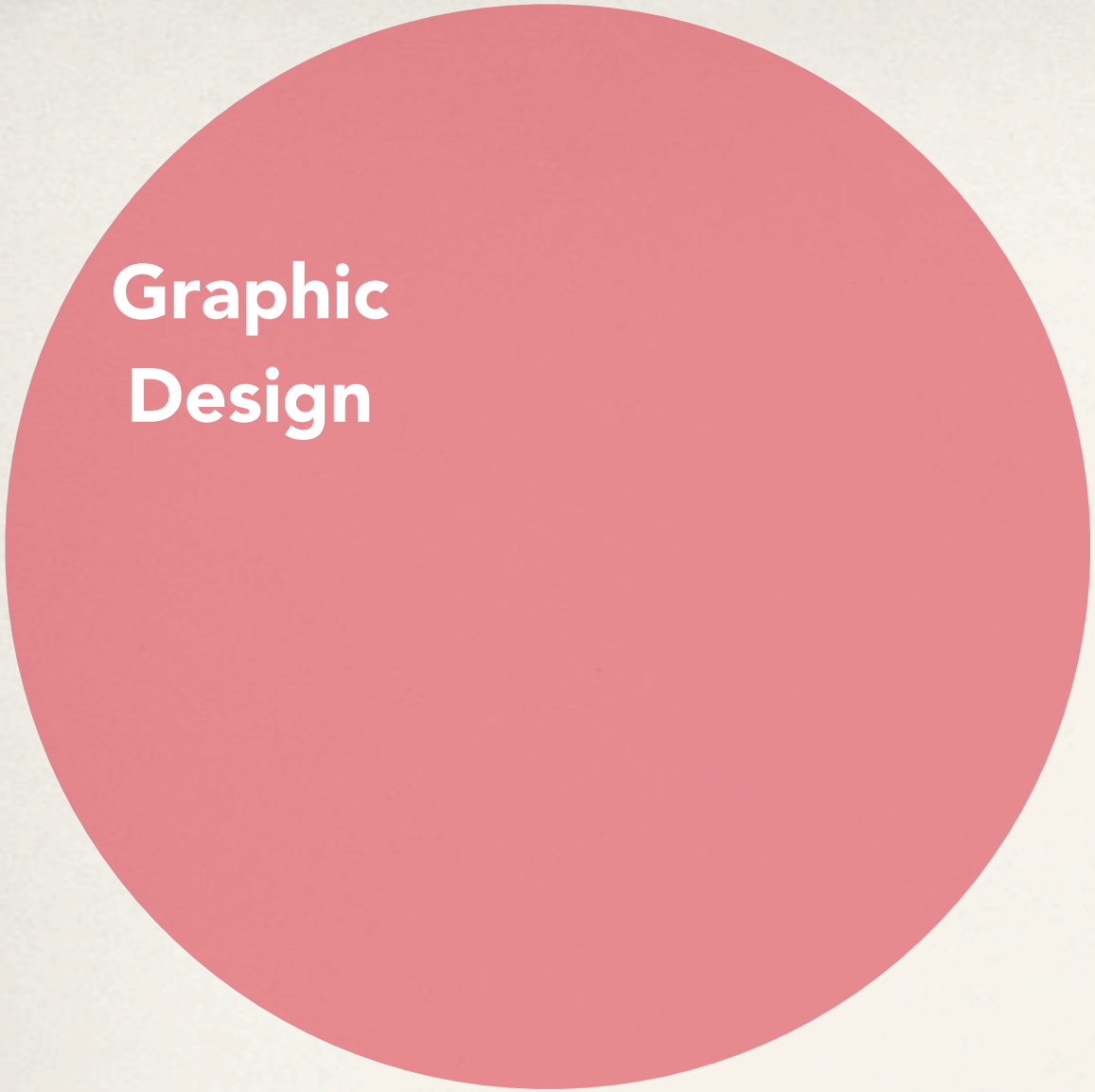


# Interaction

C. Andrews

---

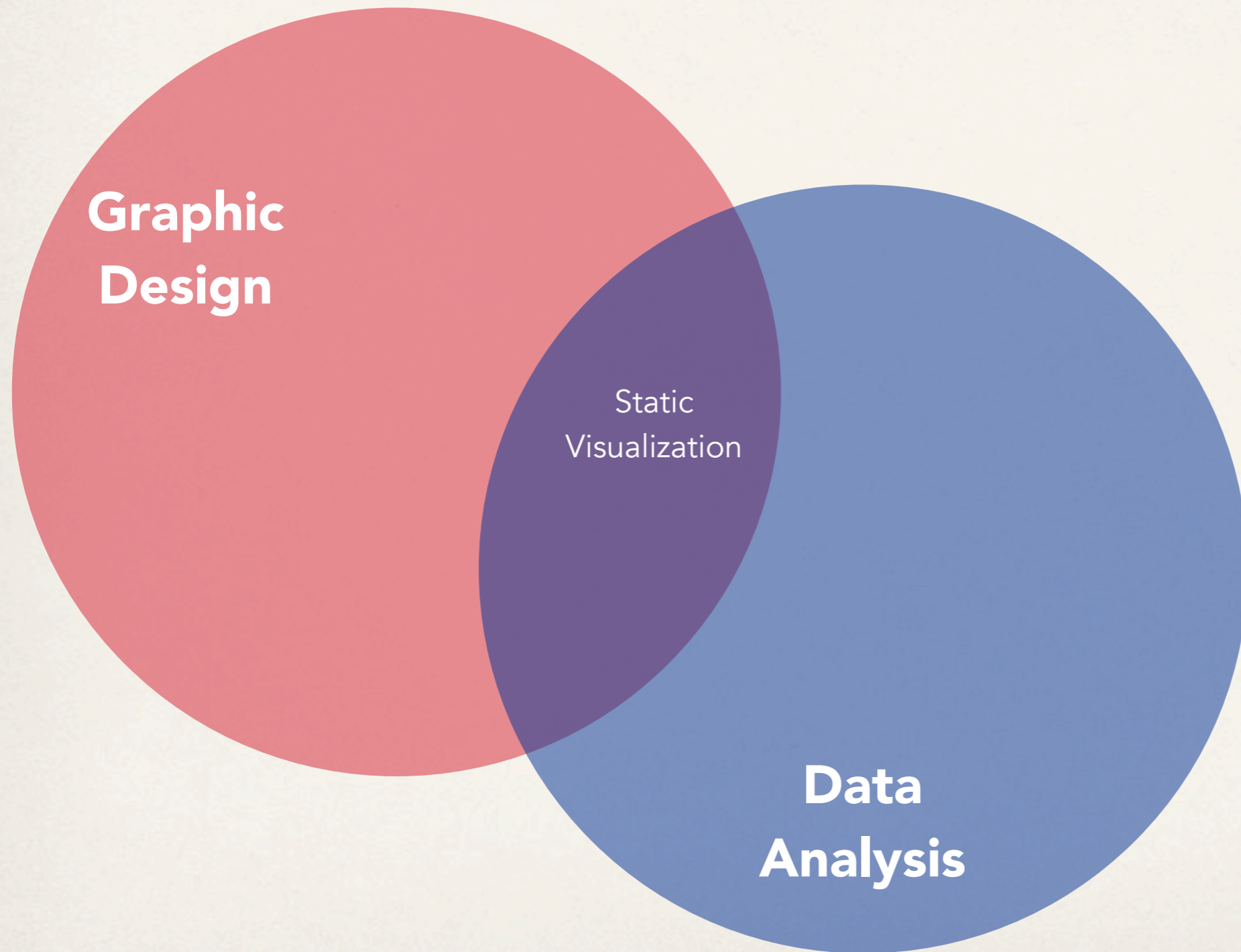
2014-03-13

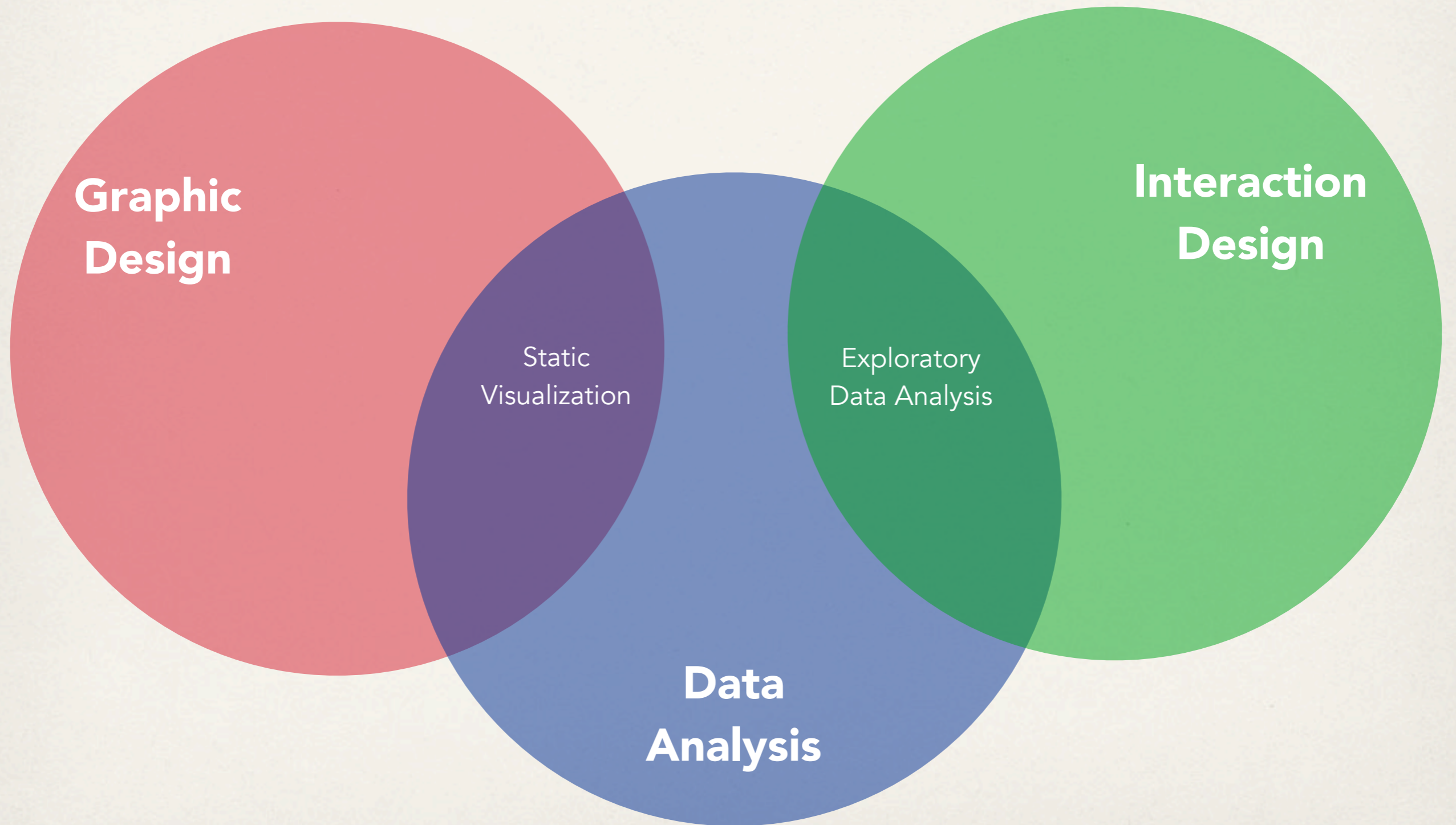


**Graphic  
Design**



**Data  
Analysis**





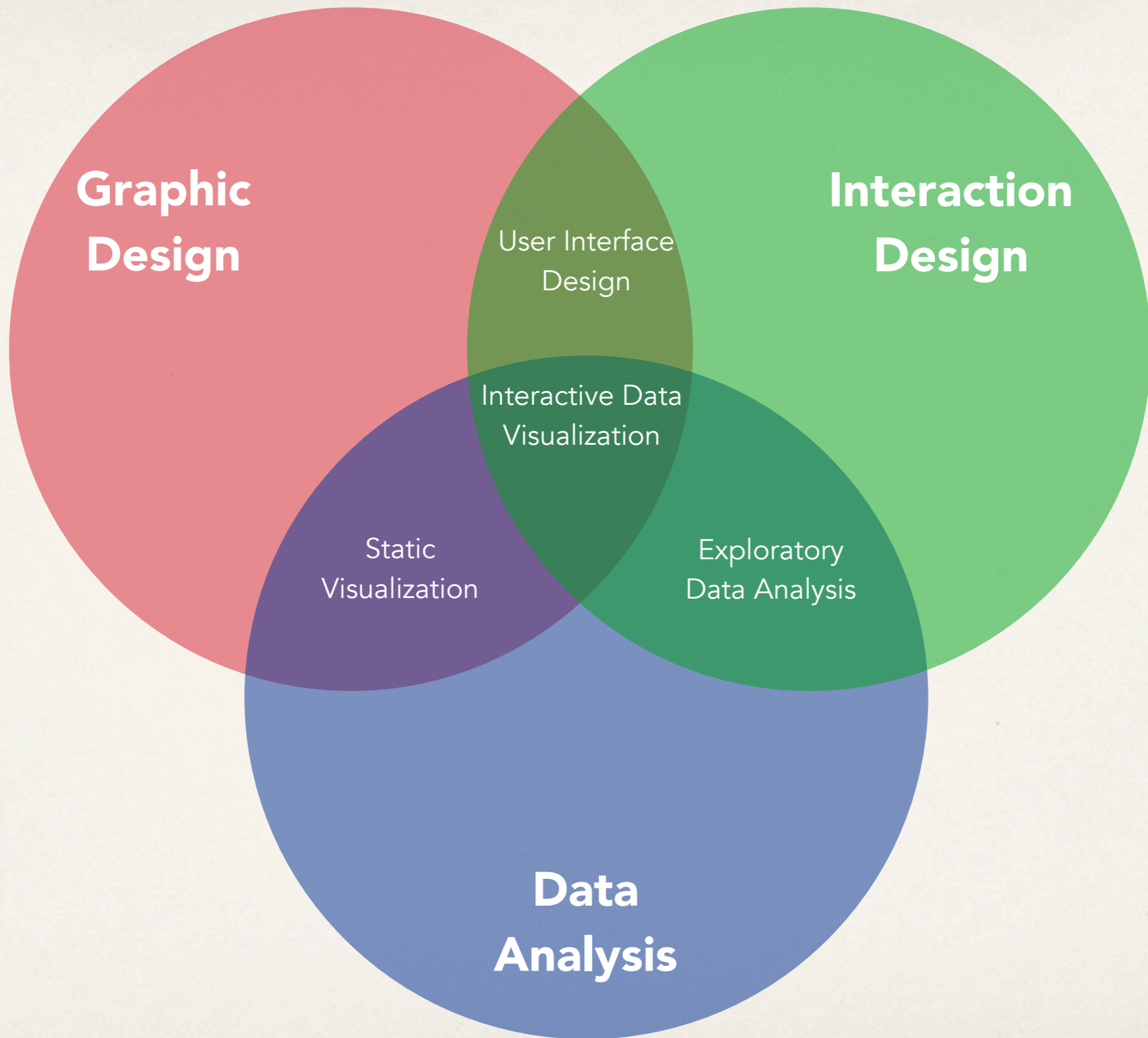
**Graphic  
Design**

Static  
Visualization

Exploratory  
Data Analysis

**Interaction  
Design**

**Data  
Analysis**



# Why interaction?

When is (static) representation not enough?

