Exercises: design critique

Data Visualization

Credits:
material in these slides is partially taken from
- T. Munzner, University of British Columbia

Design critique

- Excellent exercise to:
  - spot mistakes in Vis design
  - understand pros & cons of Vis idioms
  - become critical thinkers
  - develop your imagination
  - become confident in your choices
- How to do it: given an example of Vis:
  - understand abstraction in terms of data and tasks (the *What* and *Why* parts)
  - assess effectiveness of the solution (the *How* part: idioms etc.)
  - state what you like/dislike about it and why
  - try a better redesign
  - retain the clever ideas

Time series

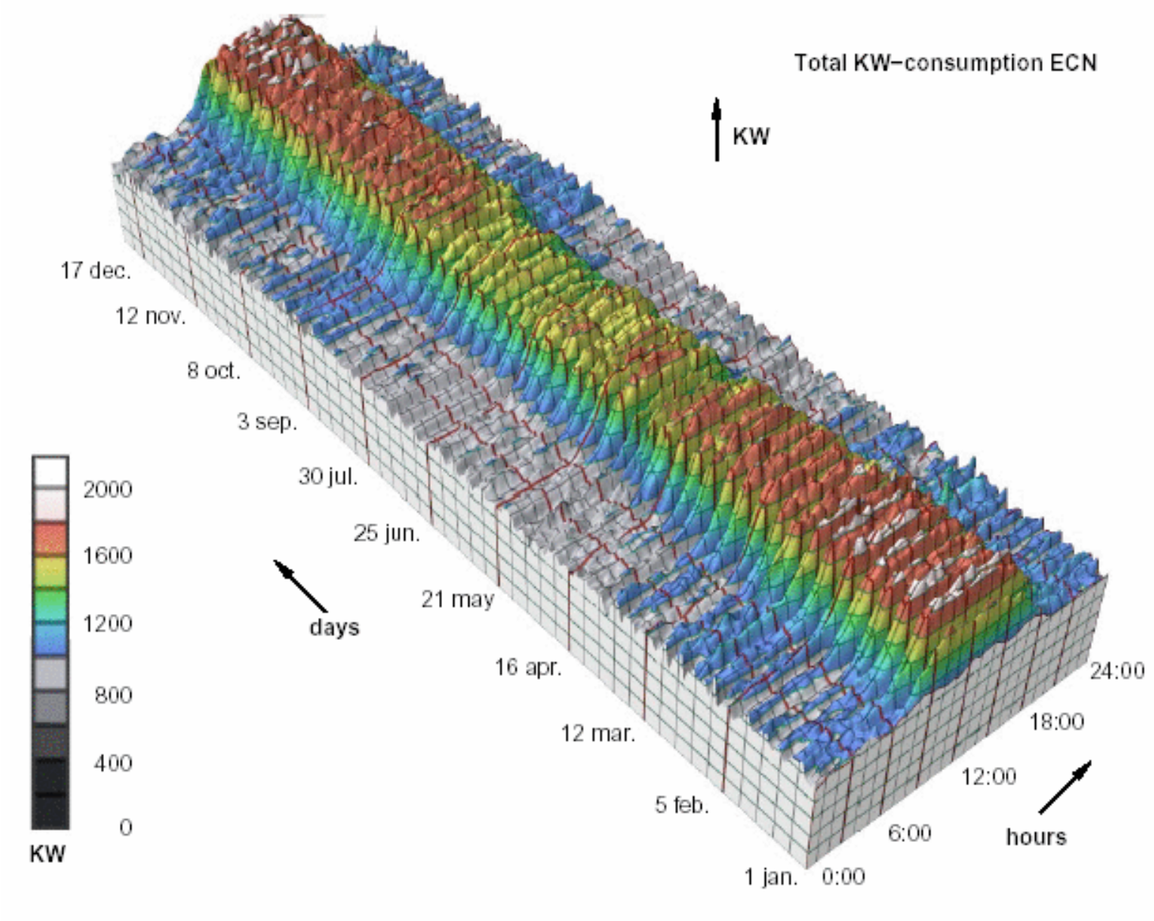
In-class Design Exercise

- Three time-series data scenarios
  - A: every 5 min, duration 1 year, 1 thing: building occupancy / energy consumption
  - B: every day, several years, a few things: currency exchange rates / stock markets
  - C: every 5 min, 1 year, many things: 1000 items: CPU load

- For each scenario:
  - give the data abstraction: items? keys? values?
  - how could we visualize it?

