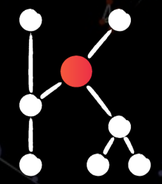

INTERACTIONS, VIEWS

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www.kirellbenzi.com

Interactions

Most datasets are too big to show everything at once

Interacting with your data amplifies cognition

We develop a “feeling” as we touch the data

It is easier to observe causality between data points

Interaction Methods

How do you plan on interacting with your viz?

- Mouse / keyboard
- Touch / mobile
- Gestures
- VR / Kinect / Leap motion


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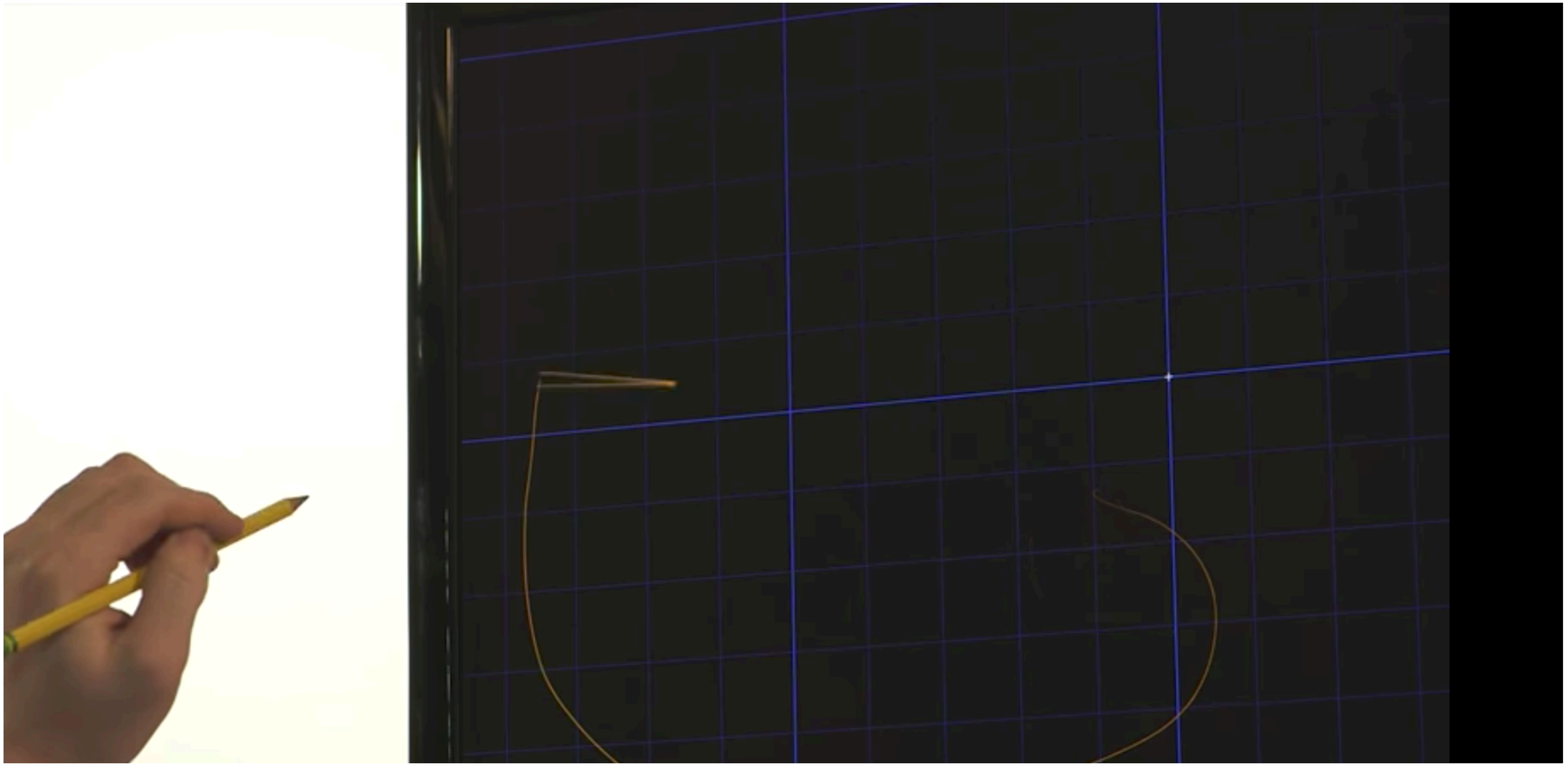


Some definitions

Filtering: showing a part of the dataset via a dynamic query on its properties or attributes