## Scale

- Too many data points
- Too many dimensions

## Exploration

## Learning

## Storytelling

# Textbook's taxonomy

## Operators

navigation, selection, filtering, reconfiguring, encoding, connecting, abstracting/elaborating, distorting

## Space of interaction

screen space, data value space, data structure space, attribute space, object space, visualization structure space

## Parameters of the interaction operators

focus, extents, transformation, blender

# Stephen Few's Principles

comparing

sorting

filtering

highlighting

aggregating

zooming and panning

details

annotating

re-encoding

selecting



# Yi et al.'s Interactive Vis Techniques

## Select

mark something as interesting

## Explore

show me something different

## Reconfigure

show me a different arrangements

## Encode

change the visual representations

## Abstract/Elaborate

show me more or less detail

## Filter

conditionally show me something

## Connect

show me related items

# Select

mark something as interesting

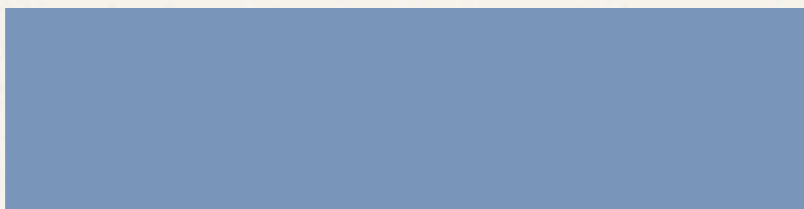
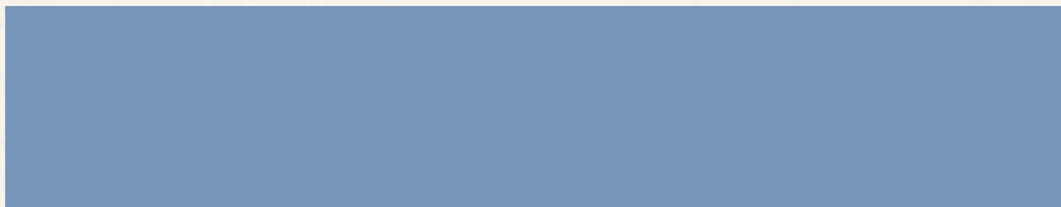
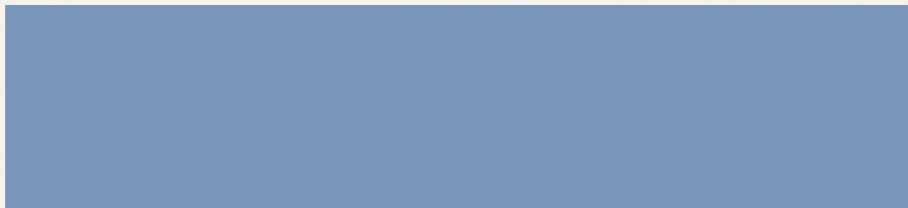
This takes the reference to all `circles` and sets the `cx` attribute for each one. (Remember that, in SVG lingo, `cx` is the x position value of the *center* of the circle.) Our data has already been bound to the `circle` elements, so for each `circle`, the value `d` matches the corresponding value in our original dataset (5, 10, 15, 20, or 25).

Another value, `i`, is also automatically populated for us. (Thanks, D3!) Just as with `d`, the name `i` here is arbitrary and could be set to whatever you like, such as `counter` or `elementID`. I prefer to use `i` because it is concise, it alludes to the convention of using `i` in for loops, and it is very common, as you'll see it in all the online examples.

So, `i` is a numeric index value of the current element. Counting starts at zero, so for our "first" circle `i == 0`, the second circle's `i == 1`, and so on. We're using `i` to push each subsequent circle over to the right, because each subsequent loop through, the value of `i` increases by one:

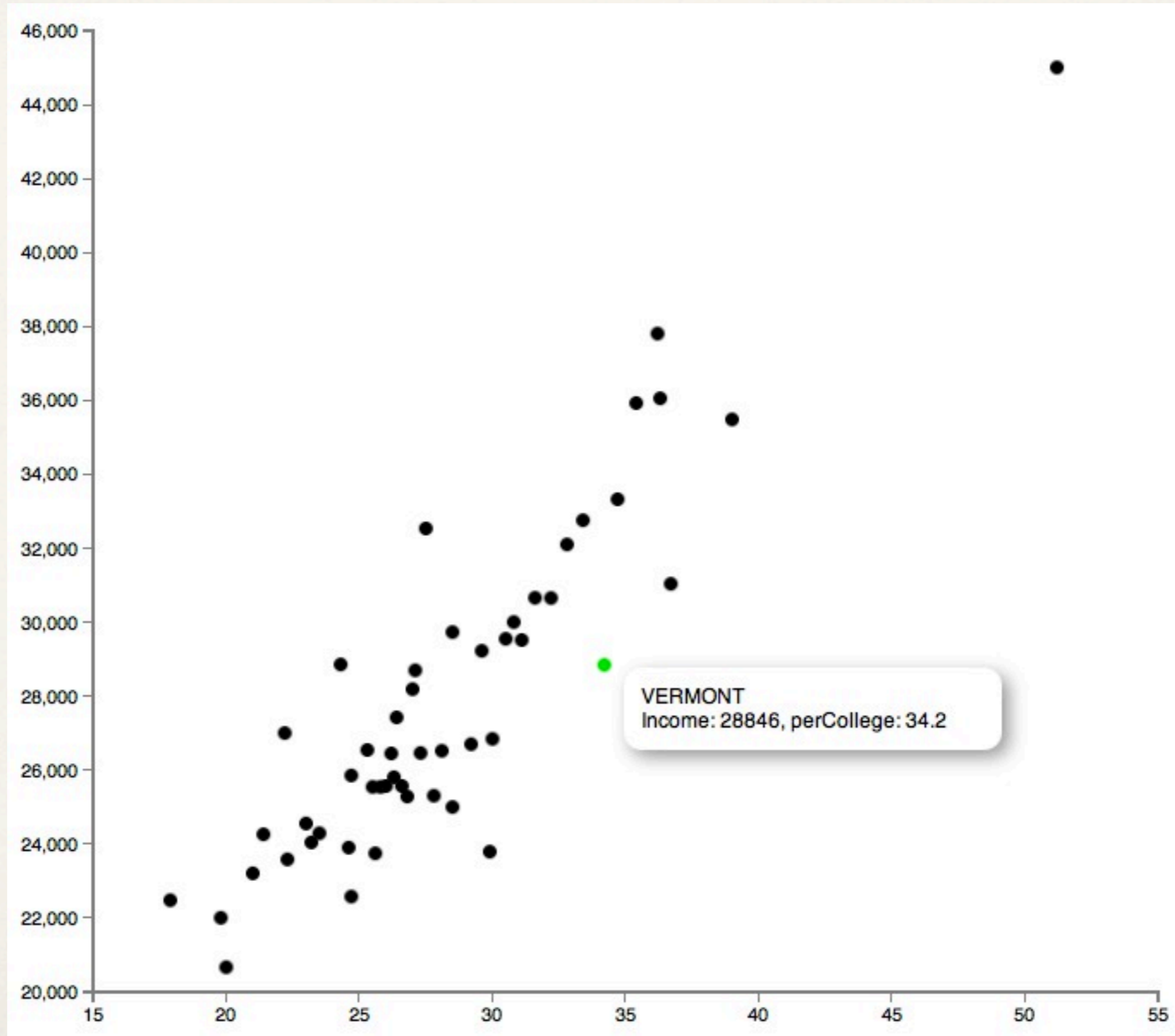
# Select

mark something as interesting



# Select

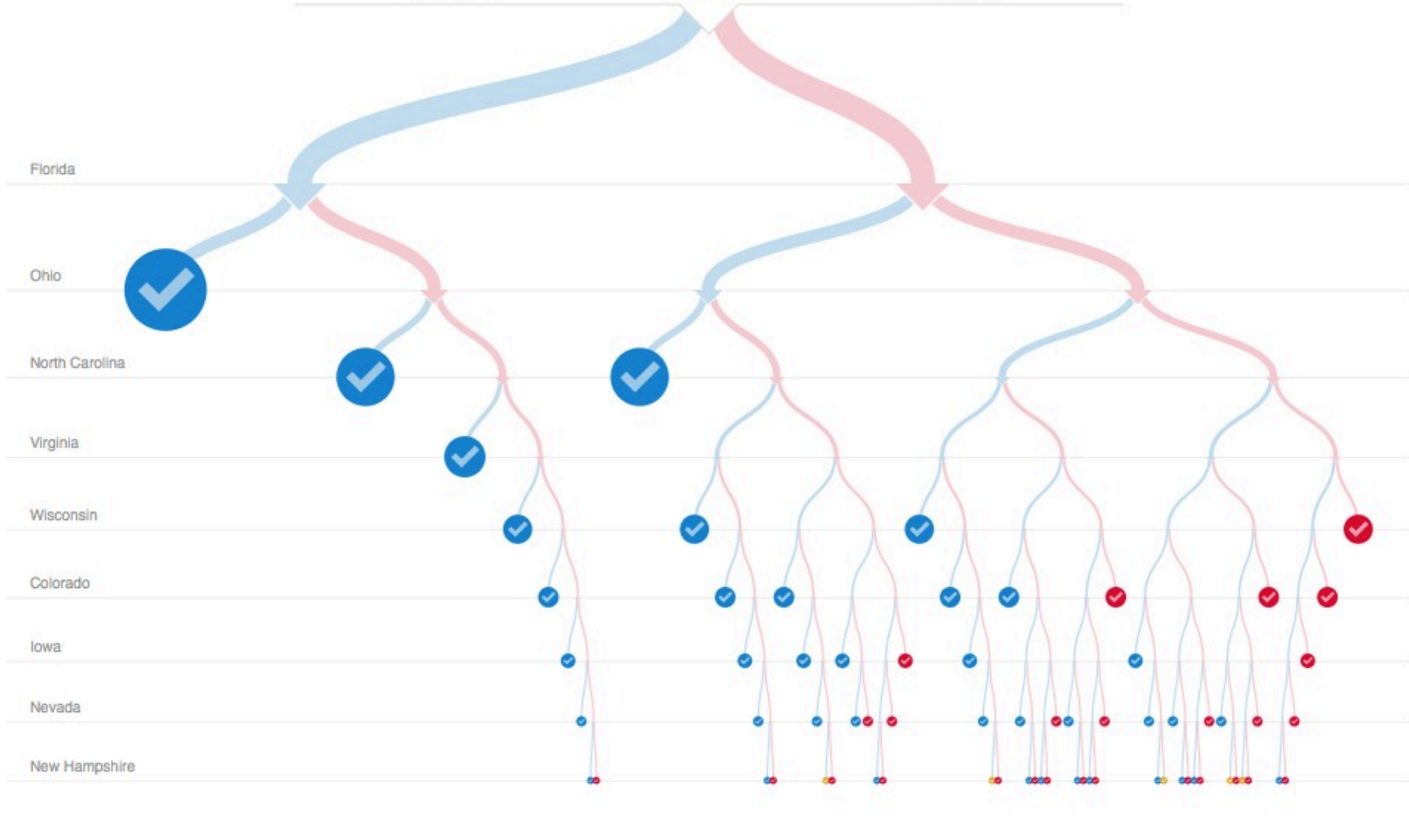
mark something as interesting



Obama has **431** ways to win  
84% of paths

**5** ties  
0.98% of paths

Romney has **76** ways to win  
15% of paths



# Explore

show me something different

CS 465 - Information Visualization

Spring 2014

[Syllabus](#)  
[Plazza](#) (class forum)

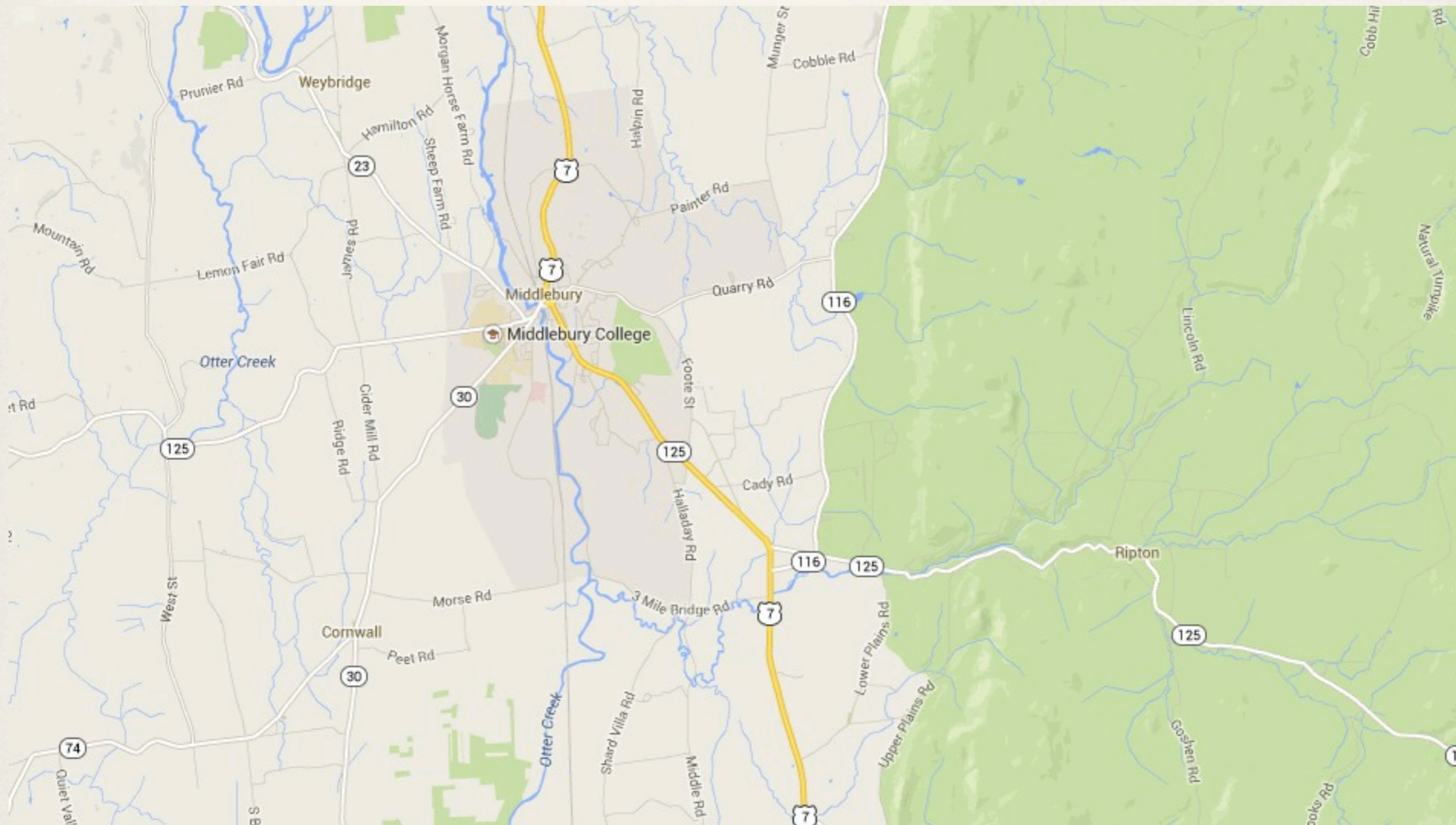
### Schedule

*This is a living schedule and subject to change*

Date	Topic	Reading	Notes	Assignment
02/11	Introduction to information visualization	WGK Ch 1	<a href="#">Introduction</a>	
02/13	Introduction to R		<a href="#">R command history</a>	<a href="#">HW1 due 2014-02-20</a>
02/18	Data	WGK Ch 2	<a href="#">Data, R command history</a>	
02/20	Perception	WGK 3.1-3.3	<a href="#">Perception 1</a>	<a href="#">HW2 due 2014-02-27</a>
02/25	Visual variables	WGK 3.3-3.5 + 4.1-4.3	<a href="#">Visual variables I</a>	
02/27	Visual variables II	WGK 3.3-3.5 + 4.1-4.3	<a href="#">Visual variables II</a>	
03/04	Effective visualization	WGK 12	<a href="#">Good vis, bad vis</a>	<a href="#">HW3 due 2014-03-11</a>
03/06	Intro to D3	M 2-3, 5-8	<a href="#">D3 template, First bar chart</a>	
03/11	D3 II	M 7-8	<a href="#">Second bar chart, scatterplot, line chart</a>	<a href="#">HW4 due 2014-03-18</a>
03/13	Interaction	WGK 10-11		
03/18	D3 Interaction	M 9-10		
03/20	Multivariate data			
03/25	Spring break			
03/27	Spring break			
04/01	Hierarchical data			
04/03				
04/08	Text			
04/10				
04/15	Maps			
04/17				
04/22	Networks and graphs			