Time-series data: Case A naive

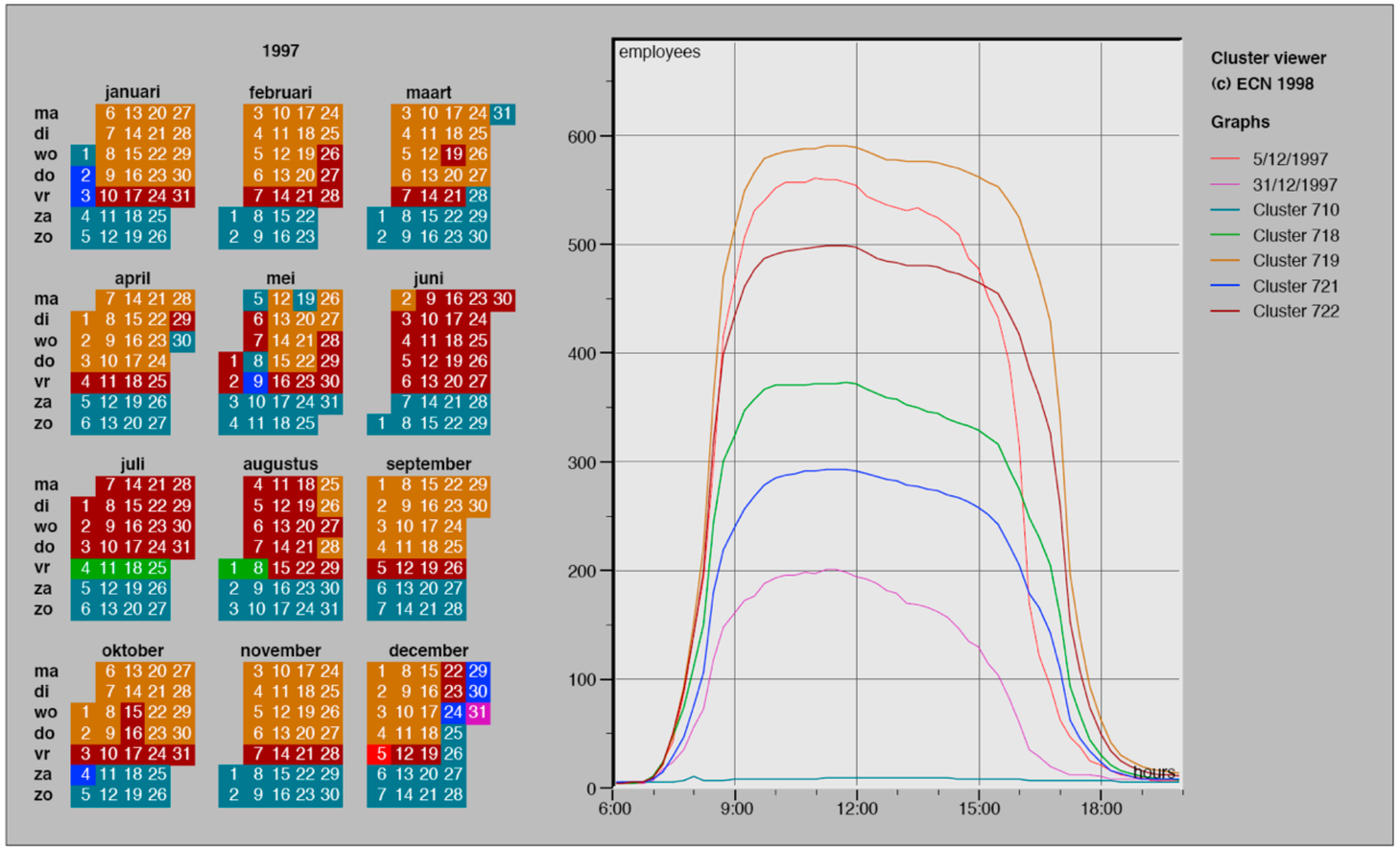
- extruded curves: detailed comparisons impossible