Brushing: selecting a subset of the data items with an input device

Linking: showing how subset of the data items behaves in other views

Aggregation: showing visual representations of subsets of the data

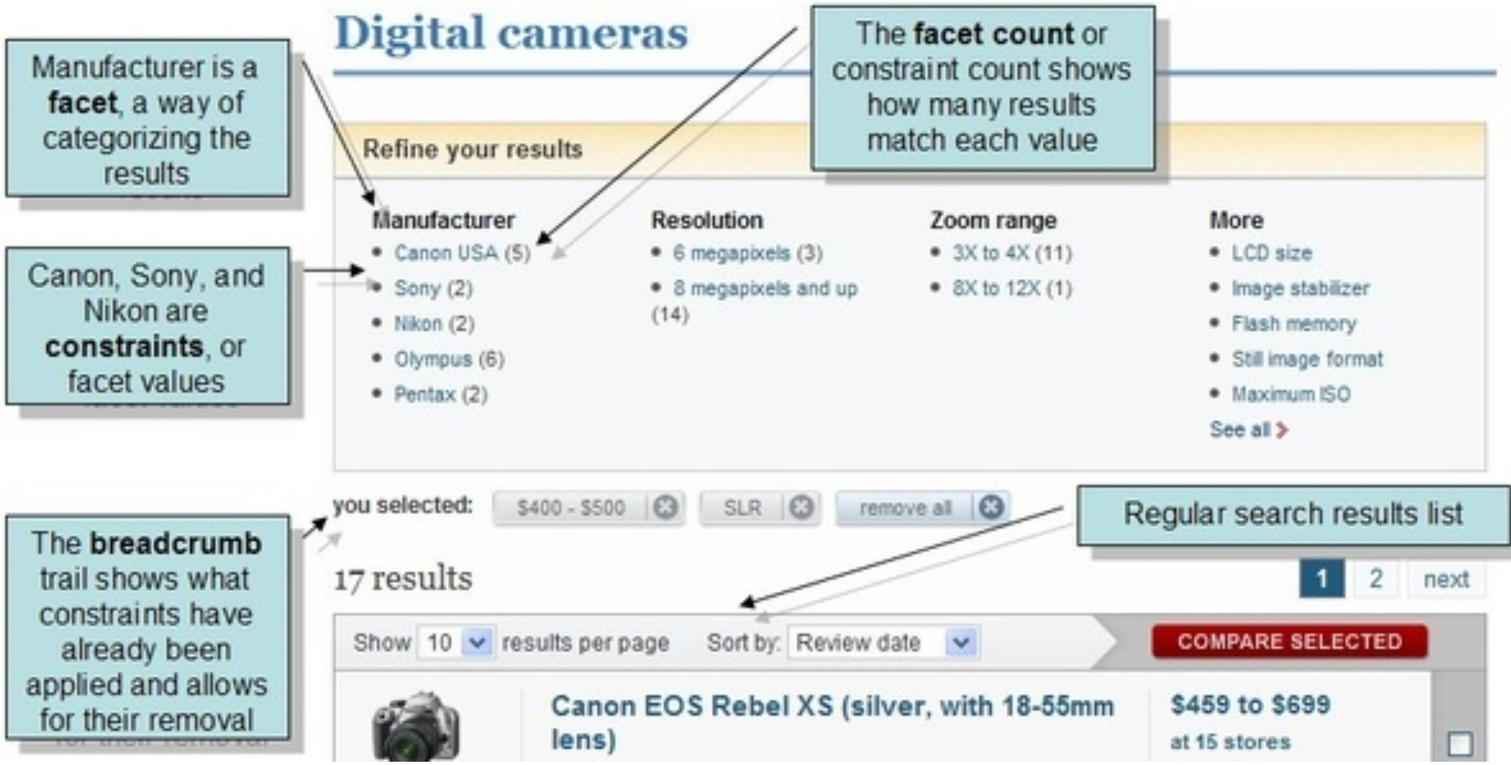
Interaction examples

Faceted (navigational) search

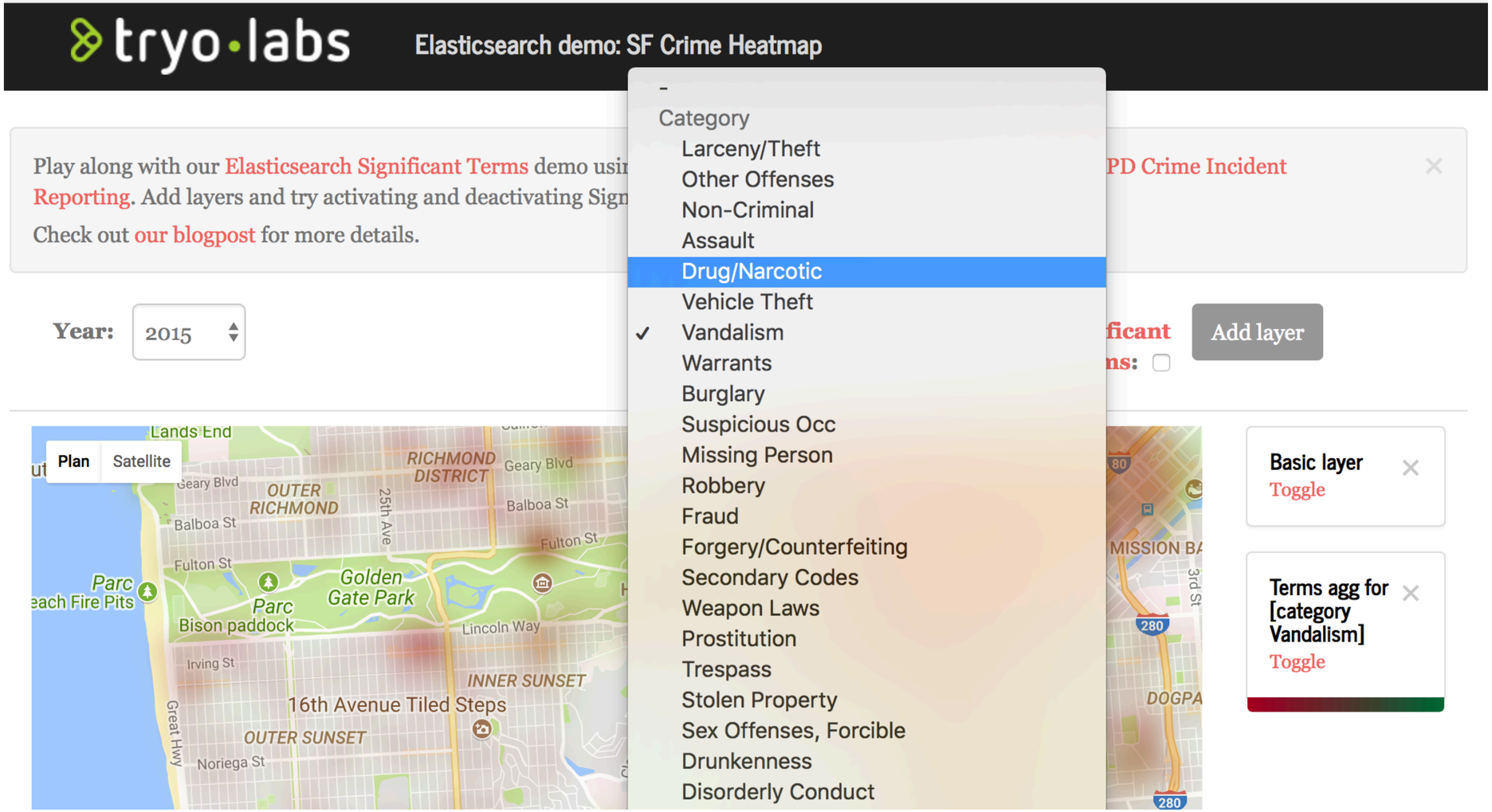
Dynamic queries that use semantic categories organized in a hierarchical structure (taxonomy)

Define criteria for inclusion exclusion (AND, OR, XOR)

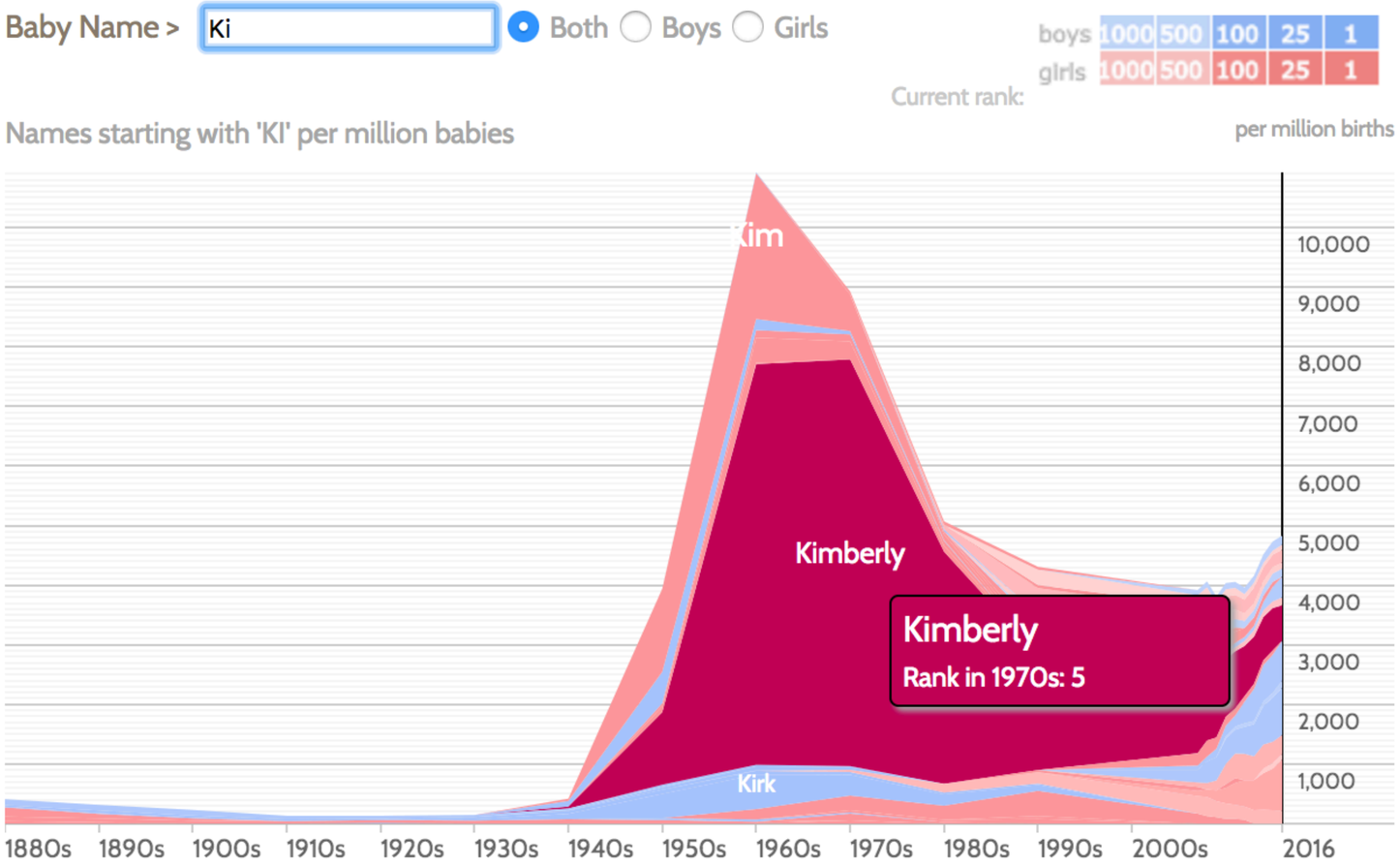
Under-the-hood complex database search queries

