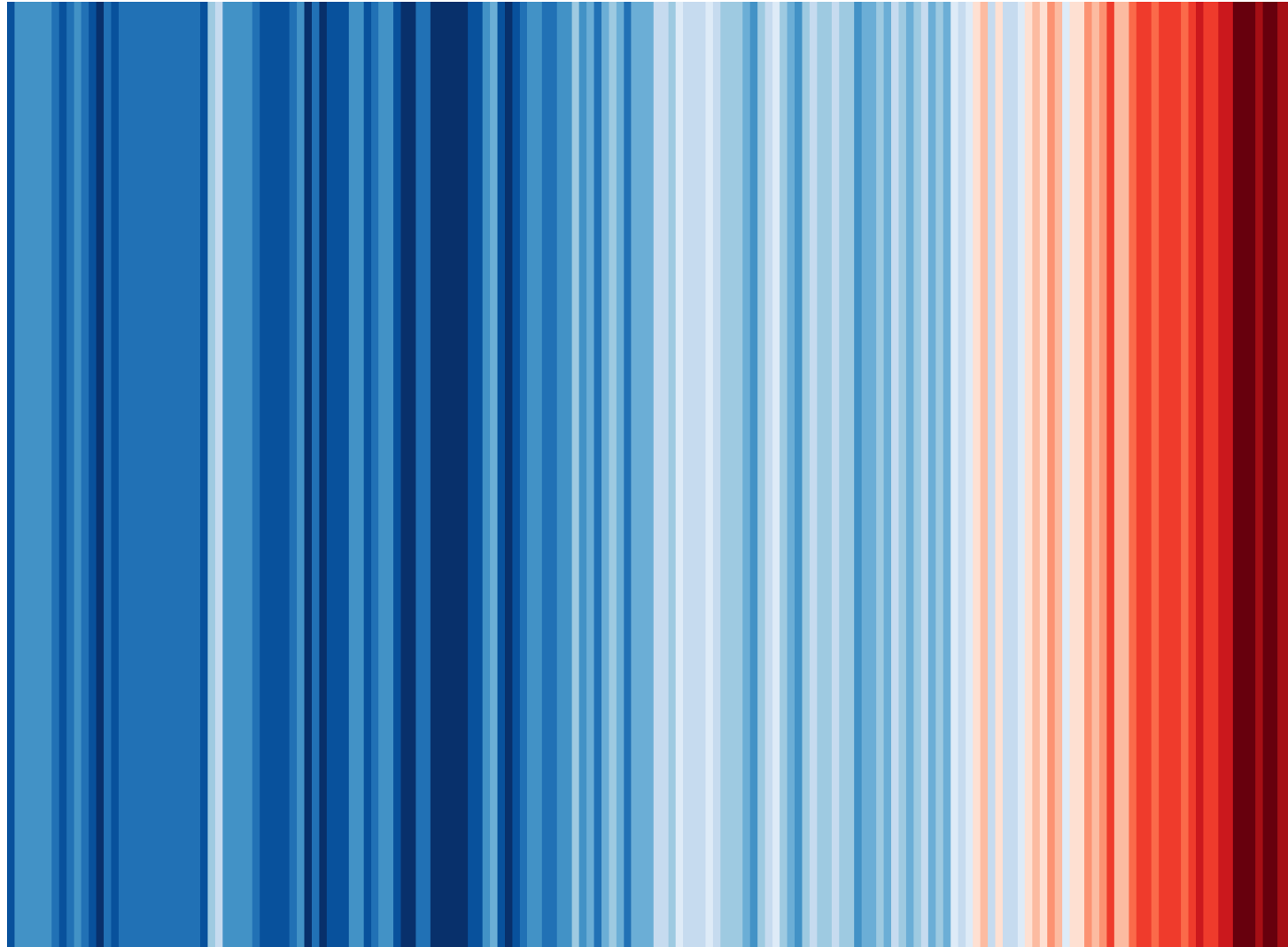


Visual Variables



What visual variables does this visualization use?