# Explore

show me something different



# Explore

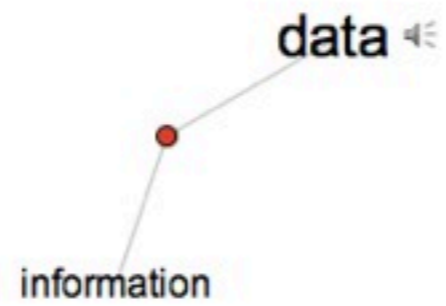
show me something different





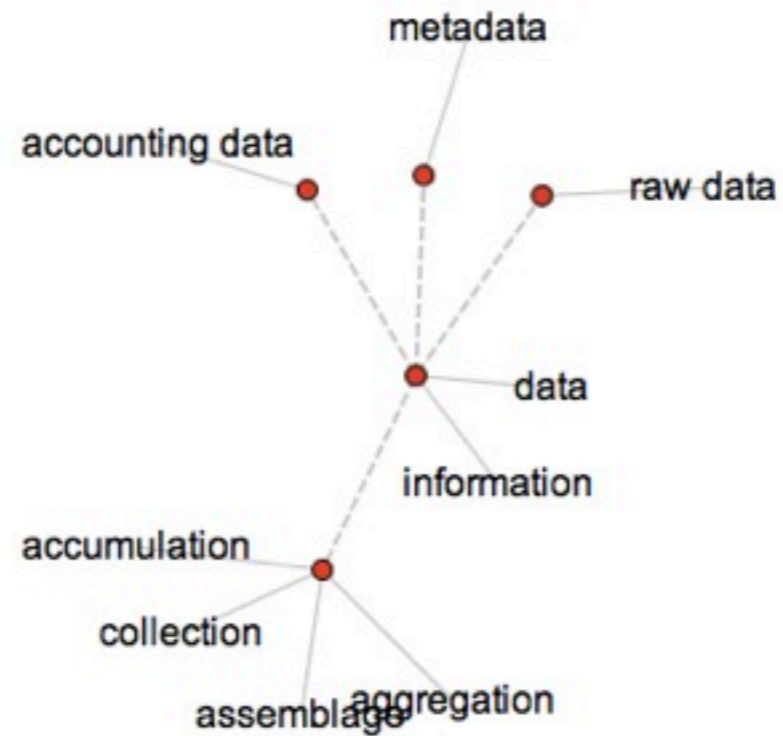
# Explore

show me something different



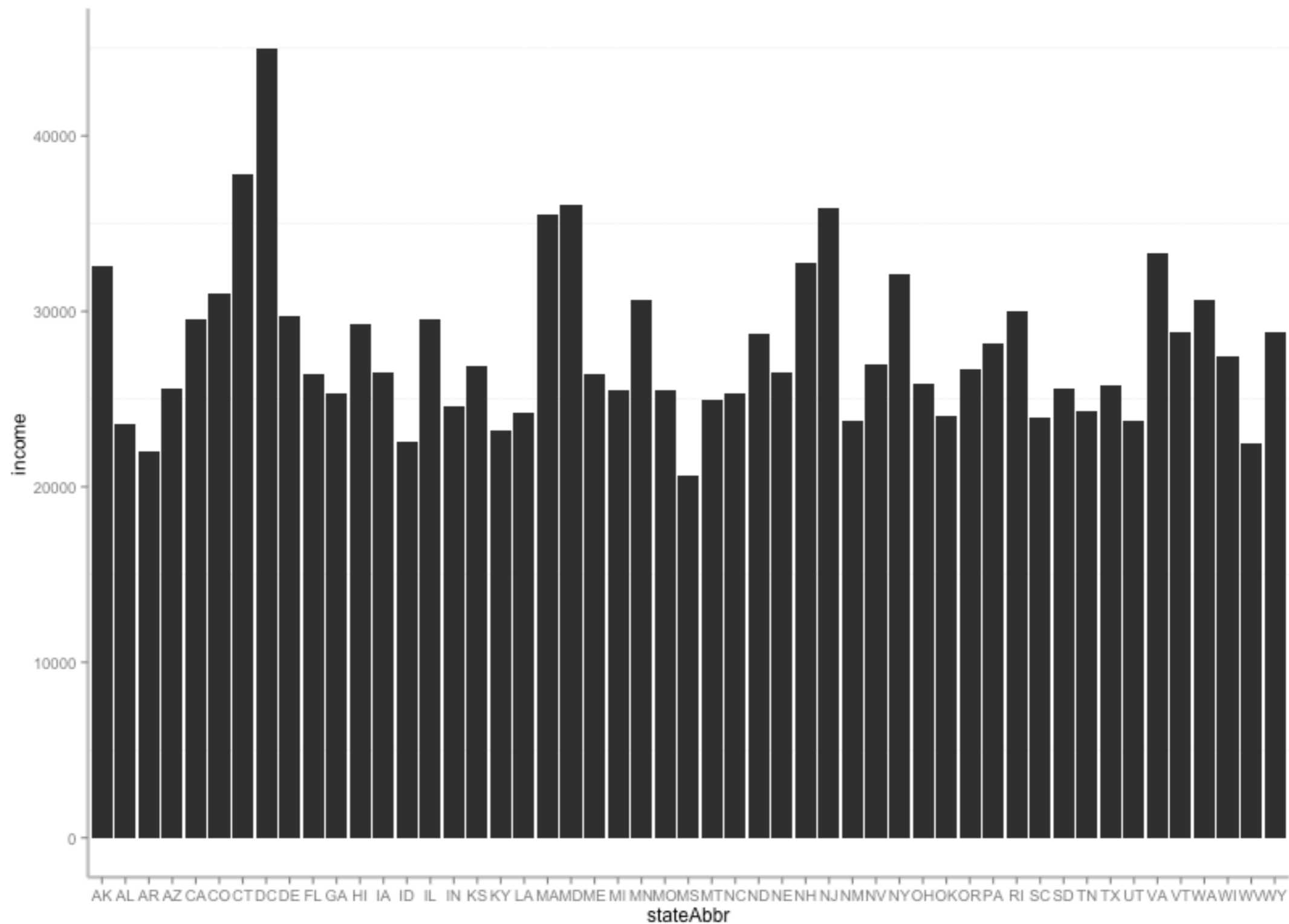
# Explore

show me something different



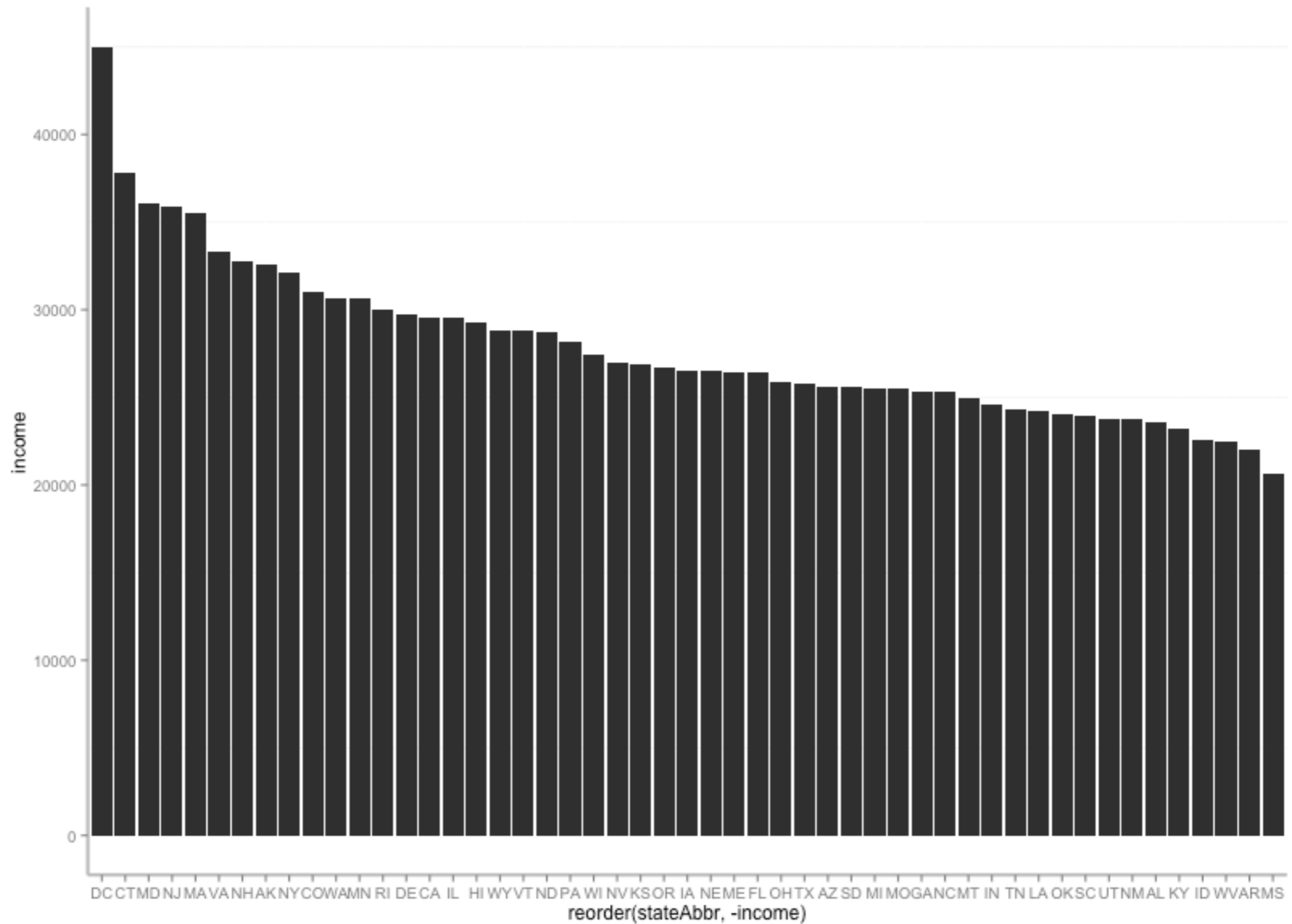