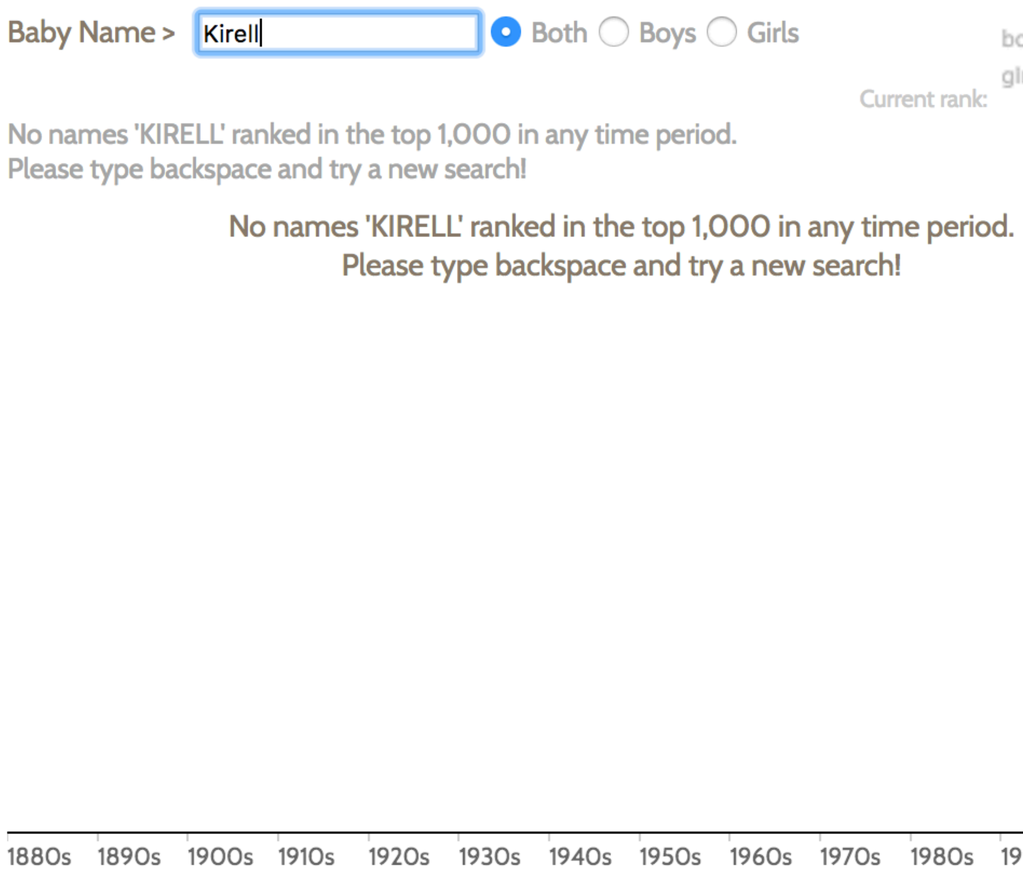


Faceted (navigational) search

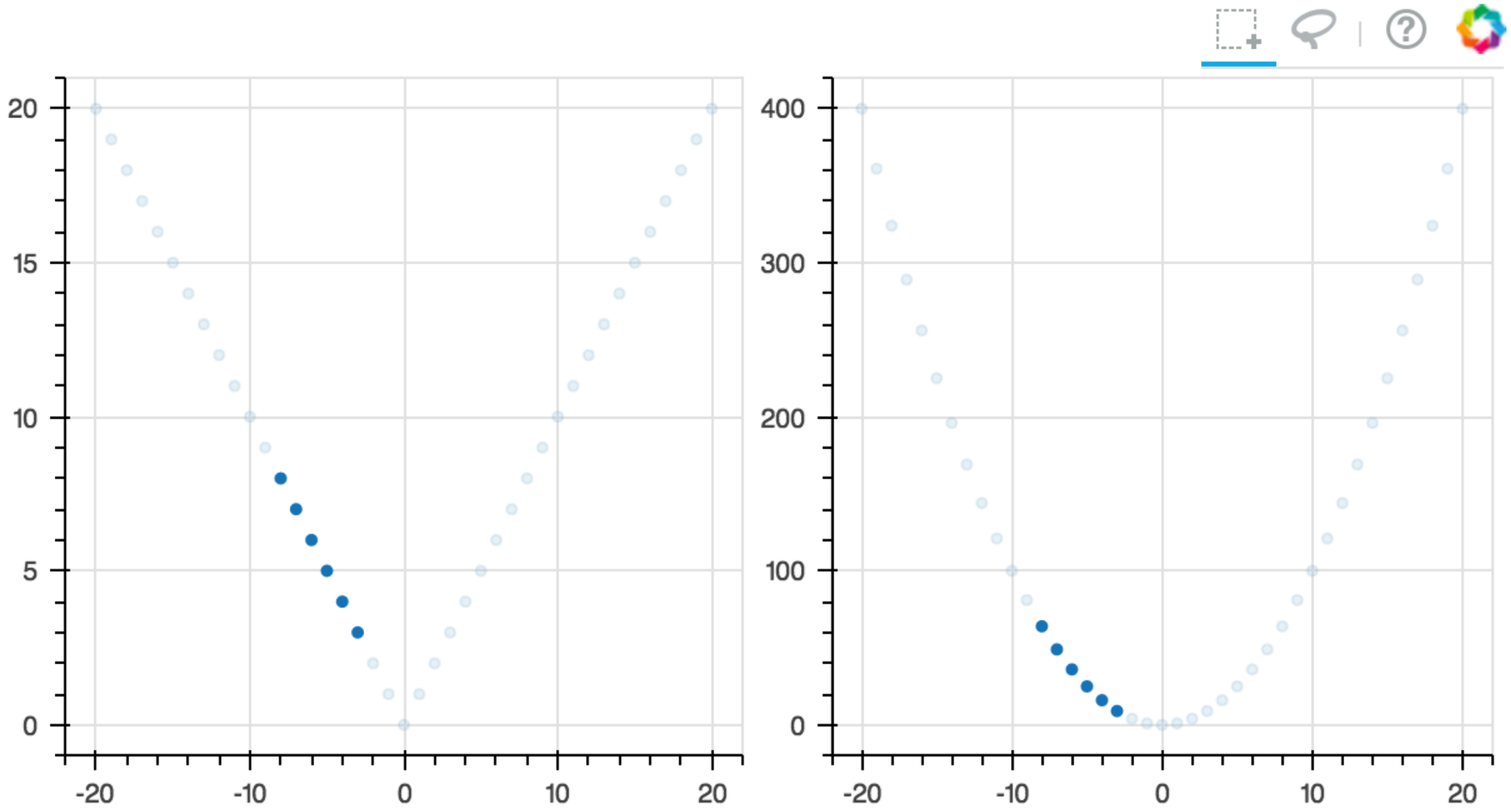


Incremental text-search





Linked plots, brushing

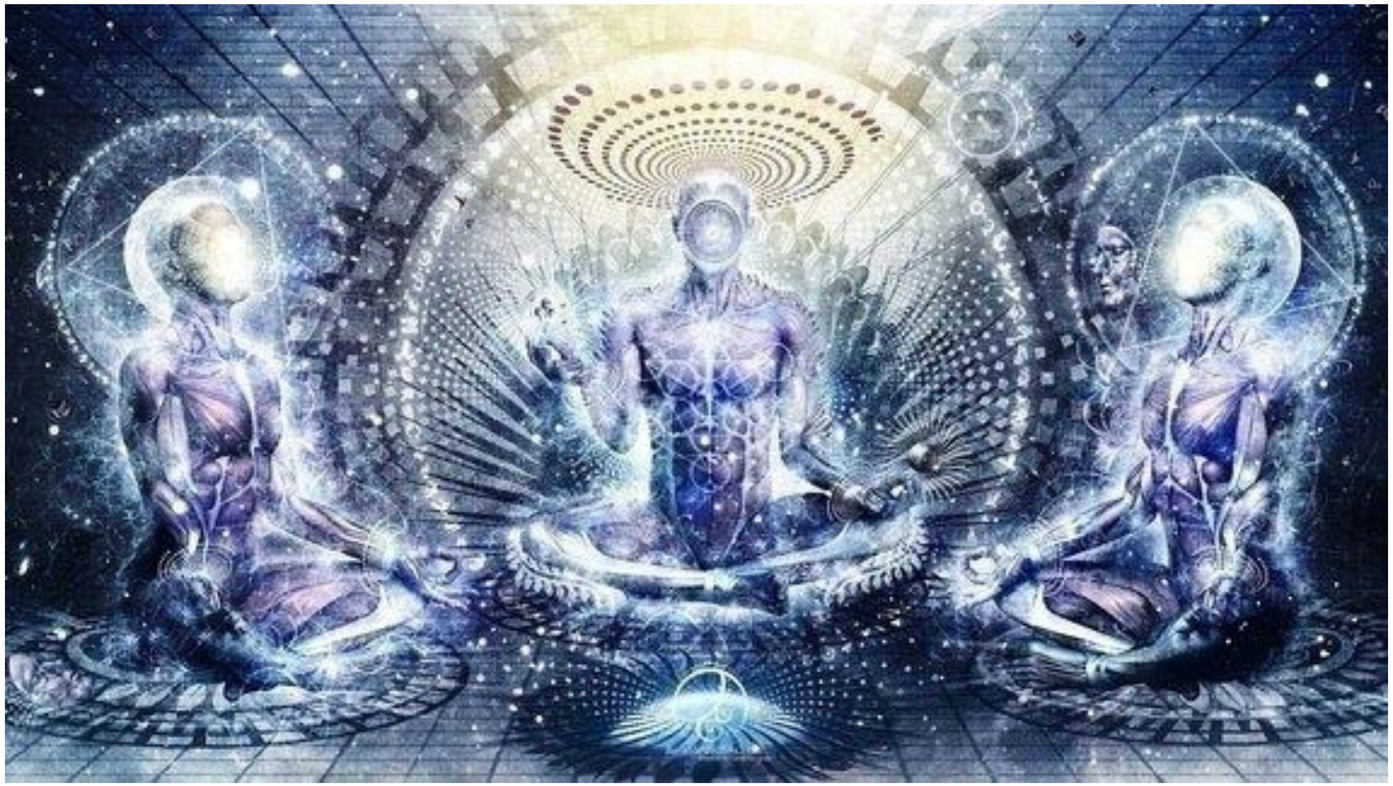


Live example

Visual Information Seeking Mantra

1. **Overview first**
2. **Zoom and filter**
3. **Details on demand**

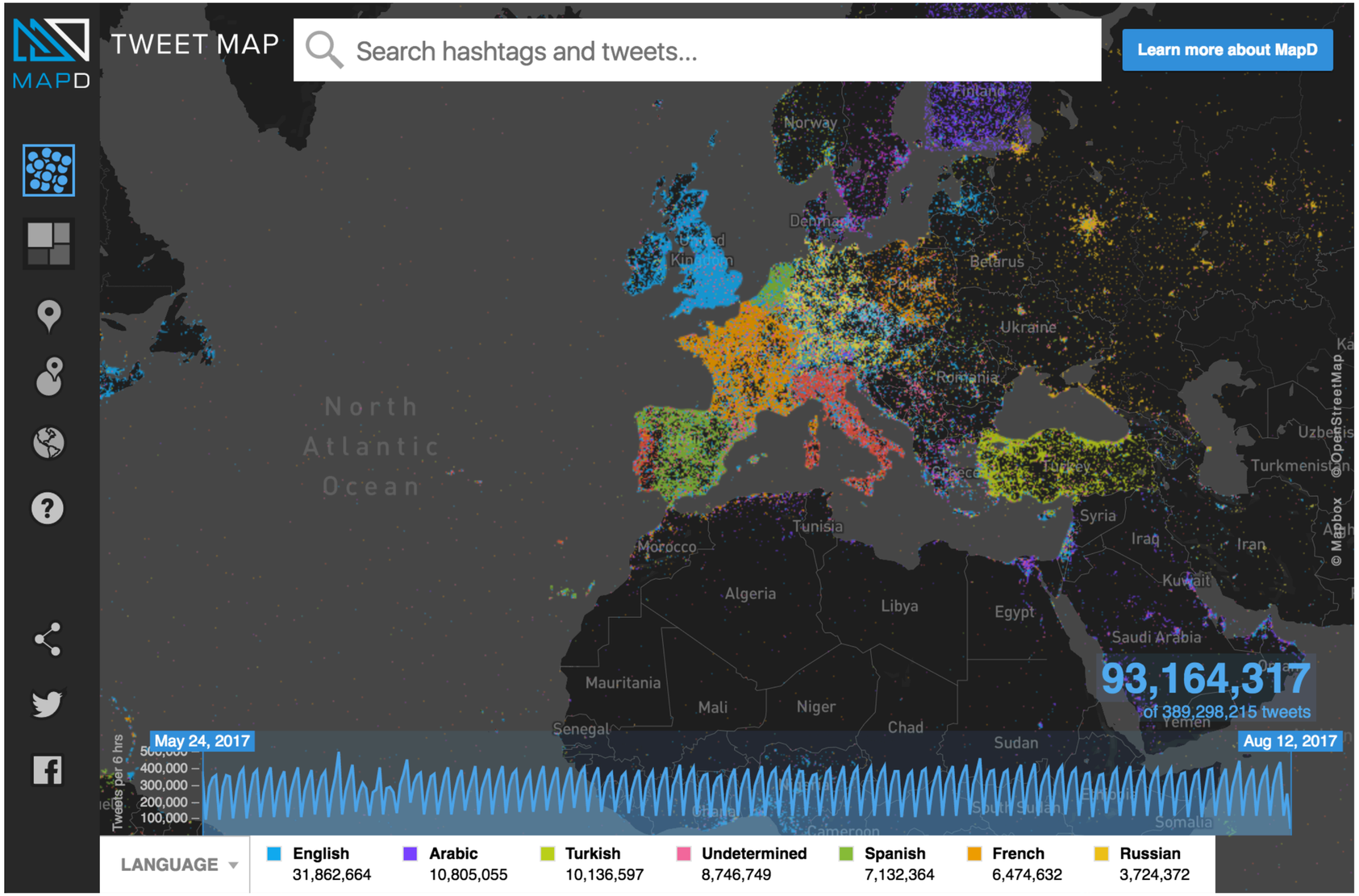
relate, history, extract



The Eyes Have It: A Task by Data Type Taxonomy for Information Visualizations

[B Shneiderman - 1996]