- x-position to encode the year
- color hue + value to encode average temperature
- does not use y-position

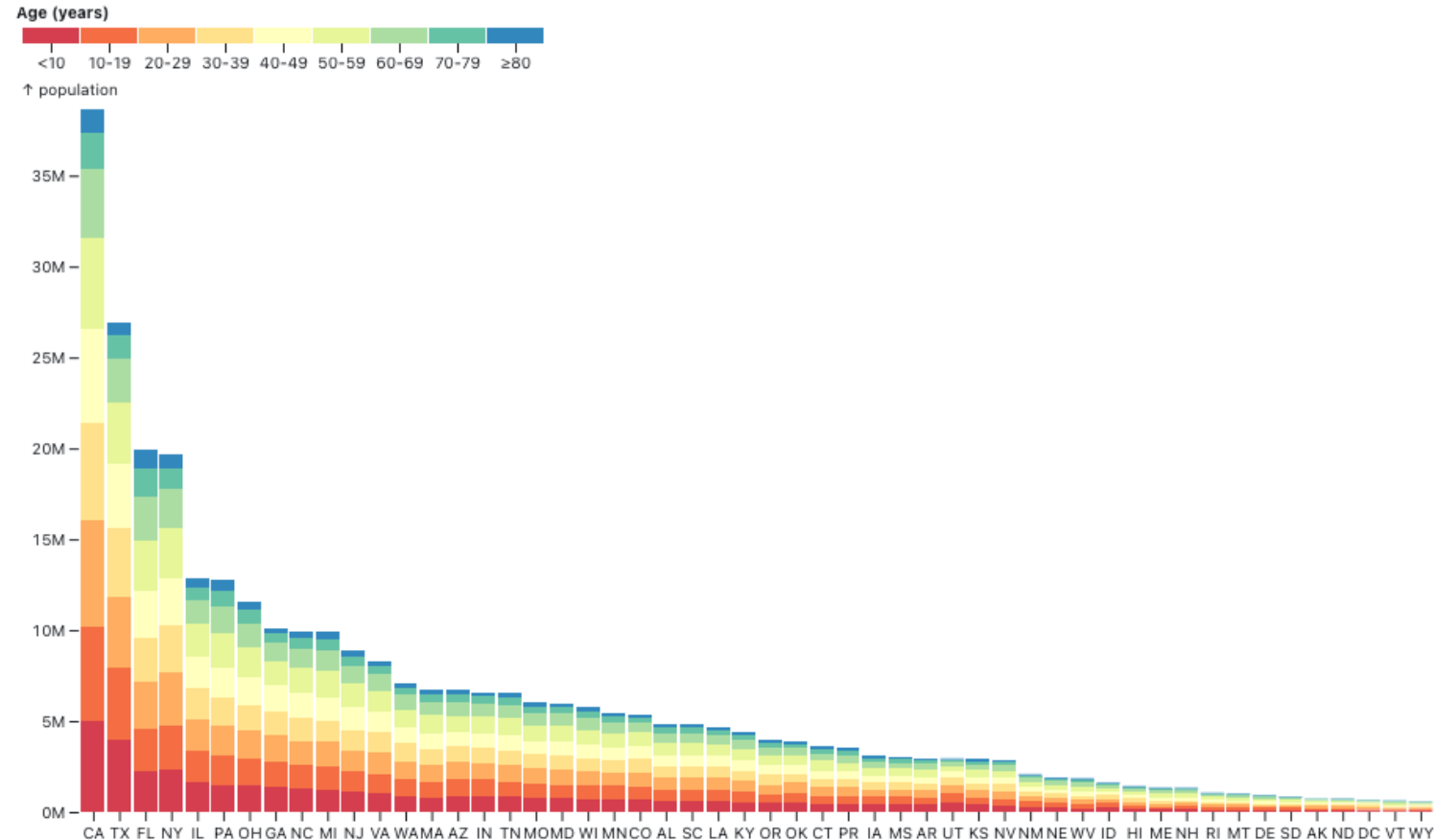


What visual variables does this visualization use?