# Reconfigure

show me different arrangements



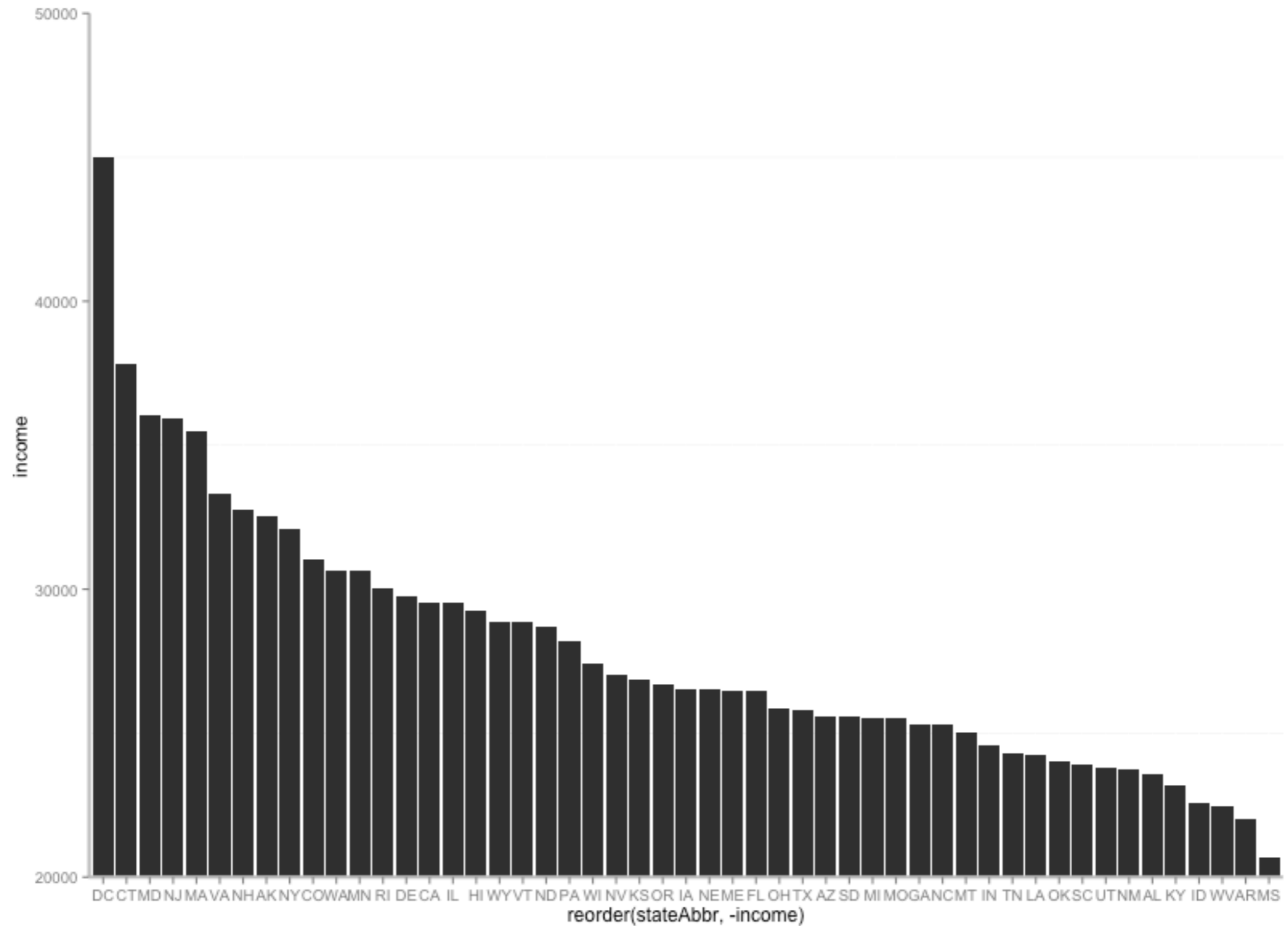
# Reconfigure

show me different arrangements



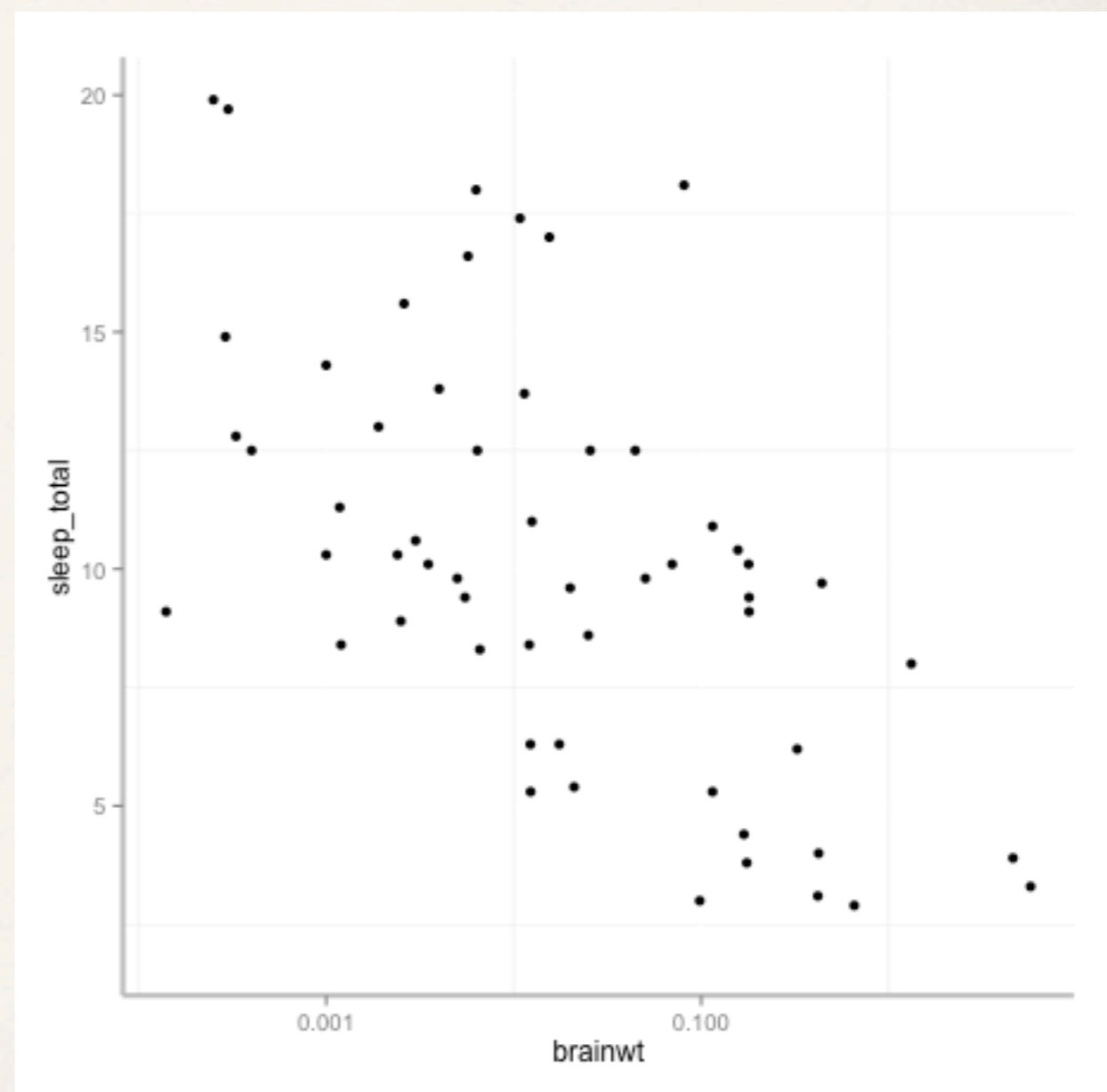
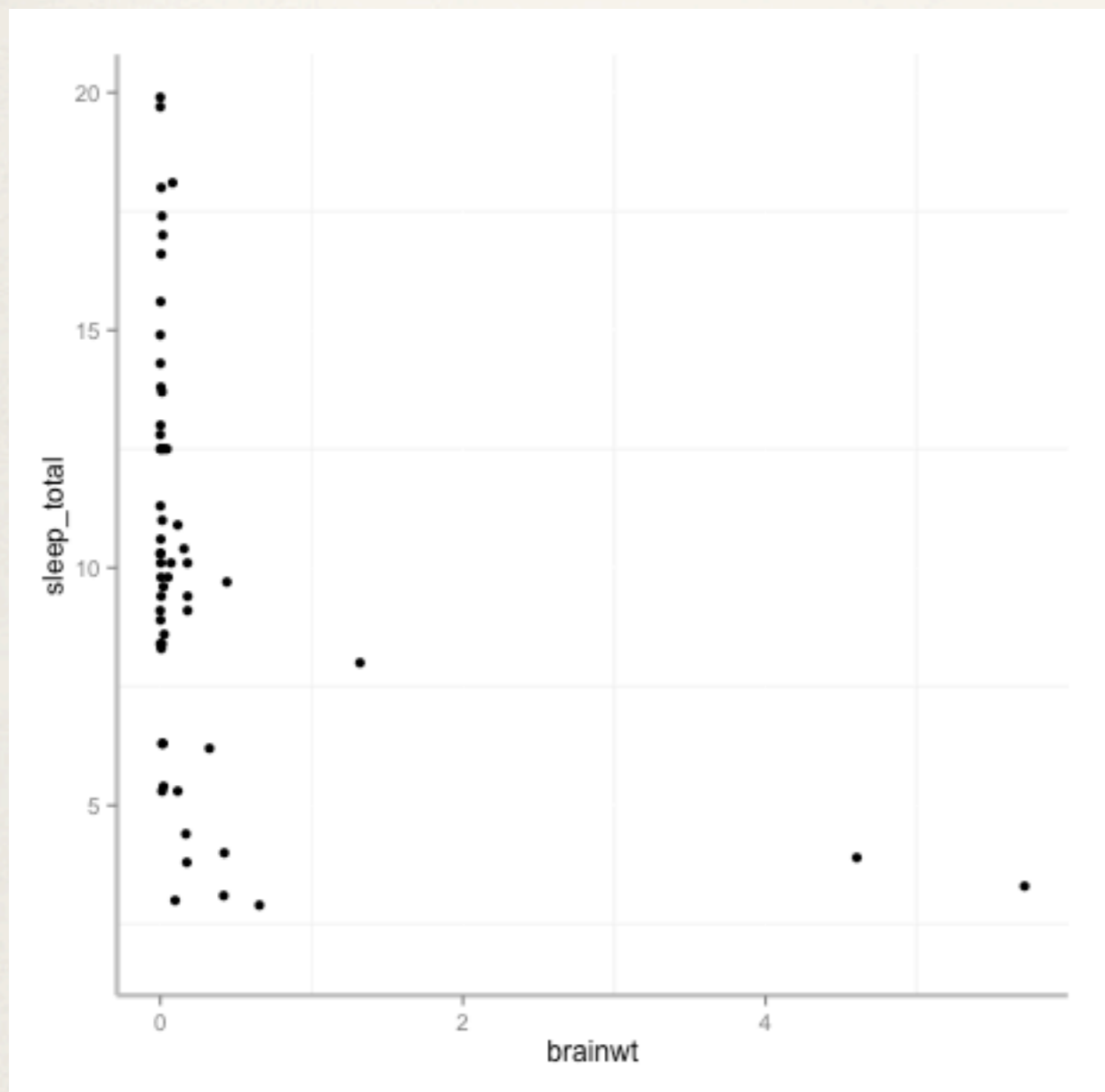
# Reconfigure

show me different arrangements



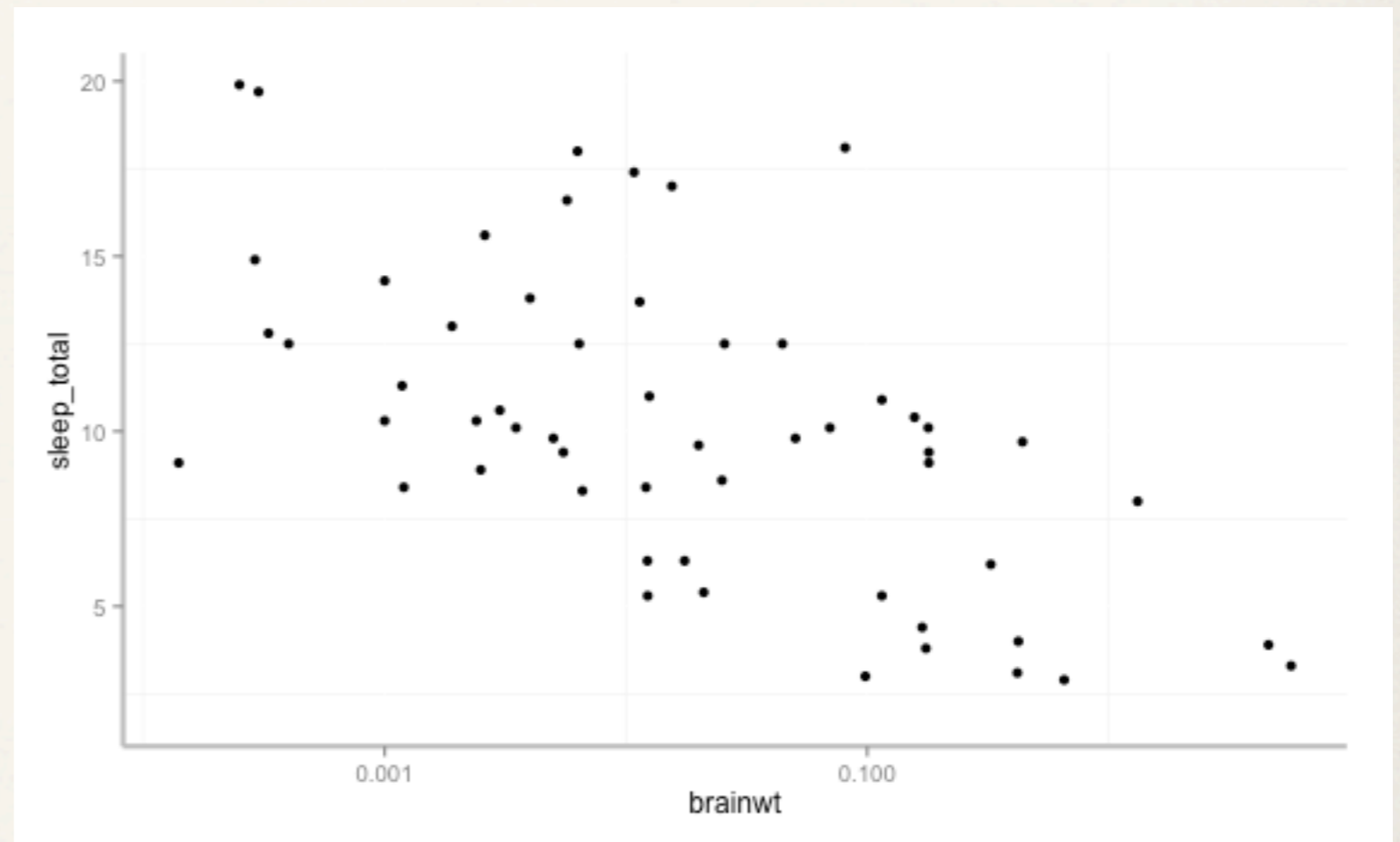
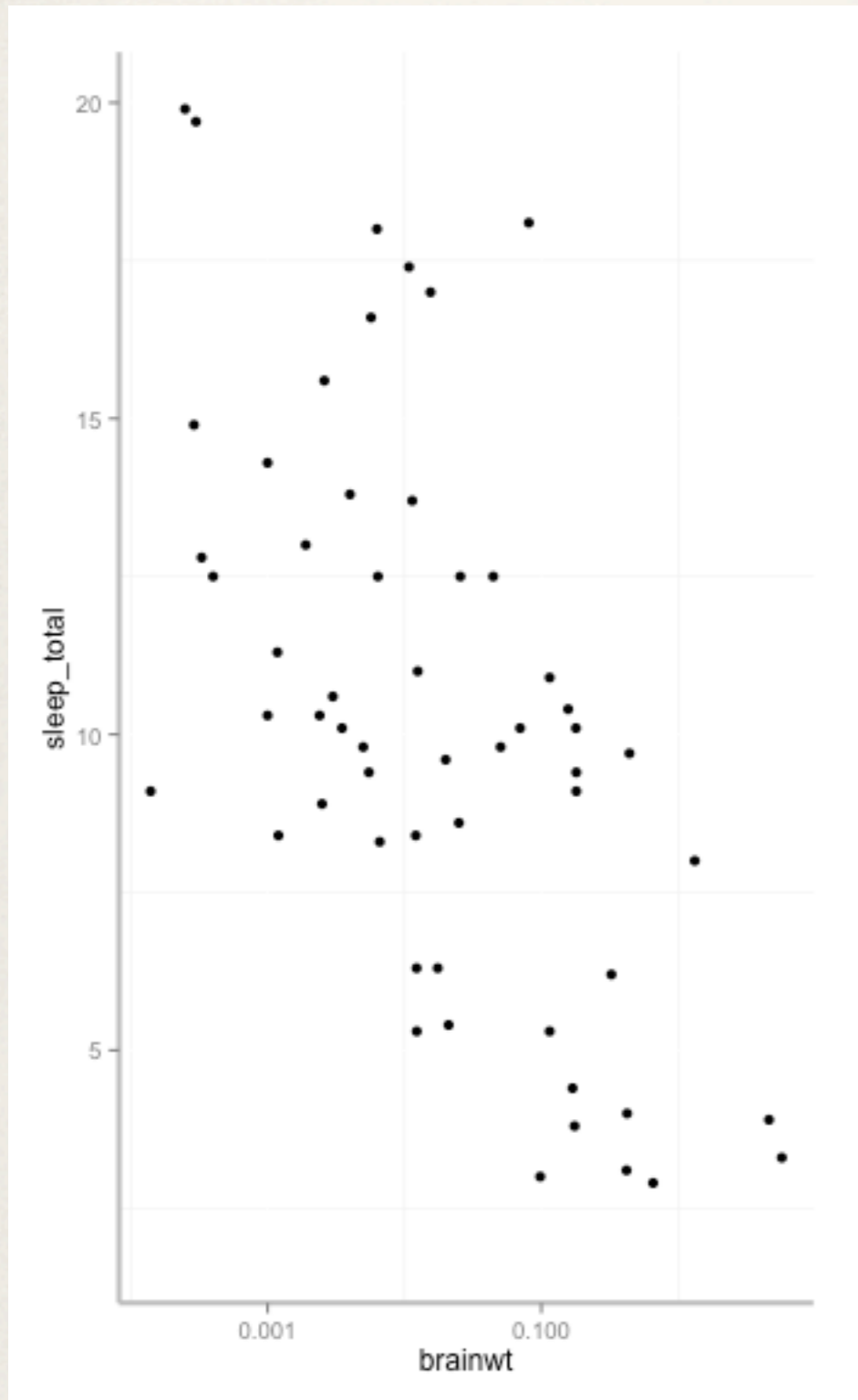
# Reconfigure