MapD Tweet map



Faceting the display

Single views

Change over Time

Select

Navigate

Item Reduction

- *Zoom*
  Geometric or *Semantic*

- *Pan/Translate*

- *Constrained*

Attribute Reduction

- *Slice*

- *Cut*

- *Project*

Juxtapose and Coordinate Multiple Side-by-Side Views

- Share Encoding: Same/Different
  - *Linked Highlighting*

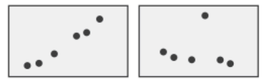
- Share Data: All/Subset/None

- Share Navigation

		Data		
		All	Subset	None
Encoding	Same	Redundant	Overview/ Detail	Small Multiples
	Different	Multiform	Multiform, Overview/ Detail	No Linkage

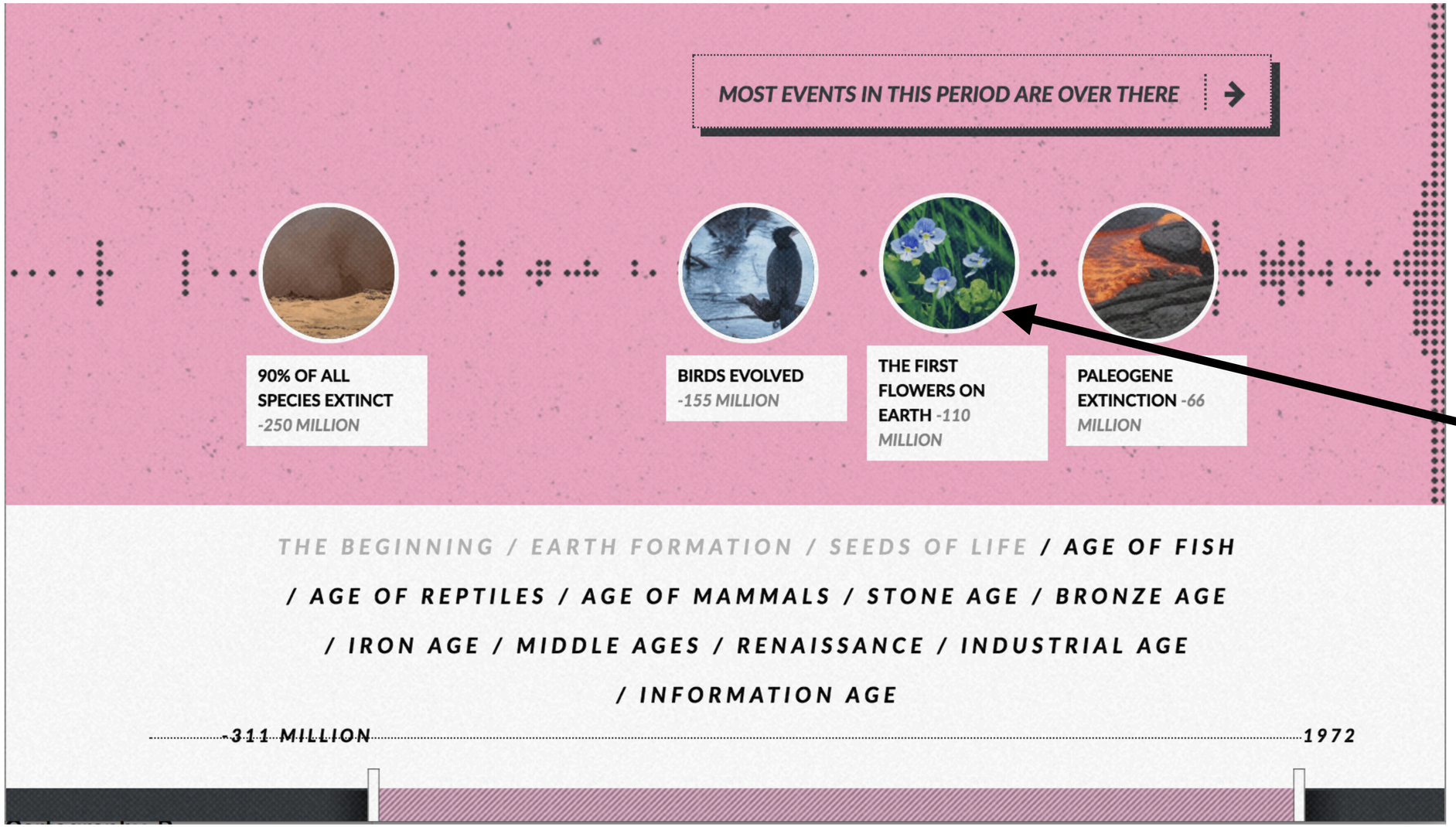
Multiple views

Partition into Side-by-Side Views



Superimpose Layers

Single view example



Selection

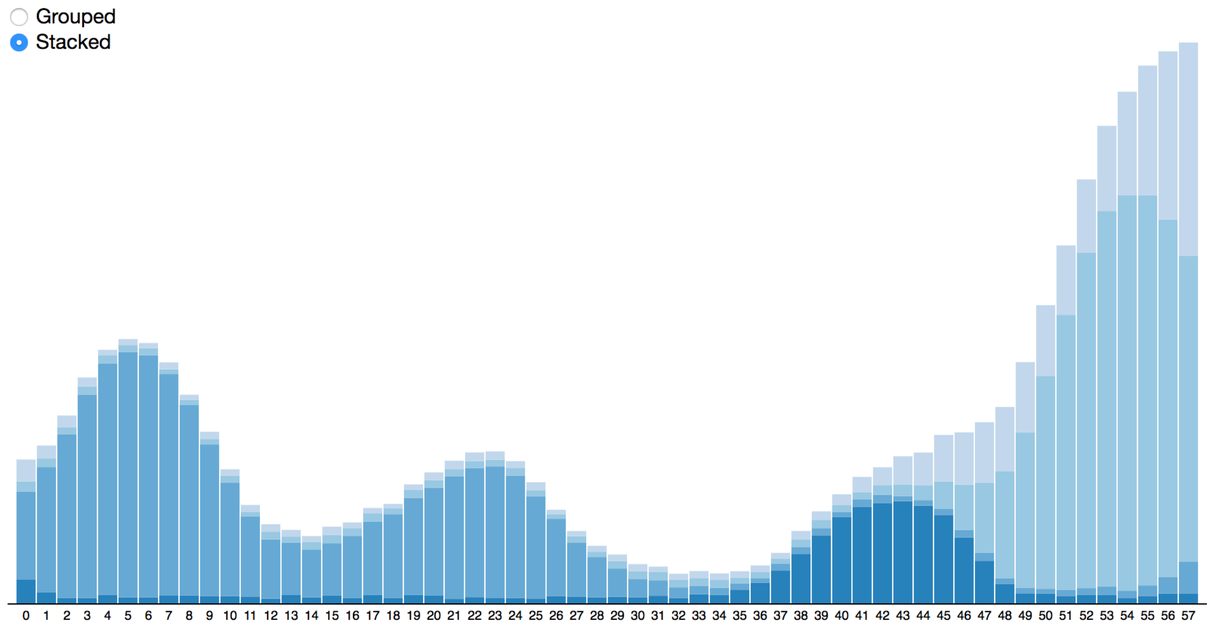
Slider + transitions / animations

Mouse wheel interaction: semantic zooming

Why use transitions?

Animated transition: smooth interpolation between visualization states or techniques

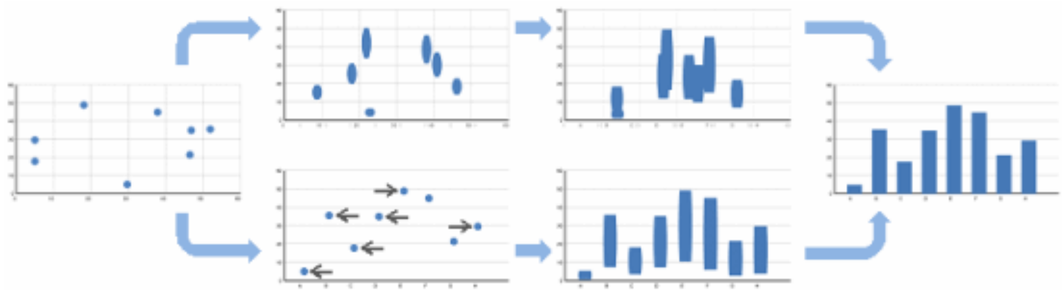
Makes it possible to track what is happening!



Caveats: changes can be hard to track

Better to rely on the eyes with multiple views than with a memory of the previous state

Animated Transitions in Statistical Data Graphics



[Jeffrey Heer, George Robertson]