- x-position to encode the state
- y-position / size to encode population counts
- color hue to encode age groups

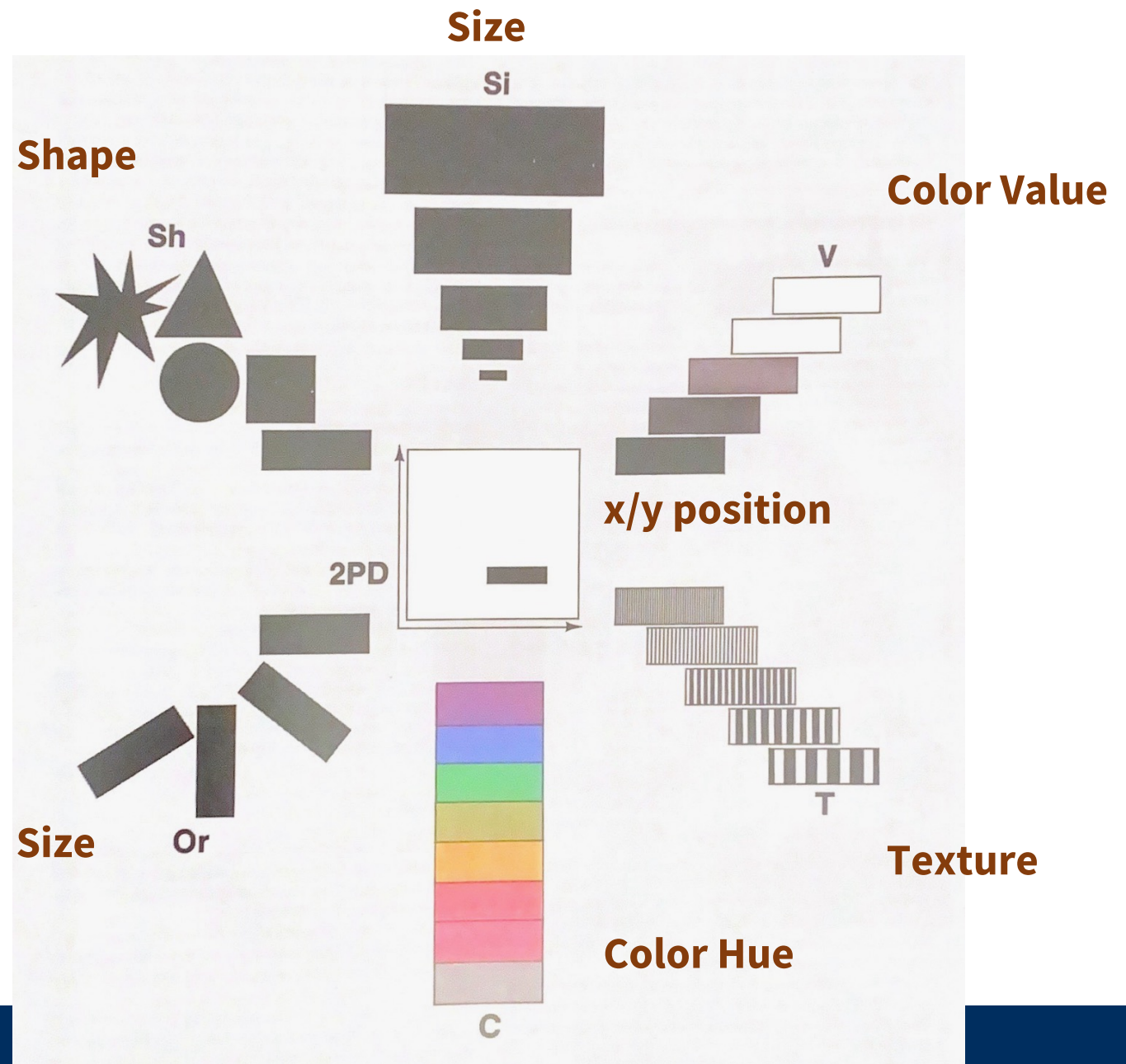
<https://observablehq.com/@observablehq/plot-stacked-bar-chart>