show me different arrangements



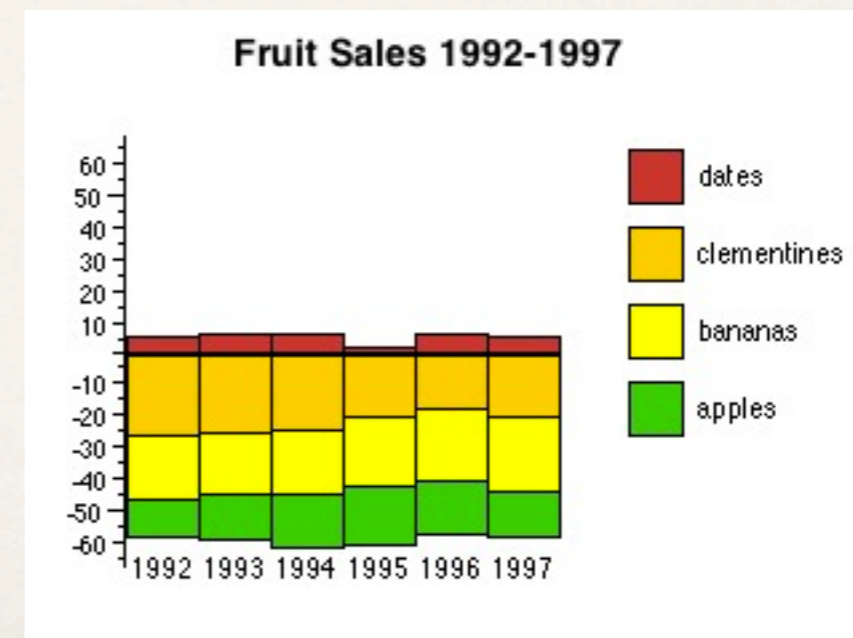
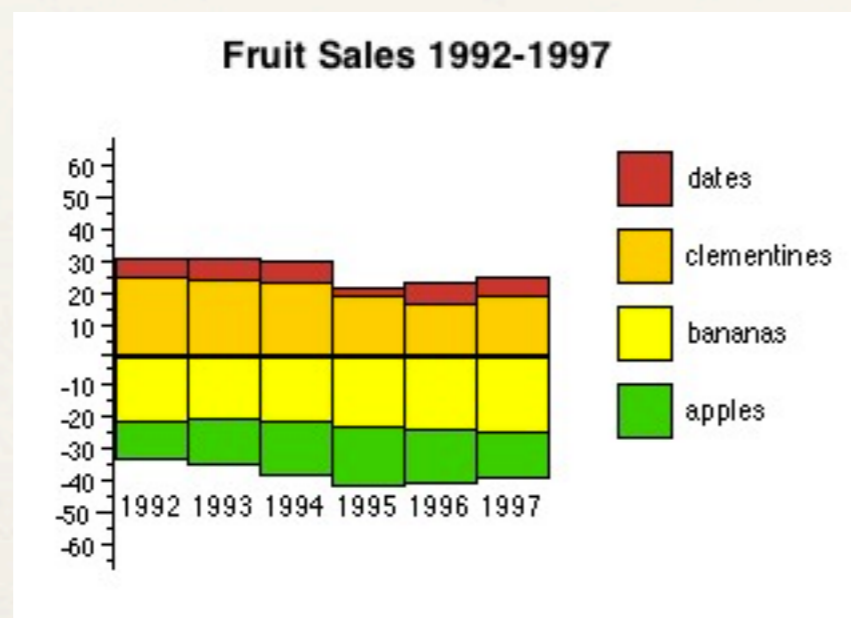
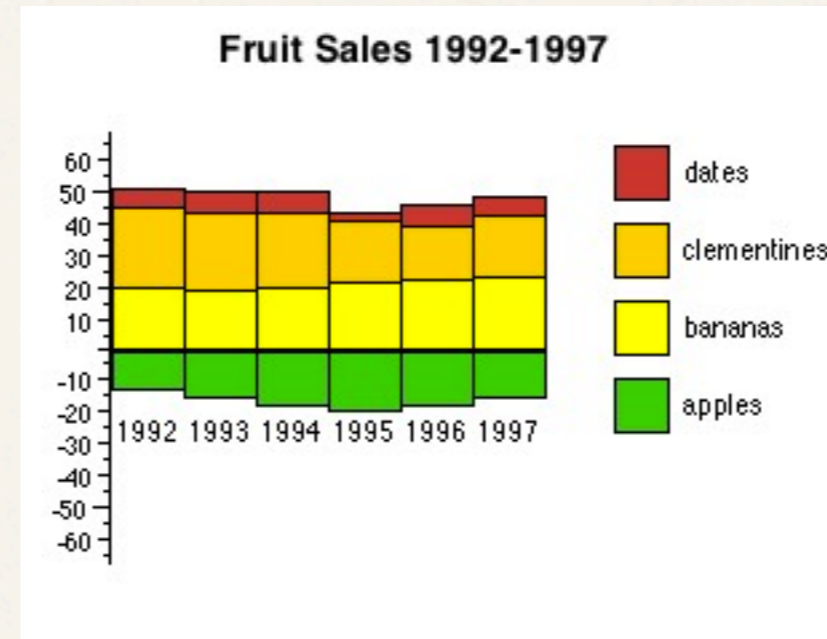
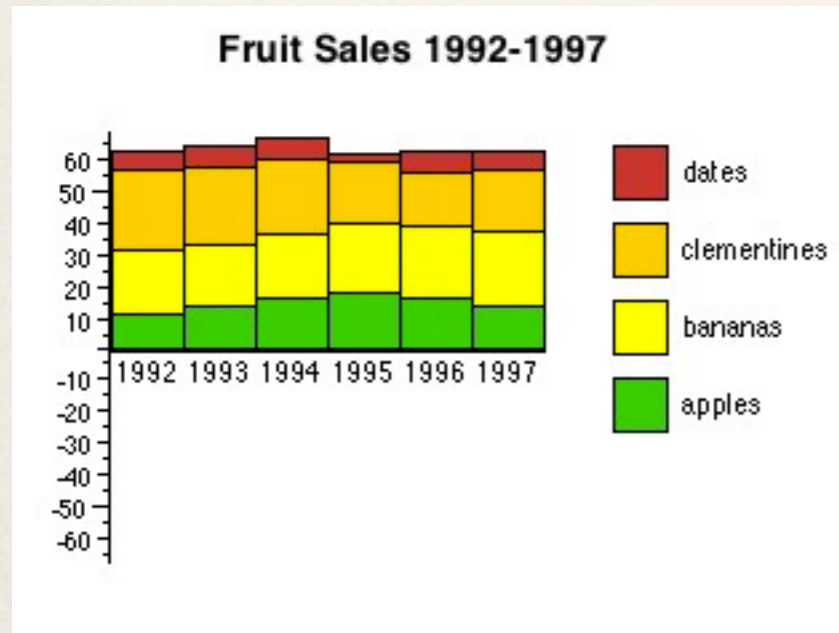
# Reconfigure

show me different arrangements



# Reconfigure

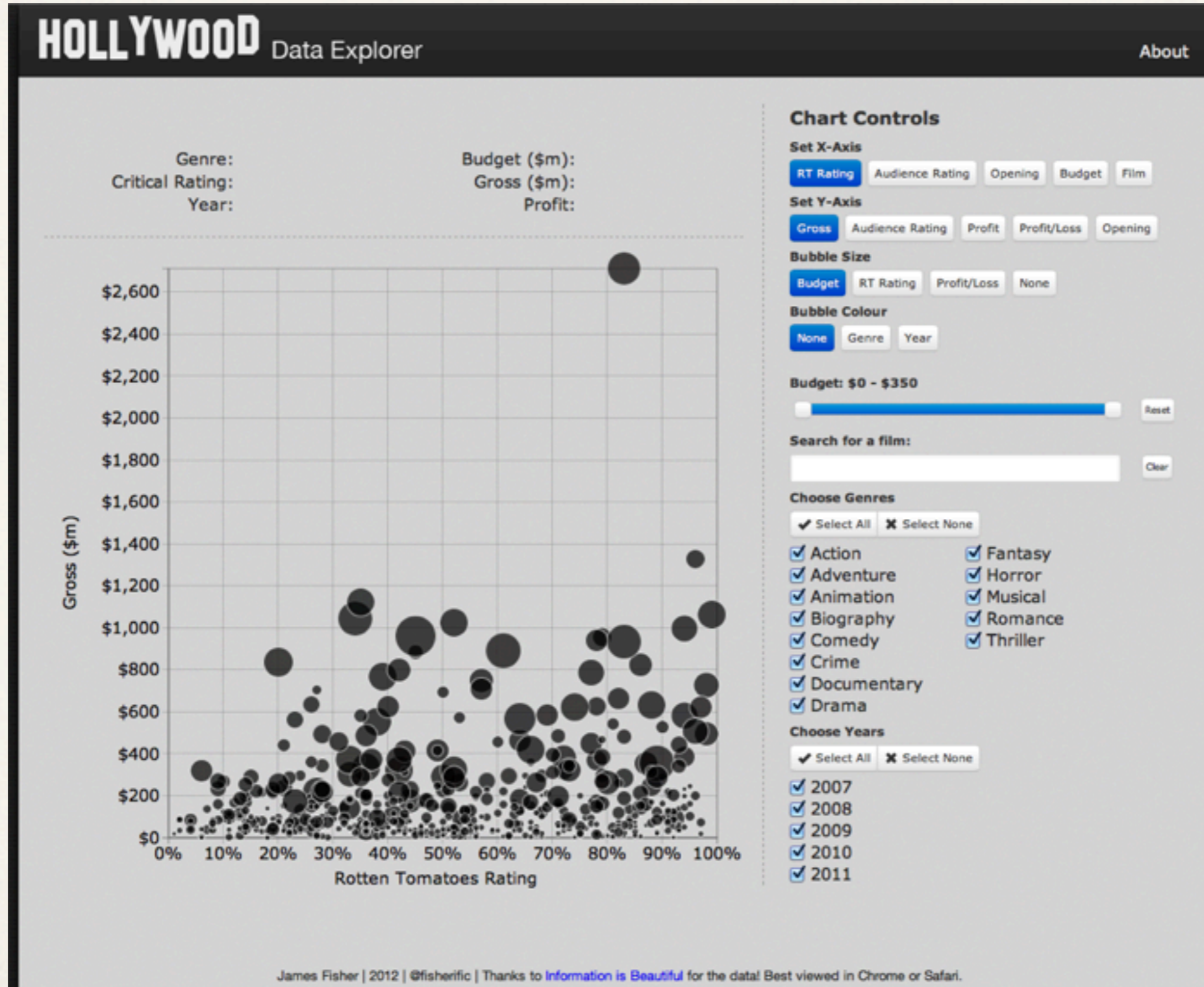
show me different arrangements





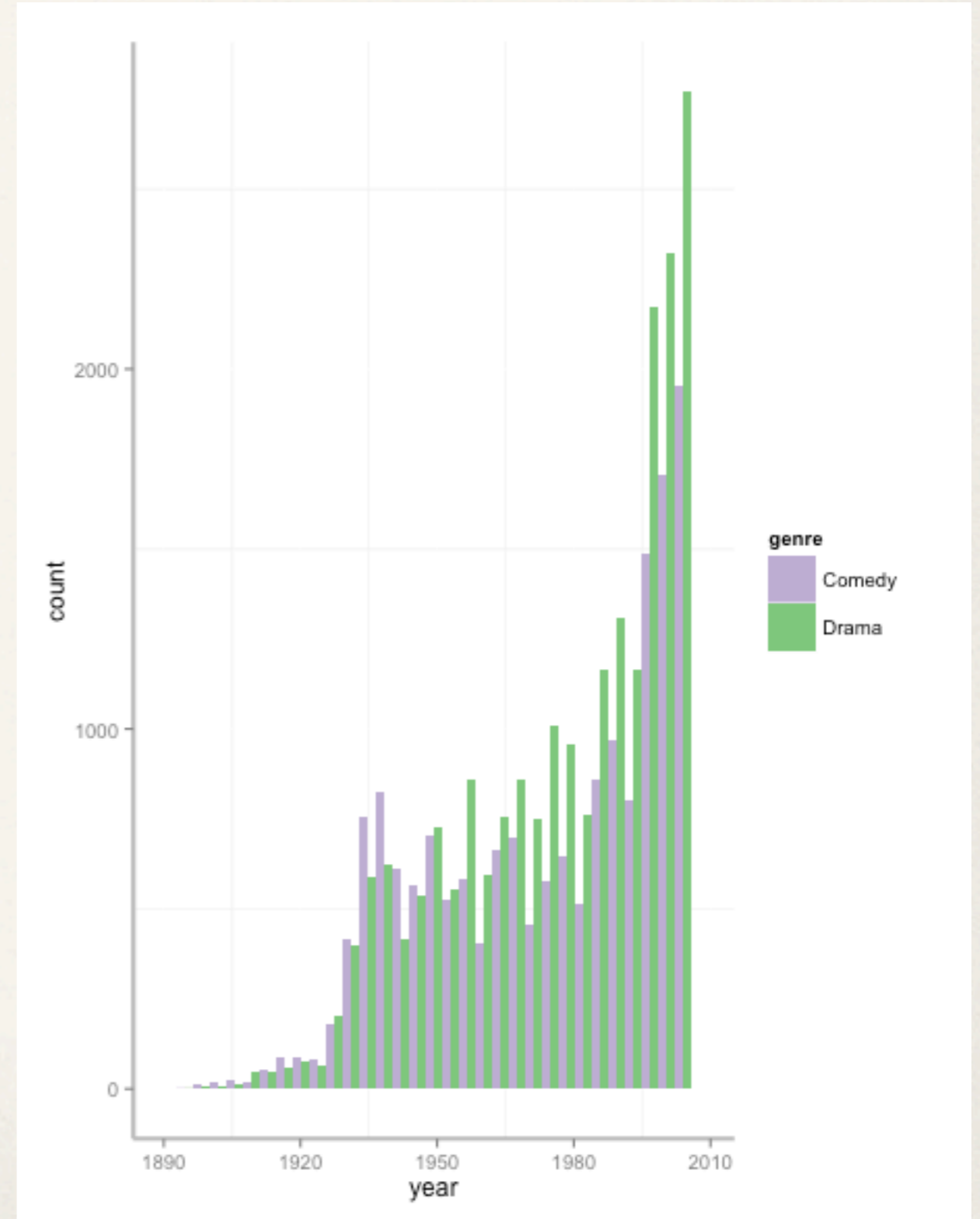
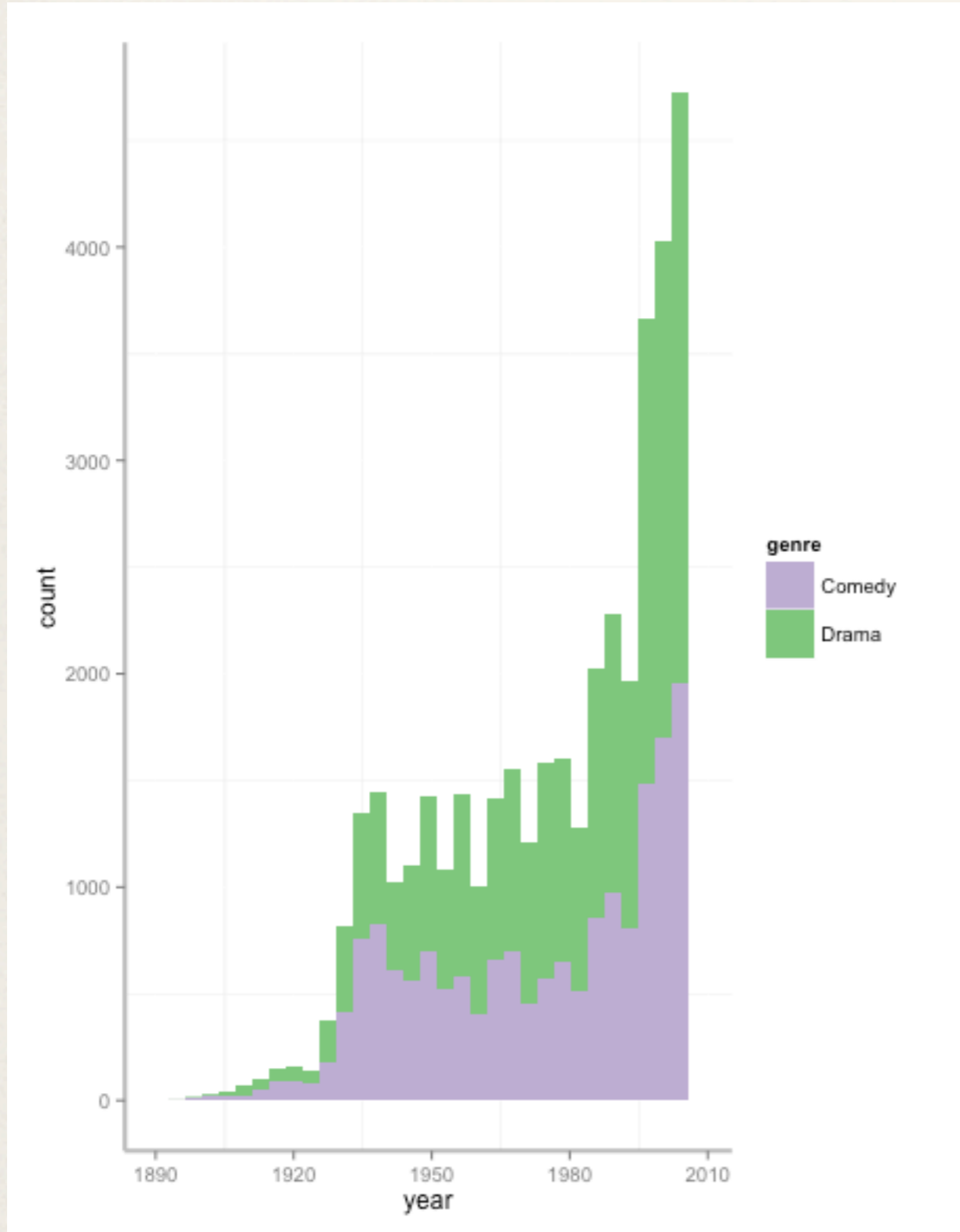
# Reconfigure