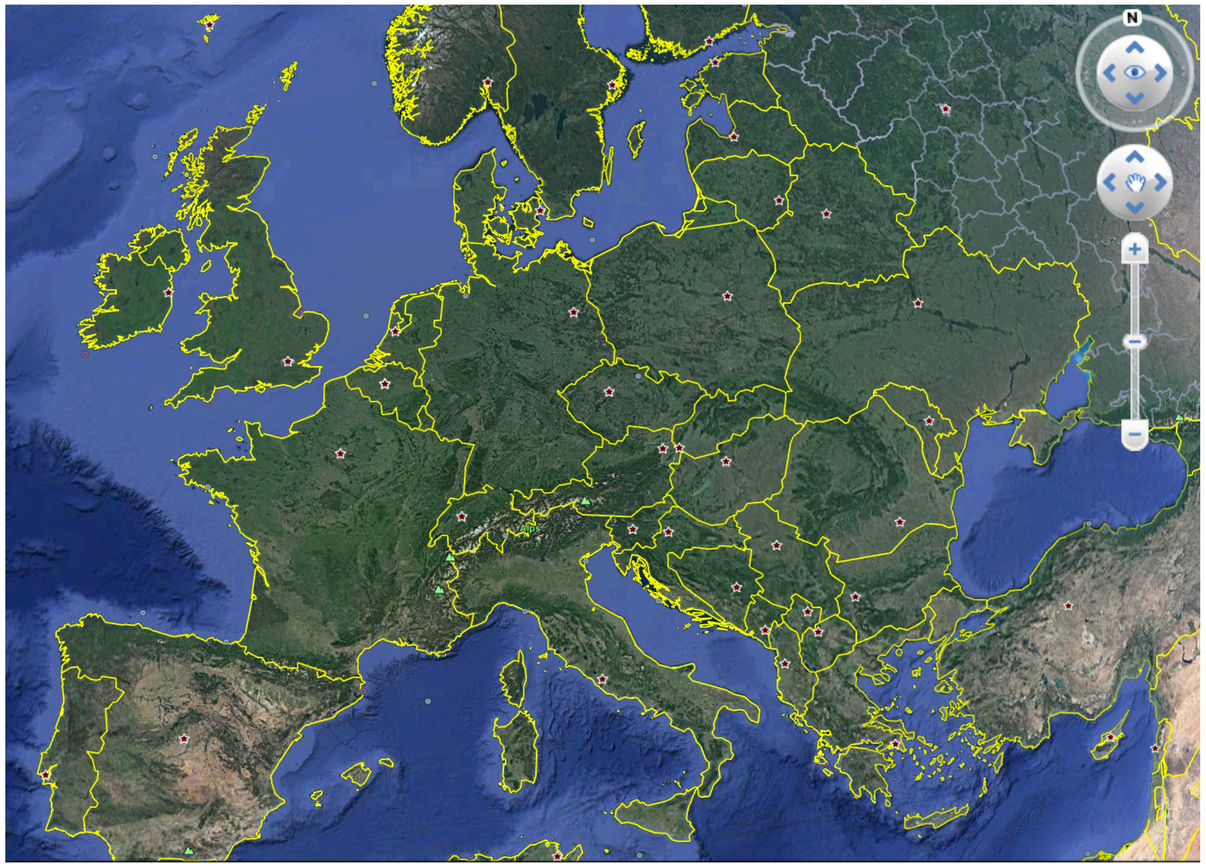
Navigation

Pan: move around in the plane

Geometric zoom: move camera far to close

Rotate

Tilt: Look from another angle (3D)



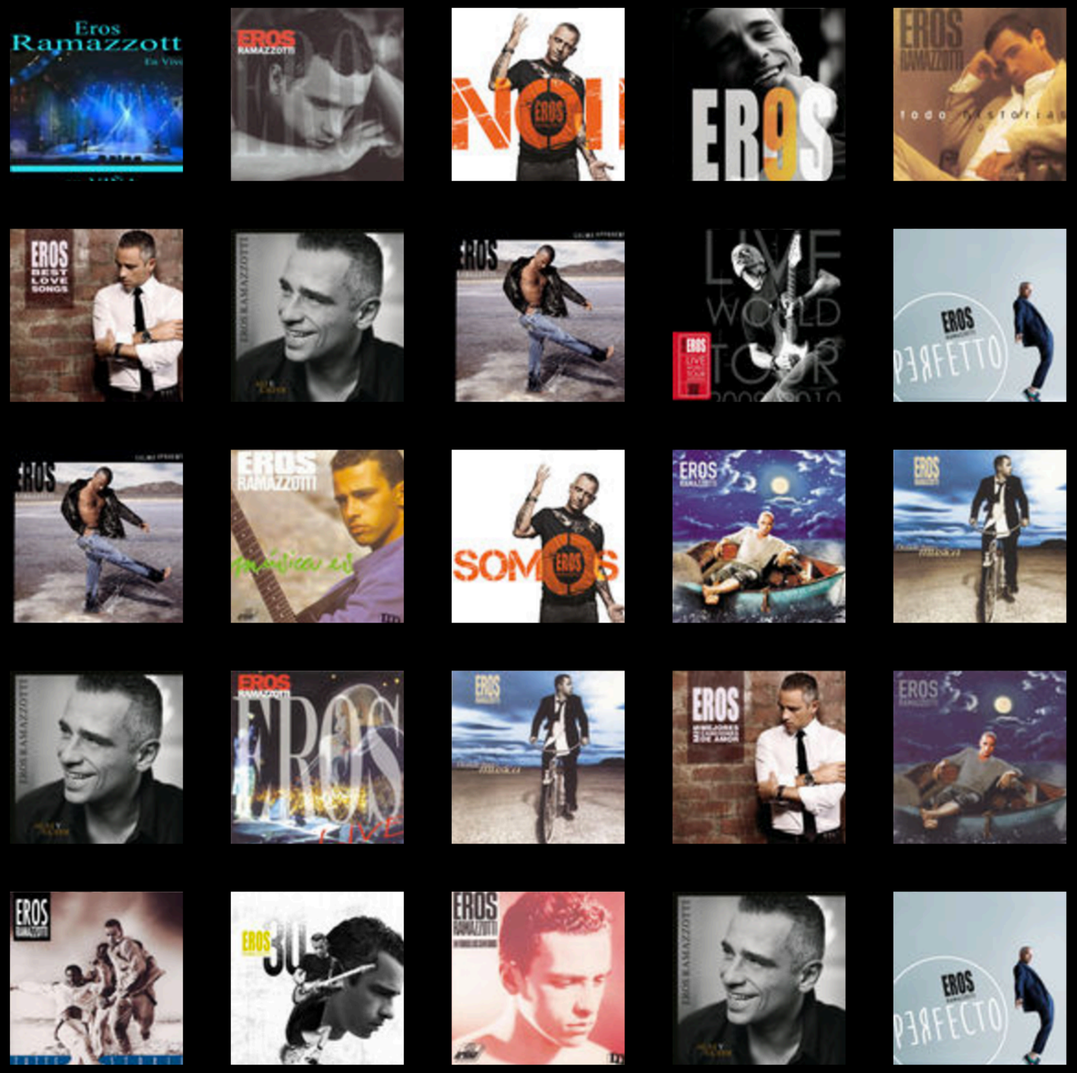
Google Earth

Geometric vs semantic zooming

Geometric (standard) zooming: The view depends on the physical properties of what is being viewed.

Semantic zooming: Different representations for different spatial scales. When zooming away, instead of seeing a scaled down version of an object, see a different representation. The representation shown depends on the meaning to be imparted

[Watson 2004]



« BACK

Calma apparente

La nostra vita
L'equilibrista
Bambino nel tempo
Tu sei
Solarità
Sta passando novembre
Una nuova età
Nomadi d'amore
Non è amore
L'ultimo metrò
I Belong to You (Il ritmo della passione)
Beata solitudine
Calma apparente

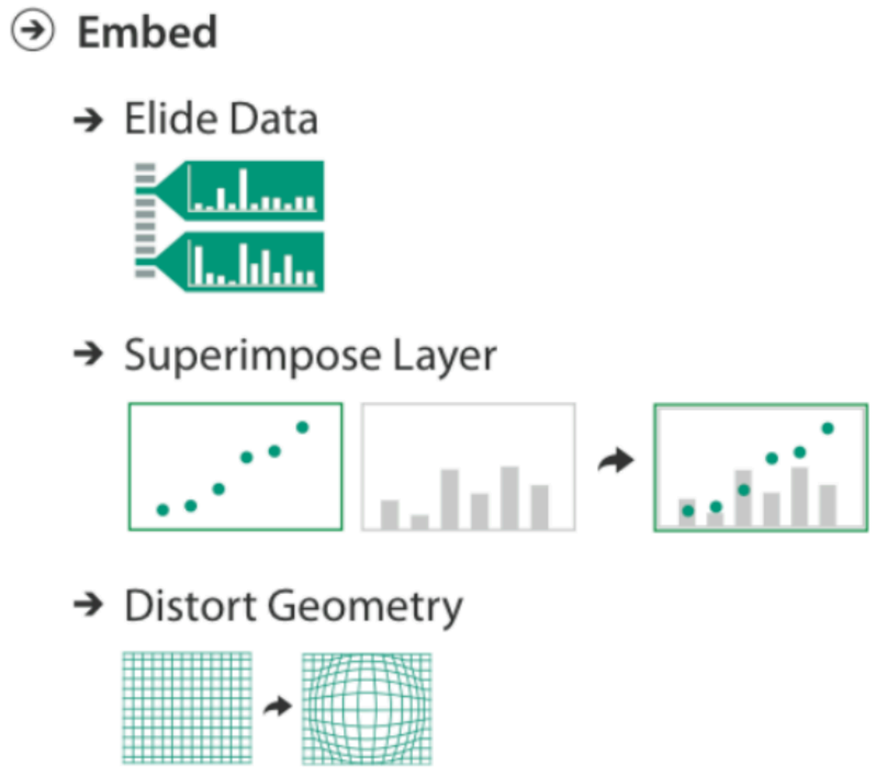
Focus + context

A principle of InfoViz that combines visual encoding and interaction design

“See the trees and the forest at the same time”

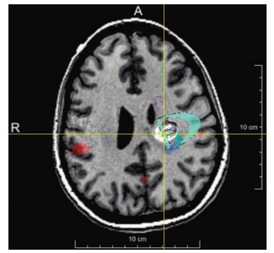
Display most important data in details without forgetting about the big picture (the context)