US Population by state



Sketching Exercise

- Sketch 3 ideas for custom visualizations using the plastic waste dataset on GitHub
- Use as many or as few variables as you like
- For each sketch, note which visual variables you are using to encode the different data points
- <https://github.com/DCS-training/custom-dataviz-observable/>



Break



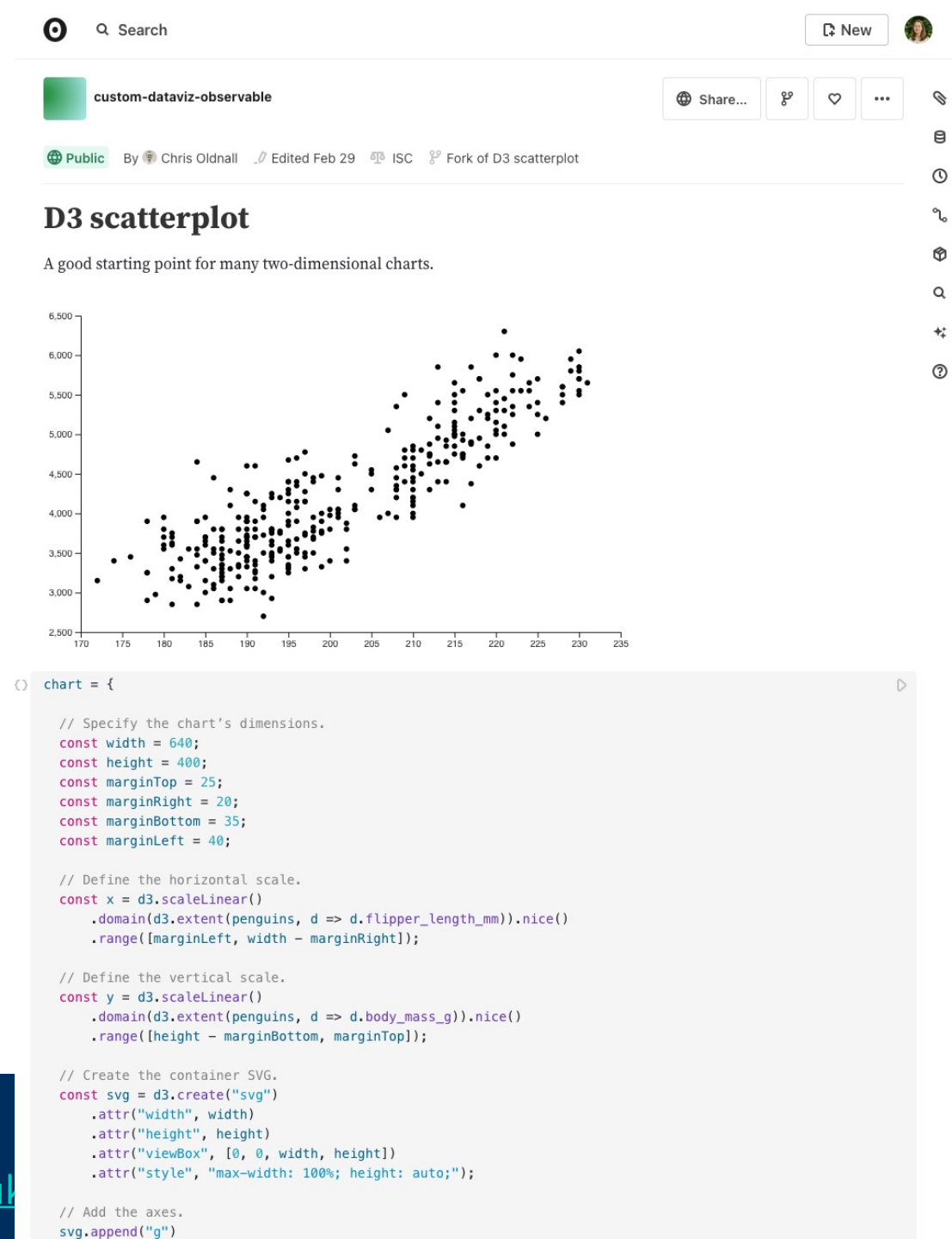
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Live Demo: Observable Notebooks & D3