show me different arrangements



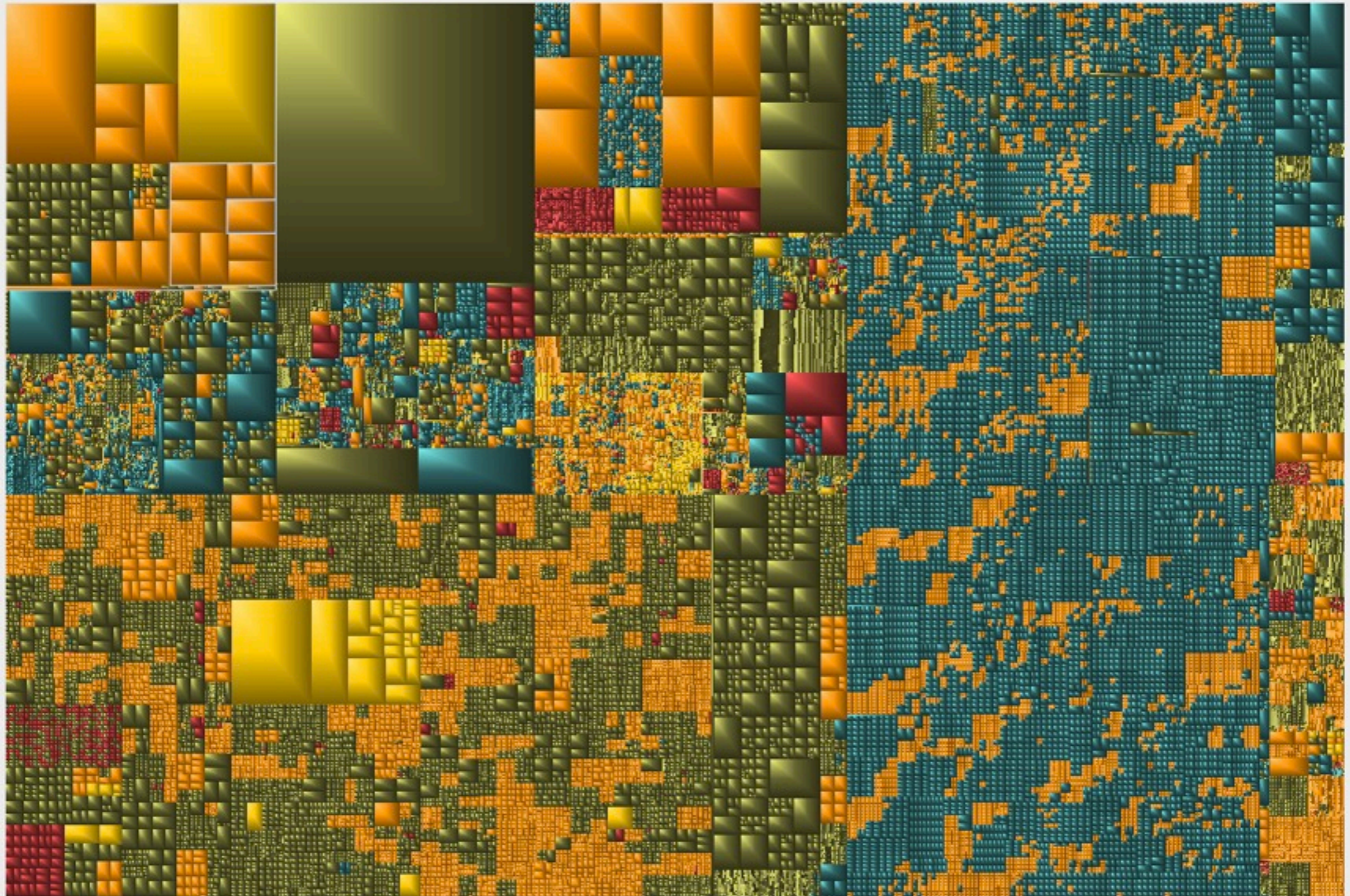
# Encode

change the visual representations



# Abstract/Elaborate

show me more or less detail

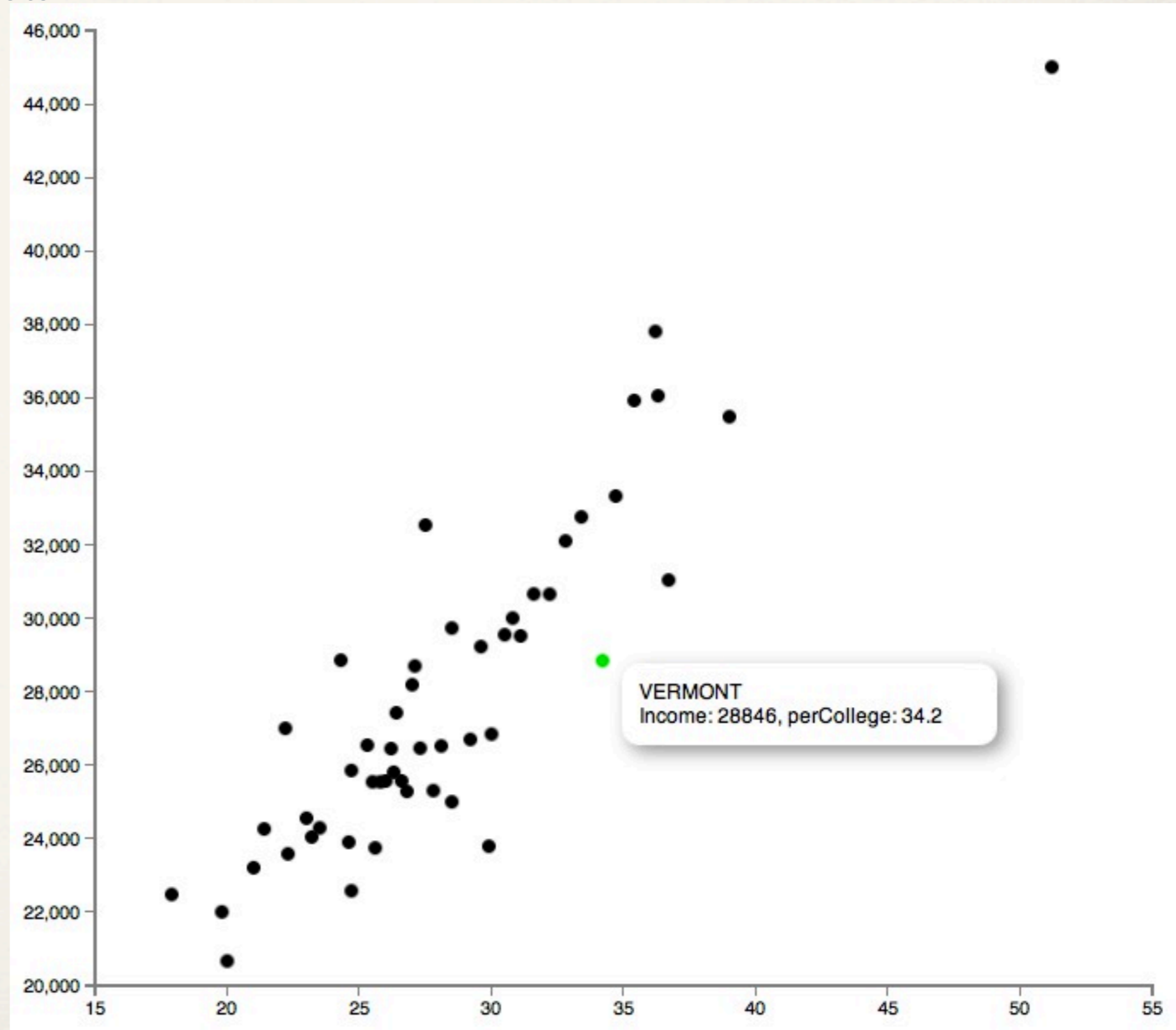


Grand Perspective

# Abstract/Elaborate

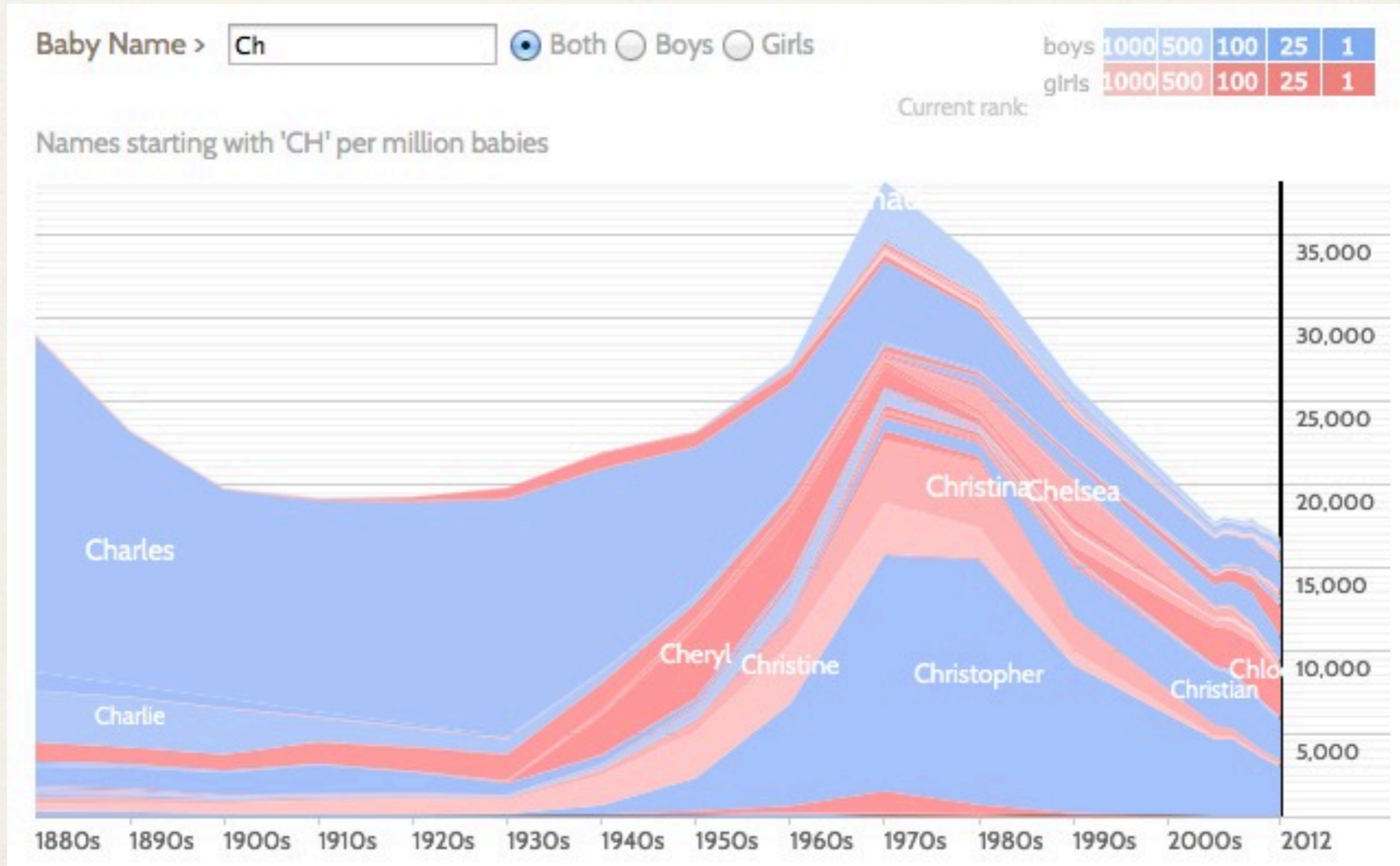
show me more or less detail

“details on demand”