[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]

Case A: Better Cluster-Calendar Solution

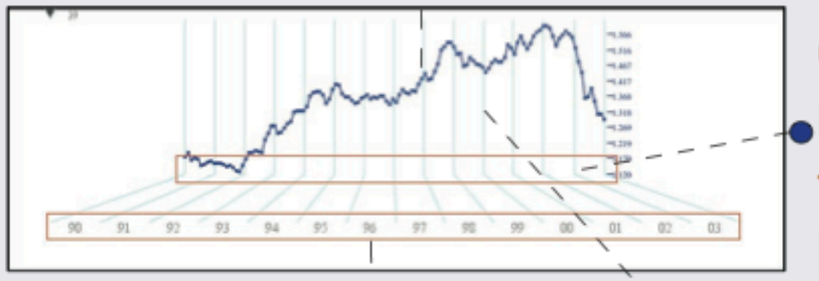
- derived data: cluster hierarchy
- juxtapose multiple views: calendar, superimposed 2D curves



[Cluster and Calendar based Visualization of Time Series Data. van Wijk and van Selow, Proc. InfoVis 99.]

Case A: BinX

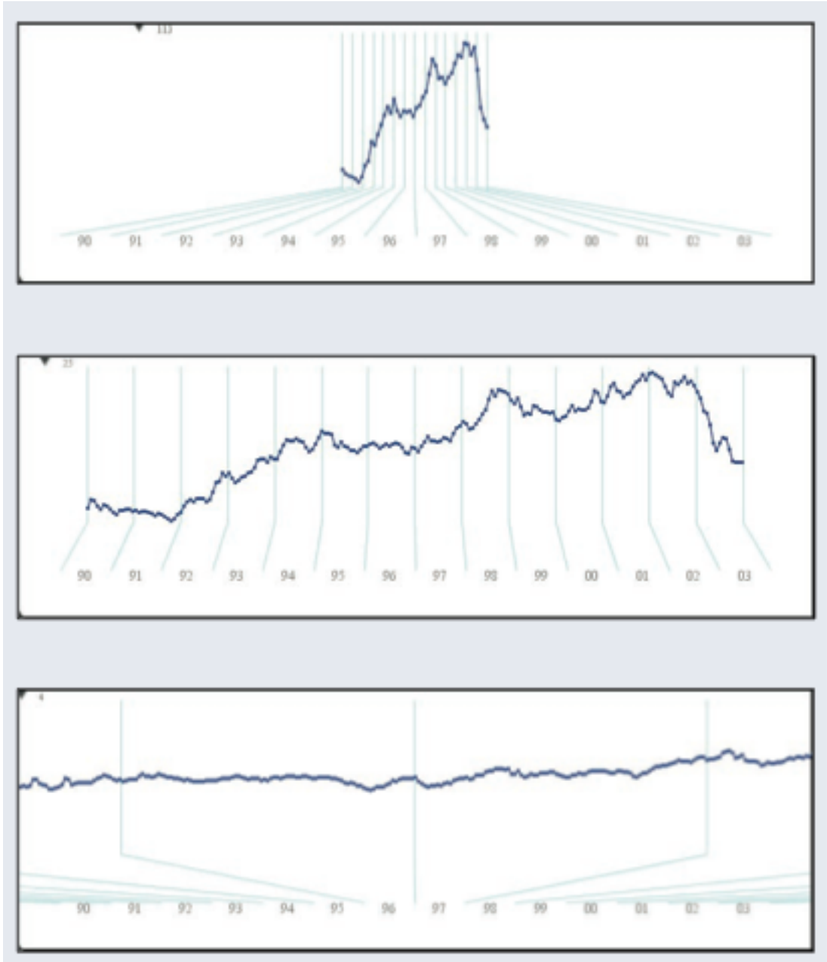
Line Graph at a controlable aggregation level



Vertical and slant-ed timelines are tick marks demarcating time intervals on the binned data