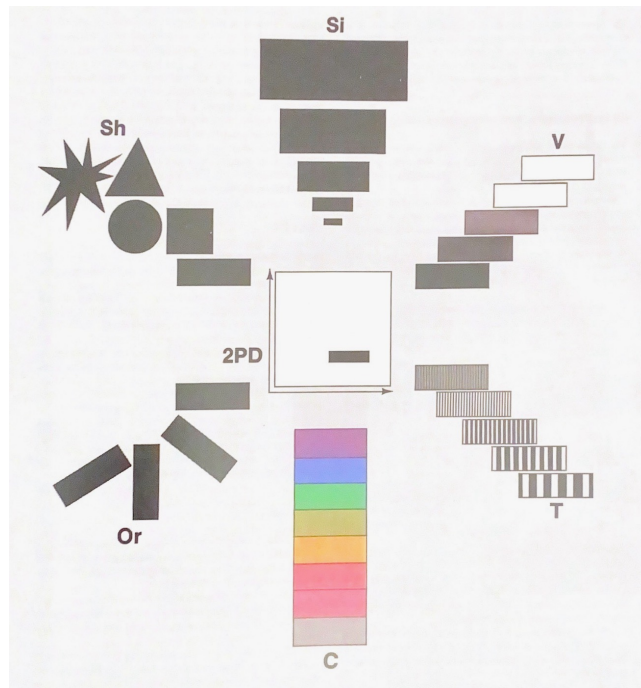
<https://observablehq.com/d/f69239b2ac2ff42f>



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Coding Exercise



- Pick one of your ideas from the sketching exercise
- Starting from the scatterplot example, try to implement it
- Go variable by variable: choose one (visual) variable and implement it, then move on to the next one

Search

New

custom-dataviz-observable

Share...

Public

By Chris Oldnall

Edited Feb 29

ISC

Fork of Plot Scatterplot

Practice with Plastic Waste

Using [Plot.dot](#).

Firstly to start off with, you should 'fork' this project. This can be done by pressing the two dots connected to another below (this is just on the left of the share button). From this you can save it in your own space.

Once you have done this, it is now necessary to attach the plastic-waste file to the project. Download this from the GitHub for the project and then attach it by clicking the paperclip on the right hand side of the screen. Here you can attach it. Then go ahead and fill in the file import below.

```
plastic_waste_data = Error: File not found: INSERT
```

Now that you have the data incorporated into the notebook, it is time to try and make some data visualisations. Firstly try filling in the elements below to get a scatter plot of the variables, 'gdp_per_cap' and 'total_pop'.

```
chart = RuntimeError: INSERT is not defined
```

```
chart = {  
  
  // Specify the chart's dimensions.  
  const width = 640;  
  const height = 400;  
  const marginTop = 25;  
  const marginRight = 20;  
  const marginBottom = 35;  
  const marginLeft = 40;  
  
  // Define the horizontal scale.  
  const x = d3.scaleLinear()  
    .domain(d3.extent(INSERT, d => d.INSERT)).nice()  
    .range([marginLeft, width - marginRight]);  
  
  // Define the vertical scale.  
  const y = d3.scaleLinear()  
    .domain(d3.extent(INSERT, d => d.INSERT)).nice()  
    .range([height - marginBottom, marginTop]);  
  
  // Create the container SVG.  
  const svg = d3.create("svg")
```

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Next Week

- Open session to work on your custom visualizations
- Bring your own data if you like! We will also have sample data for you.
- Join the Teams group and ask any questions you have between sessions there!