Provide context with: **reduction, layering, distortion**

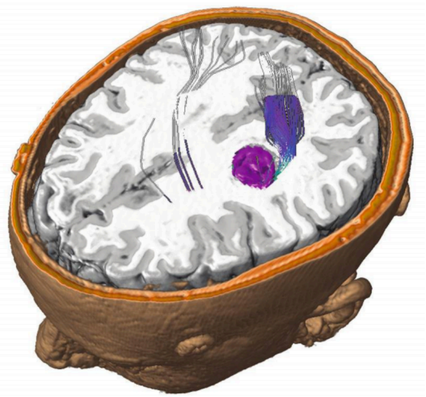


Attribute reduction

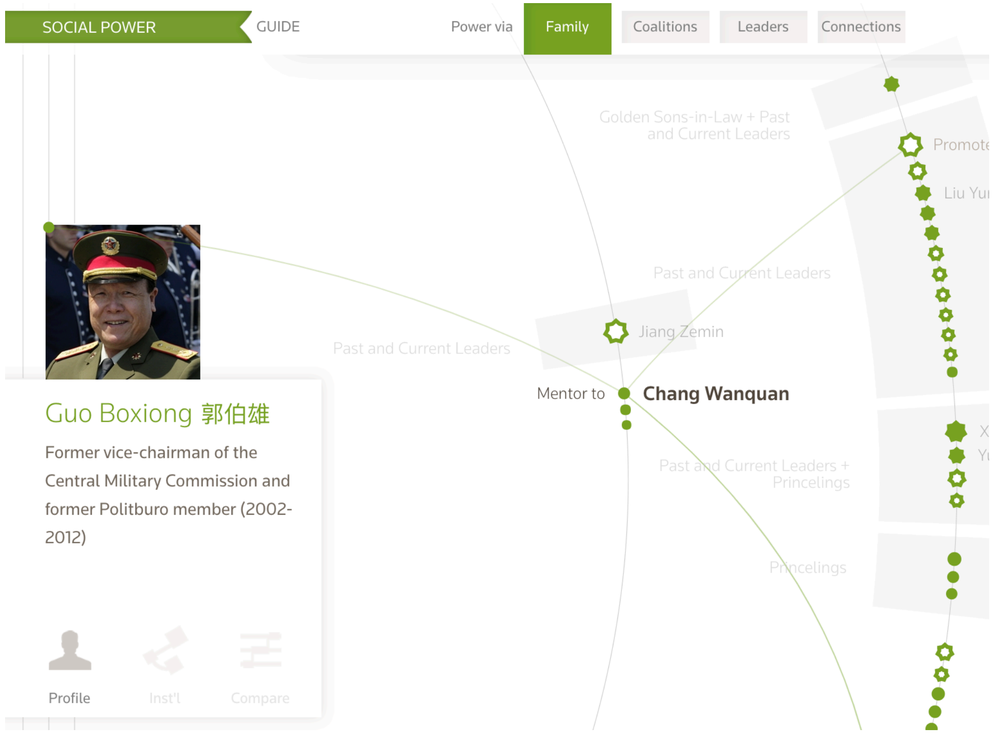
Slice: eliminates a dimension/attribute by extracting only the items with a chosen value in that dimension.



(a)



(b)

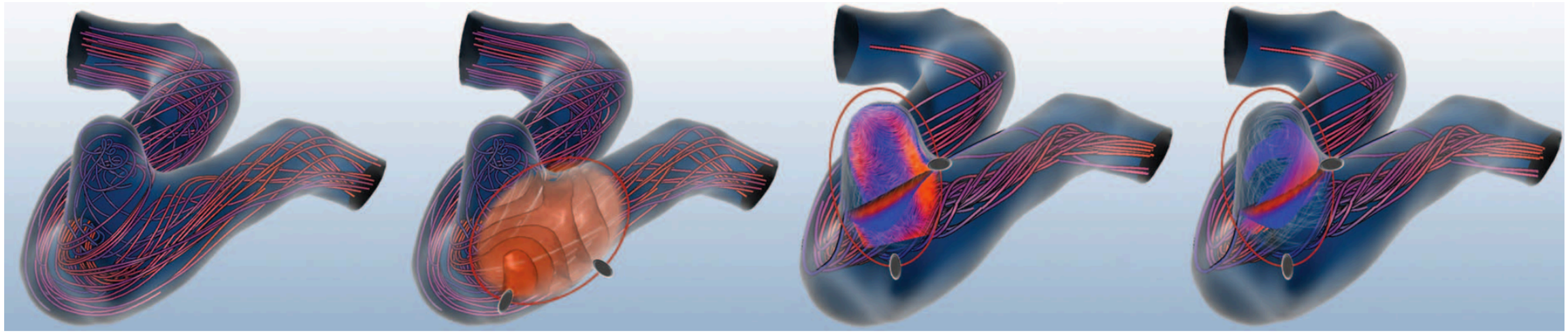


Elision: focus item is detailed, the rest is summarized for context

Superimpose

Focus layer on a local region

Context is given by the less detailed object

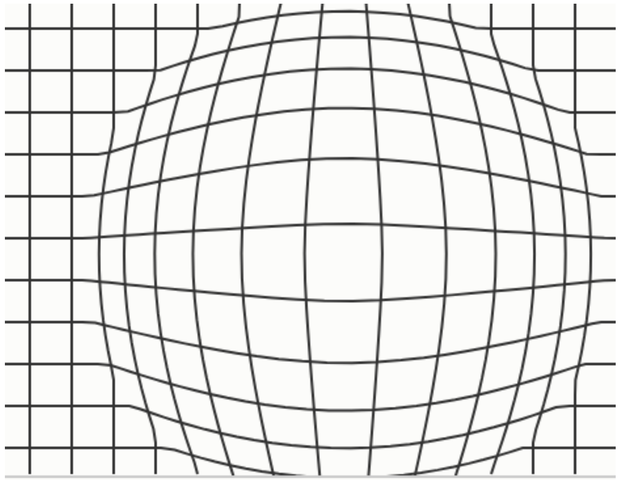


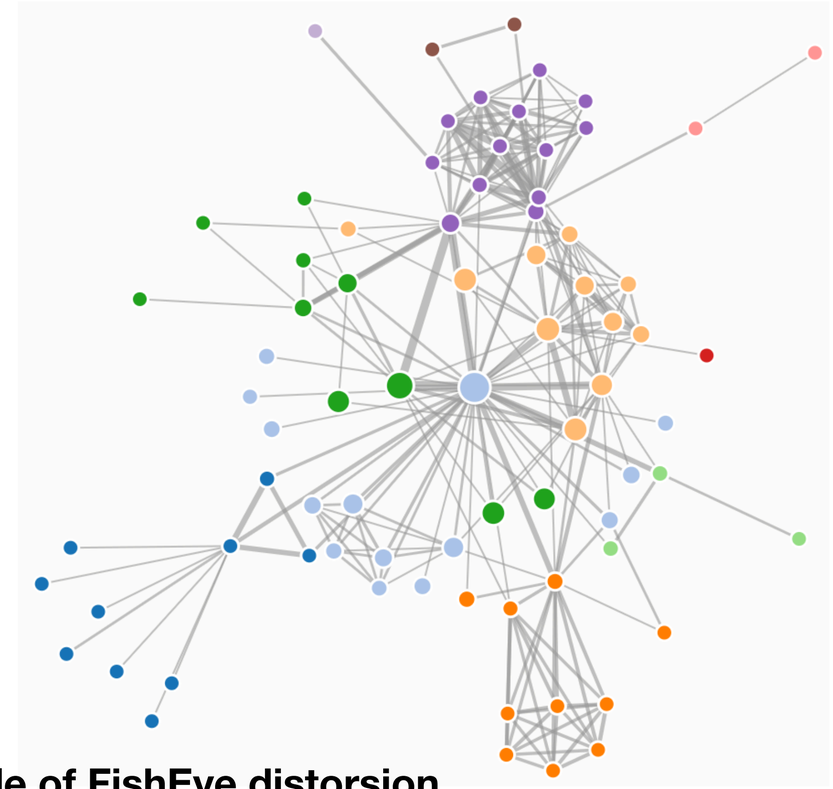
FlowLens

Geometry distorsion

Allows details to appear in the region of interest

Caveat: Cannot perform relative spatial comparison

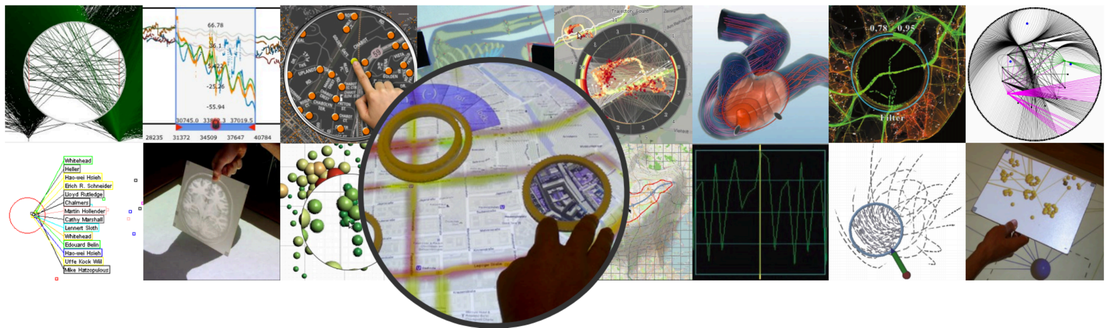




Live example of FishEye distorsion

A Survey on Interactive Lenses in Visualization

C. Tominski[1], S. Gladisch[1], U. Kister[2], R. Dachselt[2] & H. Schumann[1]
[1]Institute for Computer Science, University of Rostock
[2]Interactive Media Lab, Technische Universität Dresden

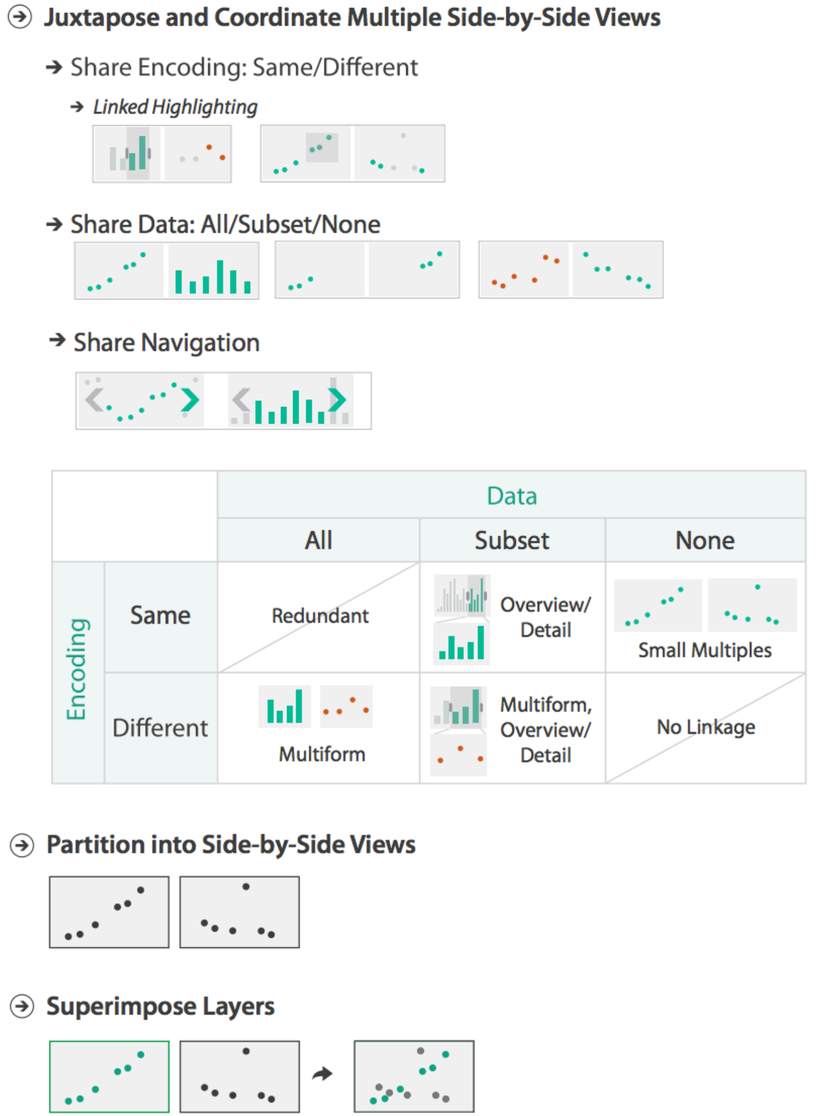


Linked views

Linked views: action on one view affects the other(s)