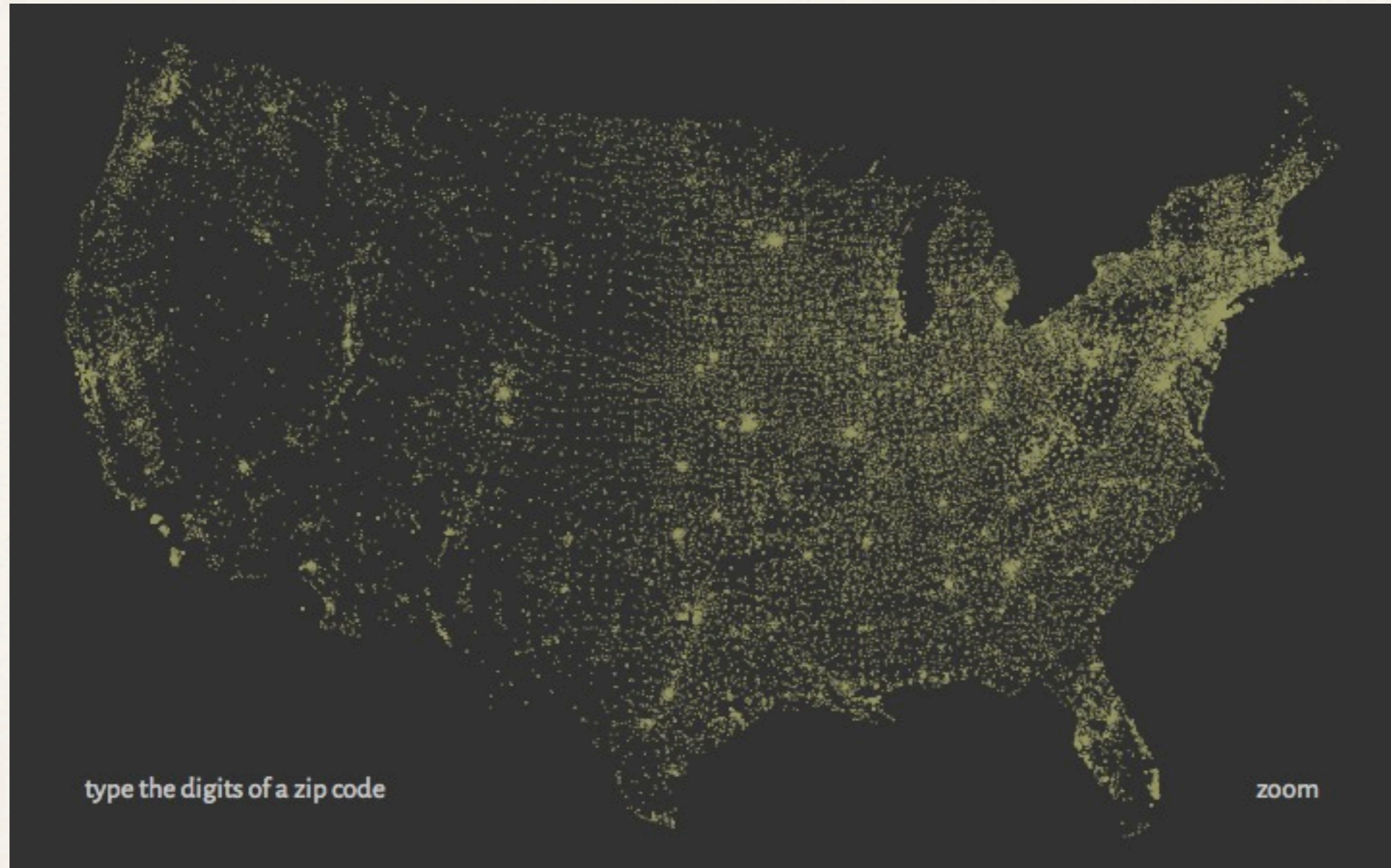
# Filter

conditionally show me something



# Filter

conditionally show me something

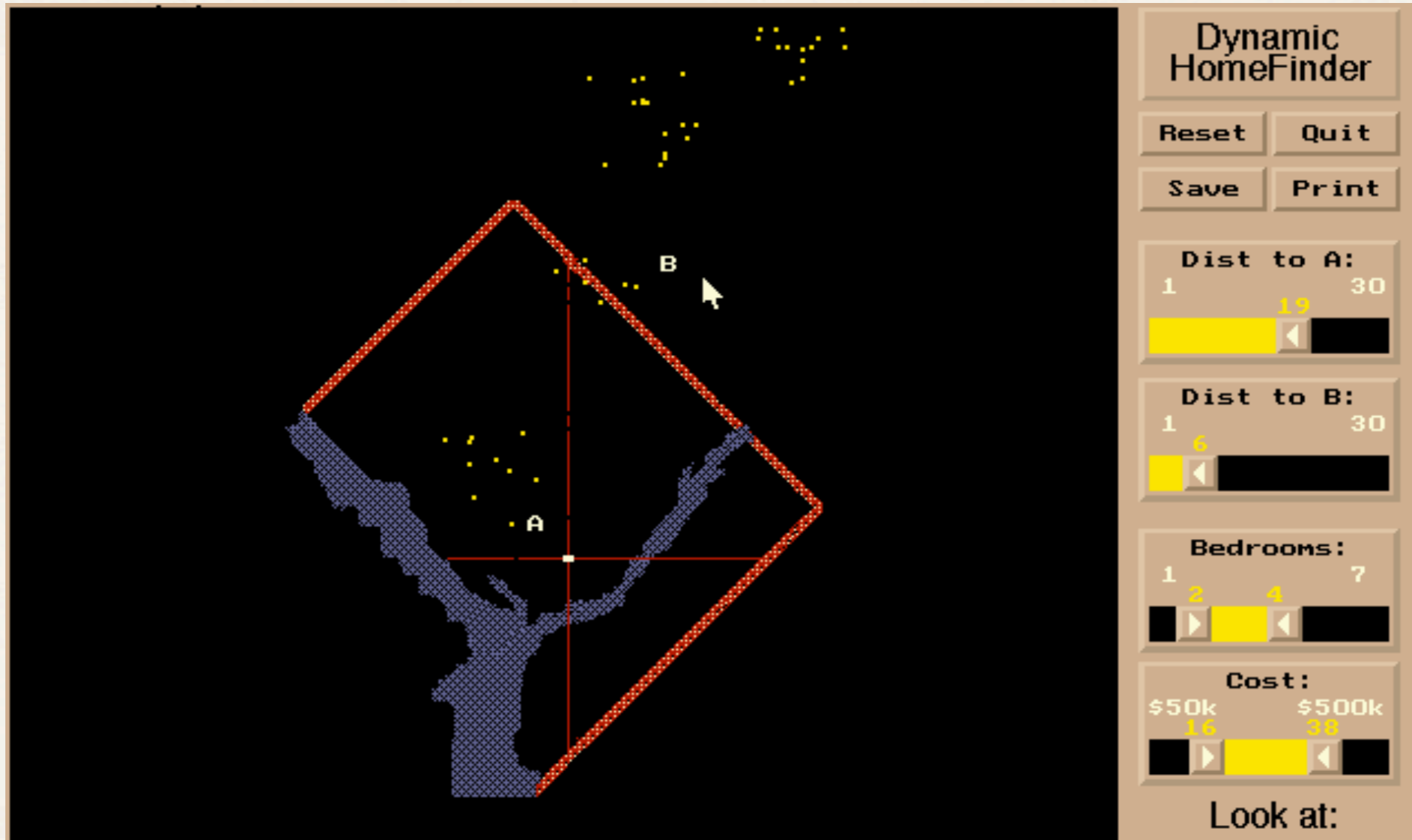


# Query language

```
SELECT address FROM realestateDB WHERE sqFoot >= 1500  
AND bedrooms >= 3 AND garage == TRUE AND price <=  
$300000
```

```
movies90 <- subset(movies, year>=1990 & year <2000)
```

# Dynamic queries



The yellow dots above are homes in the DC area for sale. You may get more information on a home by selecting it.

You may drag the 'A' and 'B' distance markers to your office or any other location you want to live near.

Select distances, bedrooms, and cost ranges by dragging the corresponding slider boxes on the right.

Select specific home types and services by pressing the labeled buttons on the right.

**Dynamic HomeFinder**

Reset Quit

Save Print

Dist to A:  
1 30  
19

Dist to B:  
1 30  
6

Bedrooms:  
1 7  
2 4

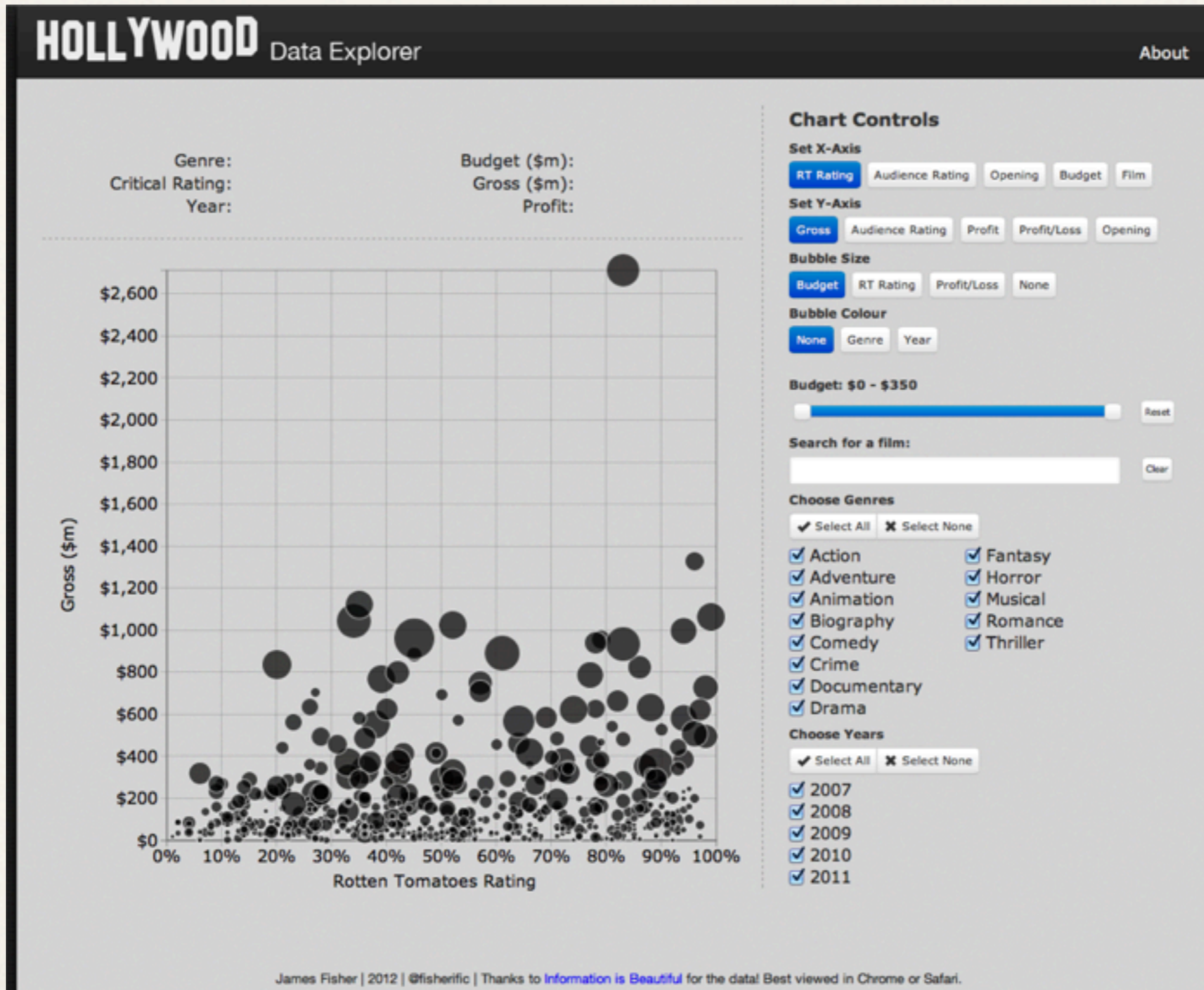
Cost:  
\$50k \$500k  
16 38

Look at:  
Hse TH Cnd

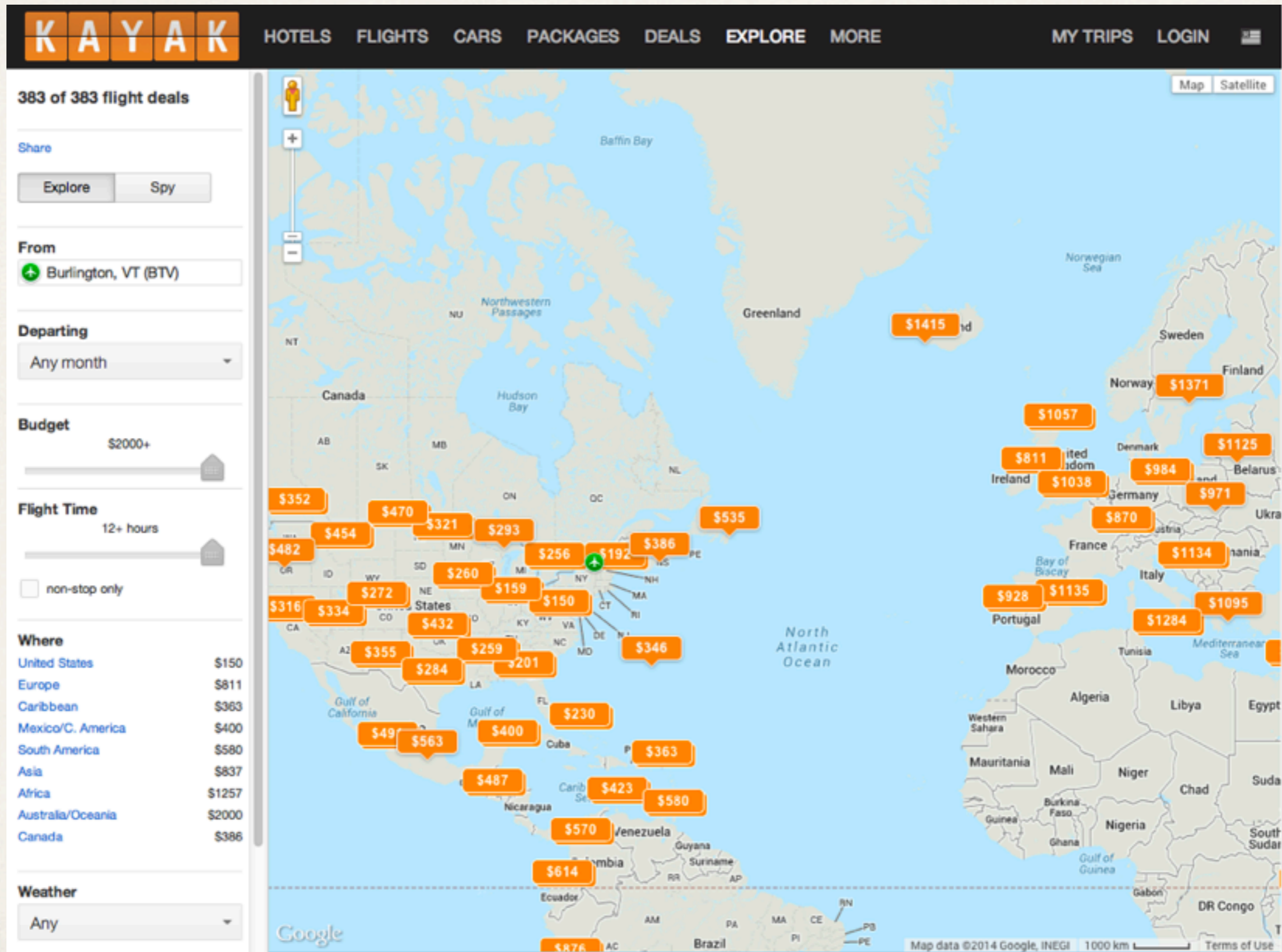
Features:  
Grg Fp1  
CAC New



# Dynamic queries

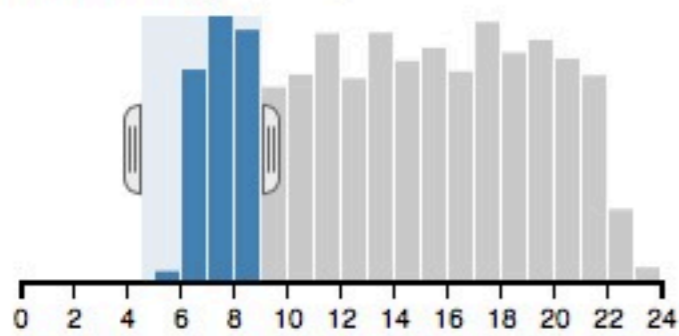


# Dynamic queries

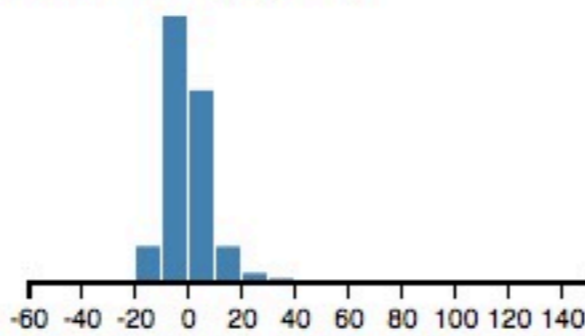


# Brushed histograms

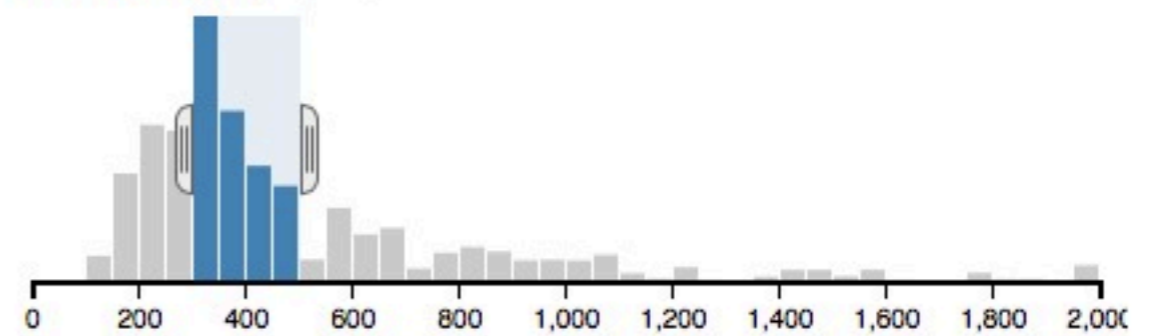
Time of Day [reset](#)