Better to rely on your eyes with multiple views than with a memory of the previous state

We can still animate linked views



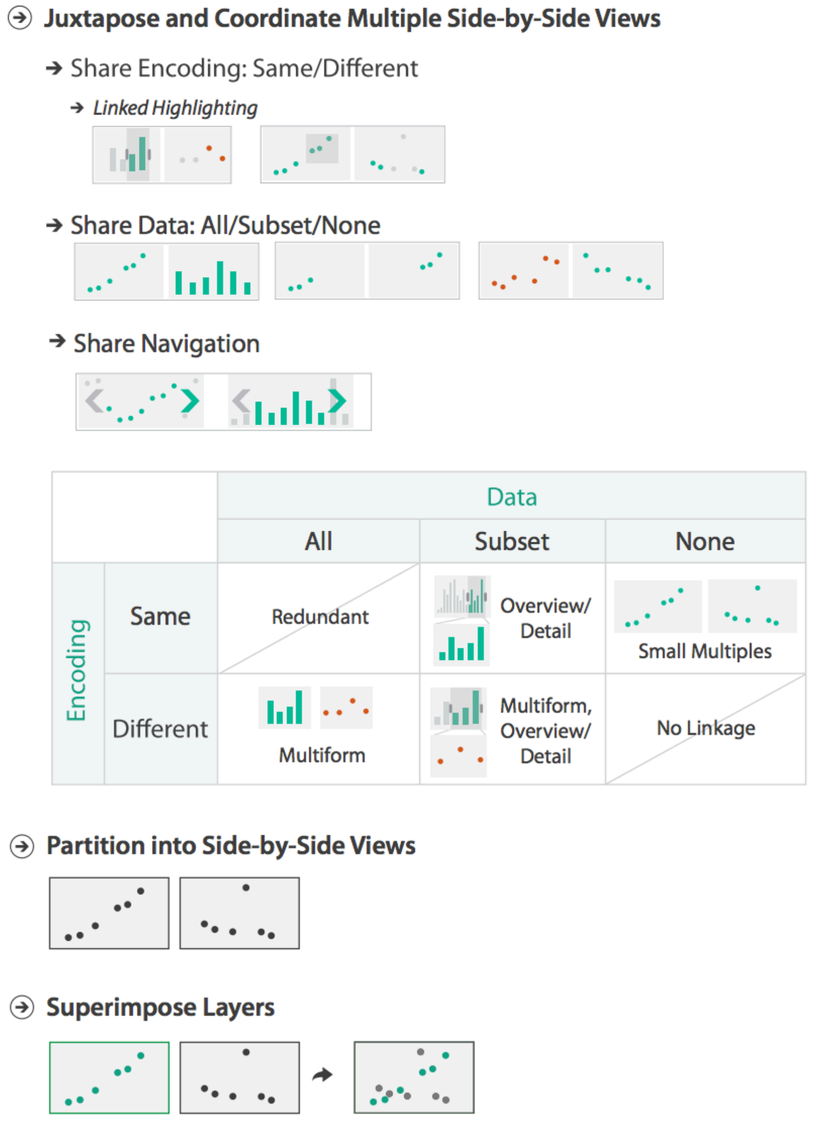
Linked views options

Visual encoding: same or multiform (scatter plot linked to scatter plot, or to bar chart)

Share: all, share a subset or don't share any data between the views

Highlighting: choose to highlight in all views, or not

Navigation: shared or not



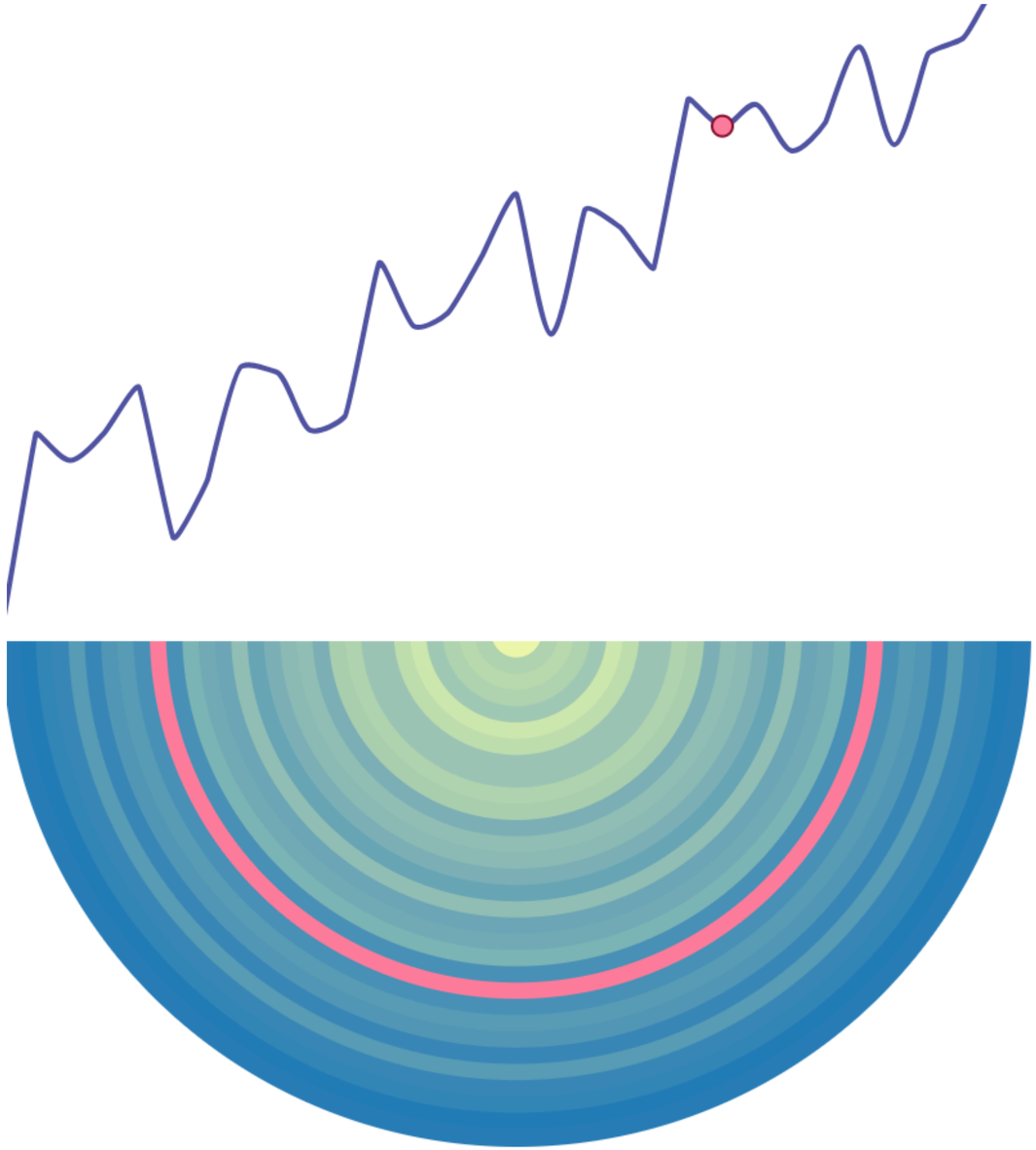
Multiform share-all linked highlighting

Share-all: interactions on one view is reflected on the others

Multiform: different visual encodings are used between the views

Why multiform?

A single view can be limited on the number of visible attributes



Overview + details

A single view cannot display everything if the data is too big or too complex

Here, general aggregated overview information +

A view for finer details on the whole or subset of data

Partitioning

Separates the data into groups, typically according to categorical attributes

Questions:

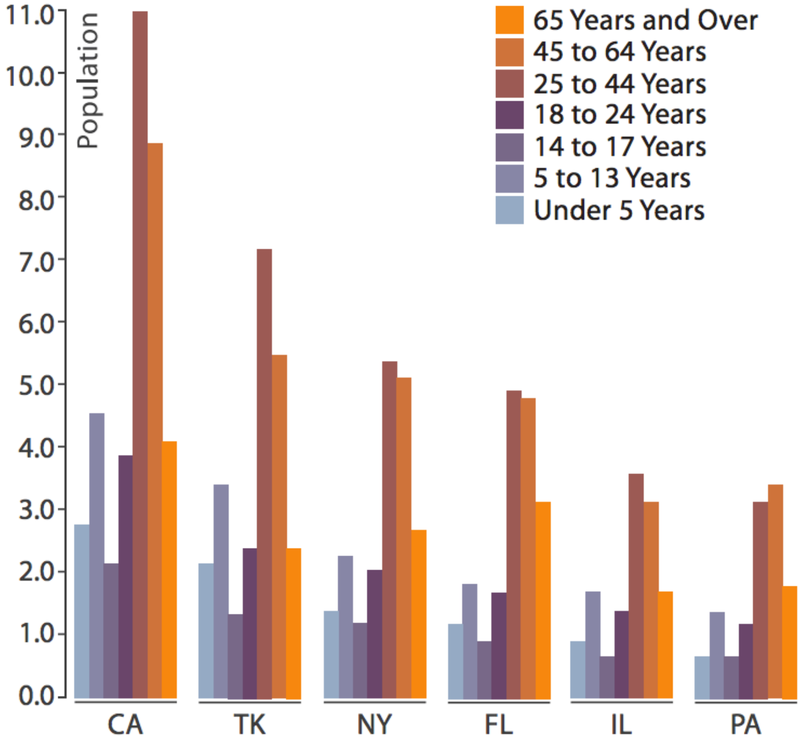
How to choose the number of views?