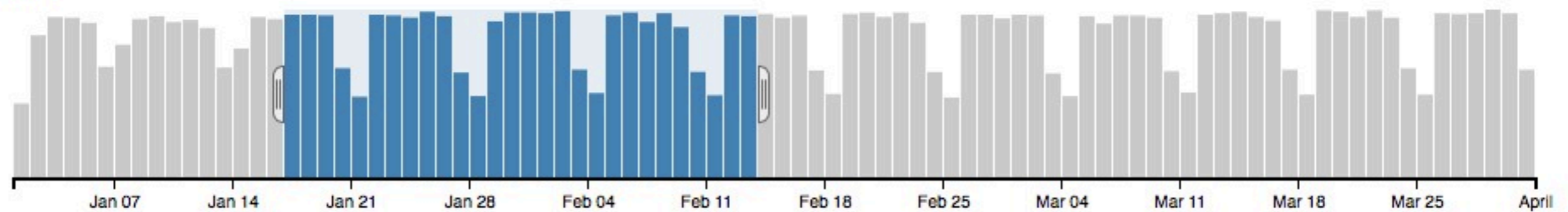
Arrival Delay (min.)



Distance (mi.) [reset](#)

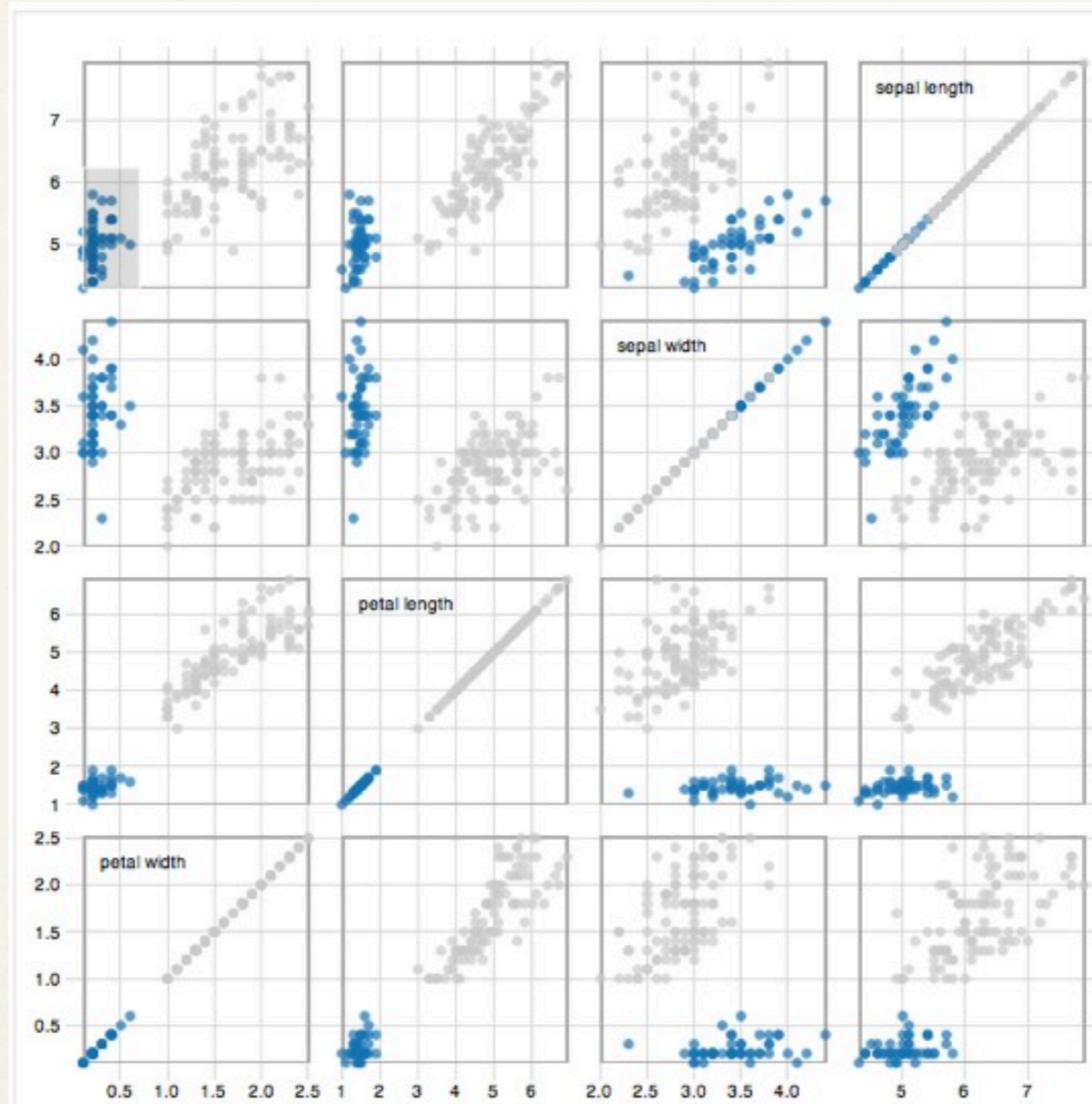


Date [reset](#)



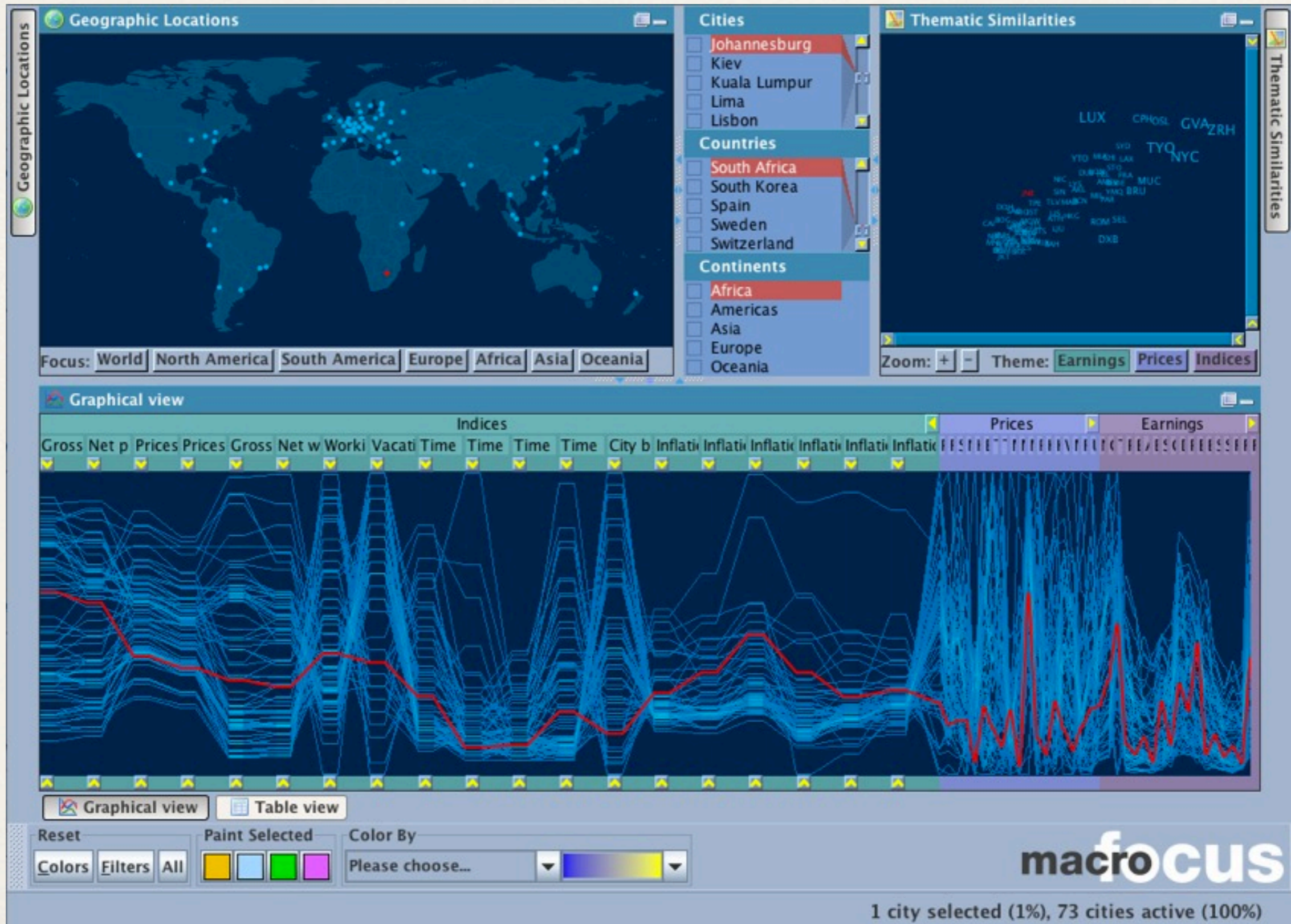
# Connect

show me related items



brush and link

# Connect

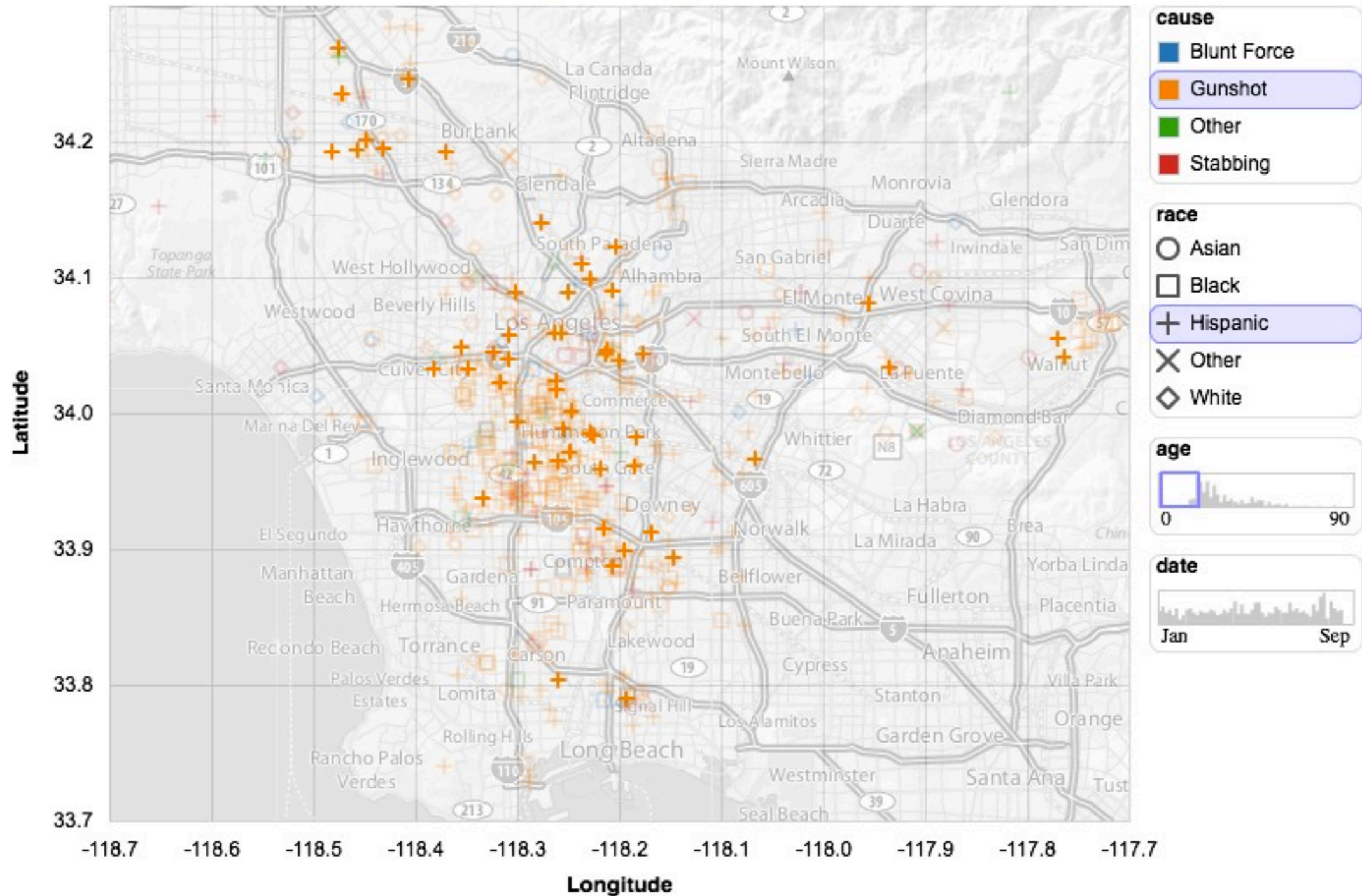


# Connect

show me related items

The image displays three web browser windows connected by a network of green lines, illustrating cross-application links. The top-left window is the NCBI Entrez Gene page for APOA1, showing general information, markers, and pathways. The top-right window is a Parallel Coordinates plot showing gene expression levels across various samples. The bottom window is an antibody product page for APOA1 (Human) antibody, showing product description and related information. Green lines connect specific elements across the windows, such as the APOA1 gene name, the antibody name, and the Parallel Coordinates plot.

### Homicide Victims in Los Angeles County, 2007 (Source: LA Times)



Geographic Death Counts Date vs. Age Time Series

`((1.565 <= `age` AND `age` <= 18.783)  
AND `cause` = 'Gunshot' AND `race` =`