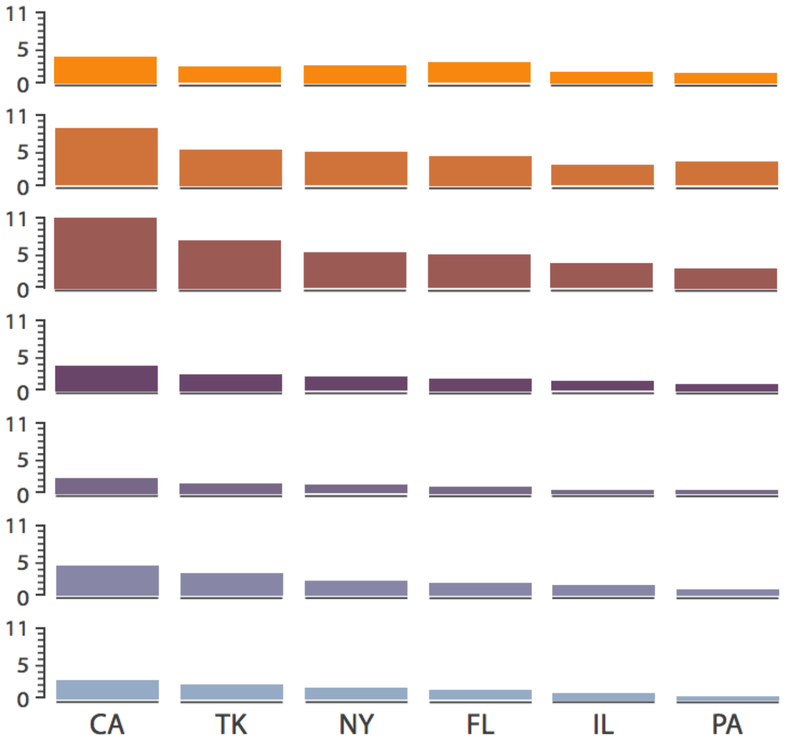
How many splits, in which order?

Small multiples

Same visual encoding but show different dimensions of the dataset altogether

Eyes beat memory: easier to compare





[VAD Figure 12.8.]

Trellis plots

Columns: Persona (profile)
Rows: Affiliate, product line
Each chart: profit and sales by year

Attributes encoded in individual views

Attributes partitioning in columns, rows, and pages

Order of the partition based on derived data

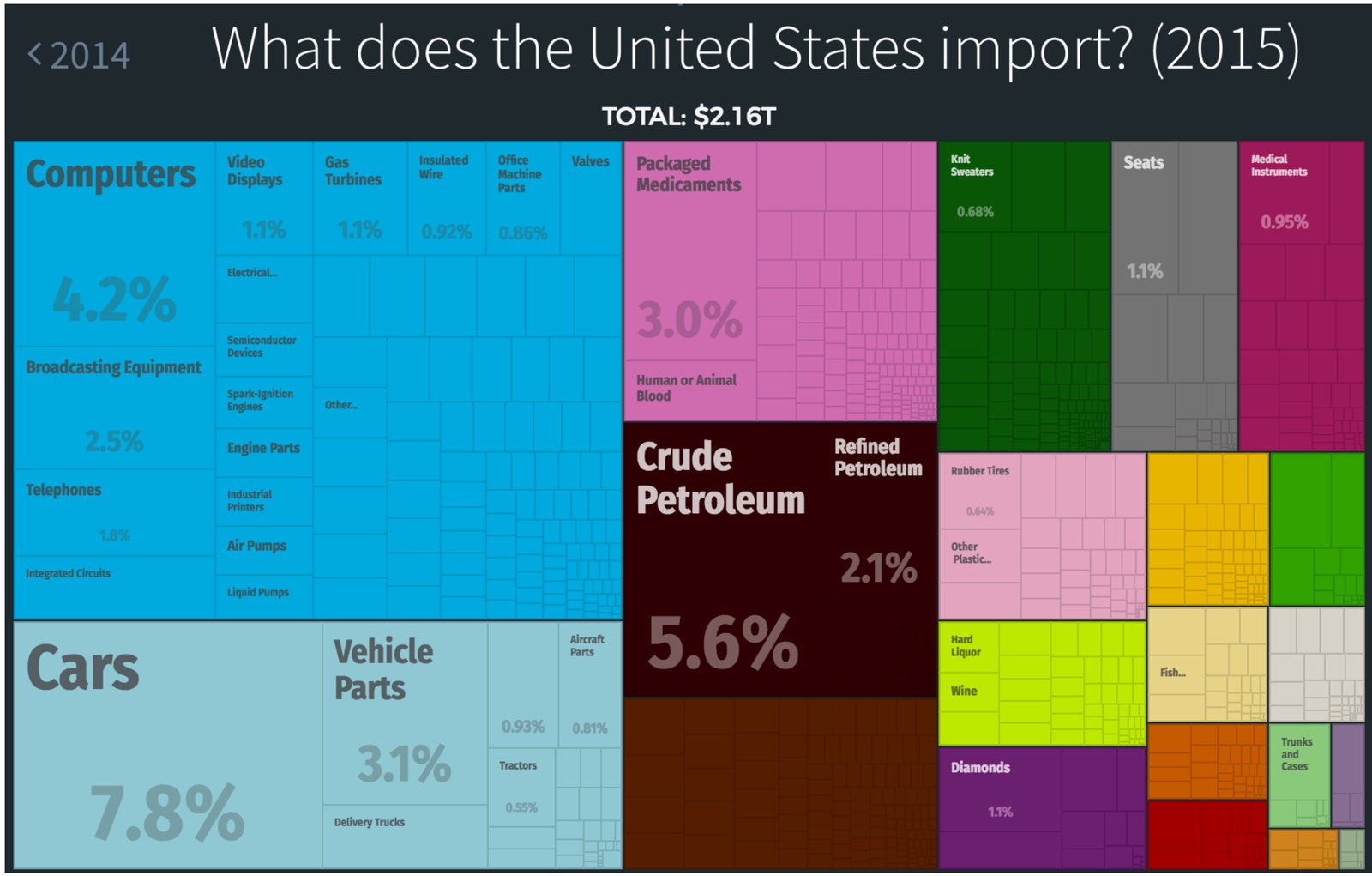
Allows to perceive trends and structure in the dataset

Recursive subdivision

Create a hierachical structure based on attributes

Use Treemap viz: fill the partionned space with rectangles

More on this in the following lectures

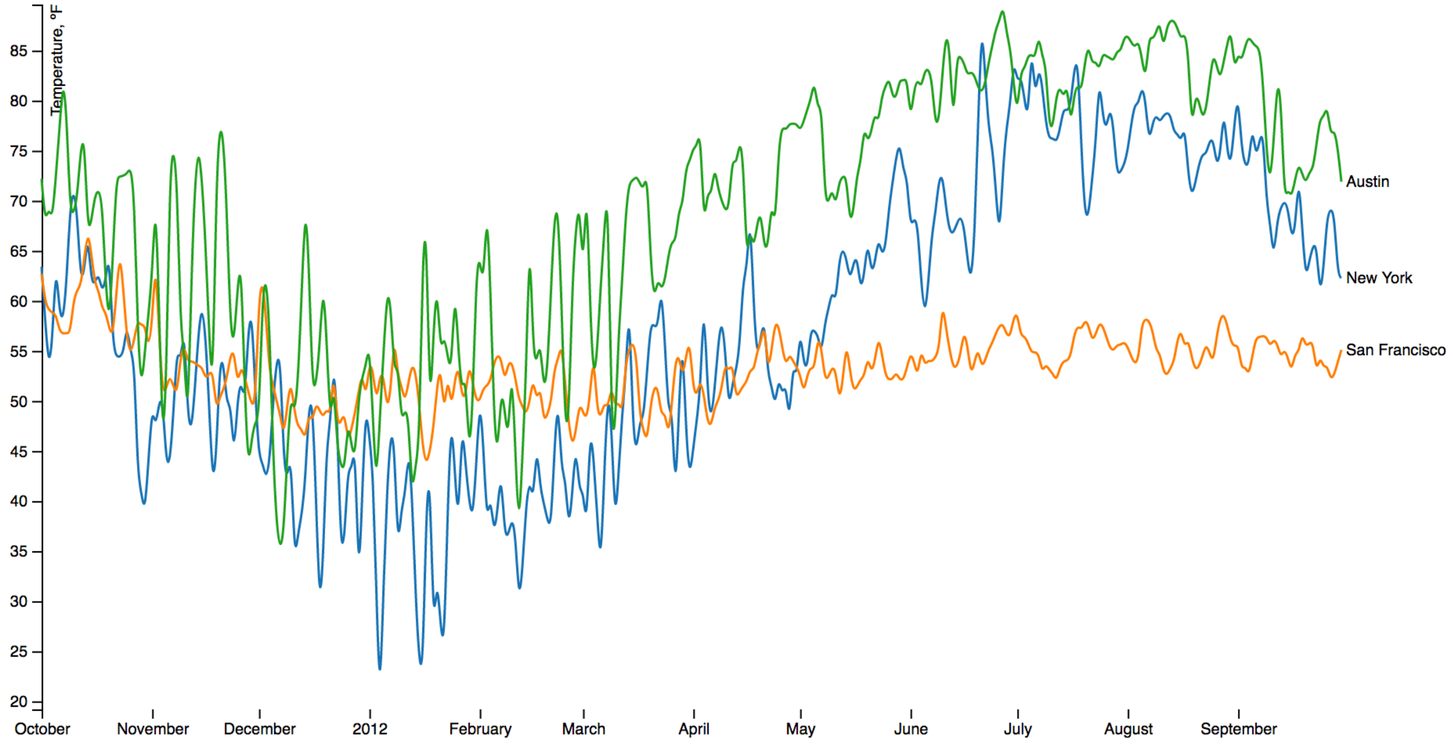


Layering

Create a composite view by stacking different views on top of each other

Pro: support a larger, more detailed view

Con: cannot use any visual encoding, not too many layers



Grafana live example