Fixed time coordinate axis shows full range of dataset

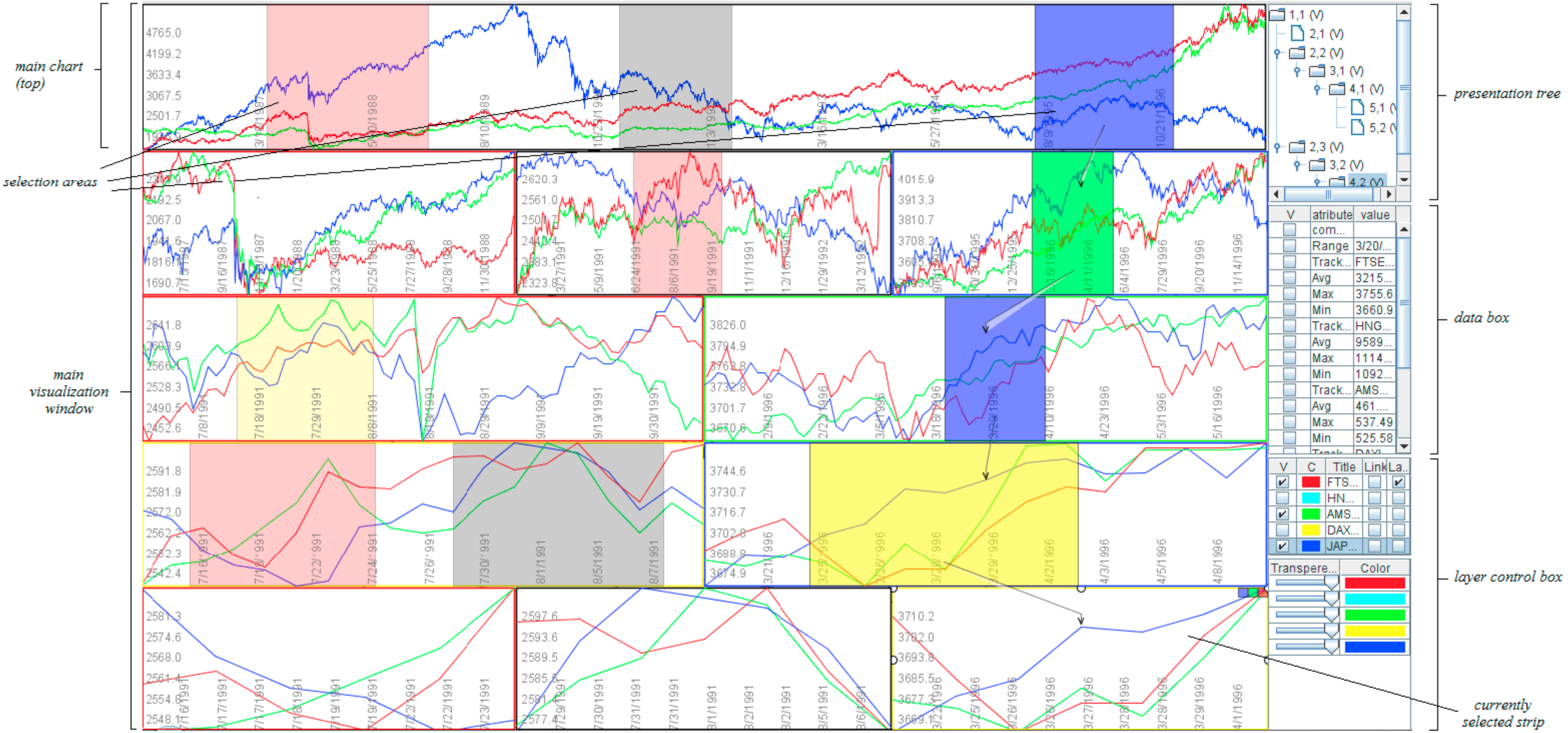
Optional Information on binned data



[BinX: Dynamic Exploration of Time Series Datasets Across Aggregation Levels. Lior Berry and Tamara Munzner.] InfoVis 2004 Posters Compendium, pp 5-6.

Case B: Stack Zooming

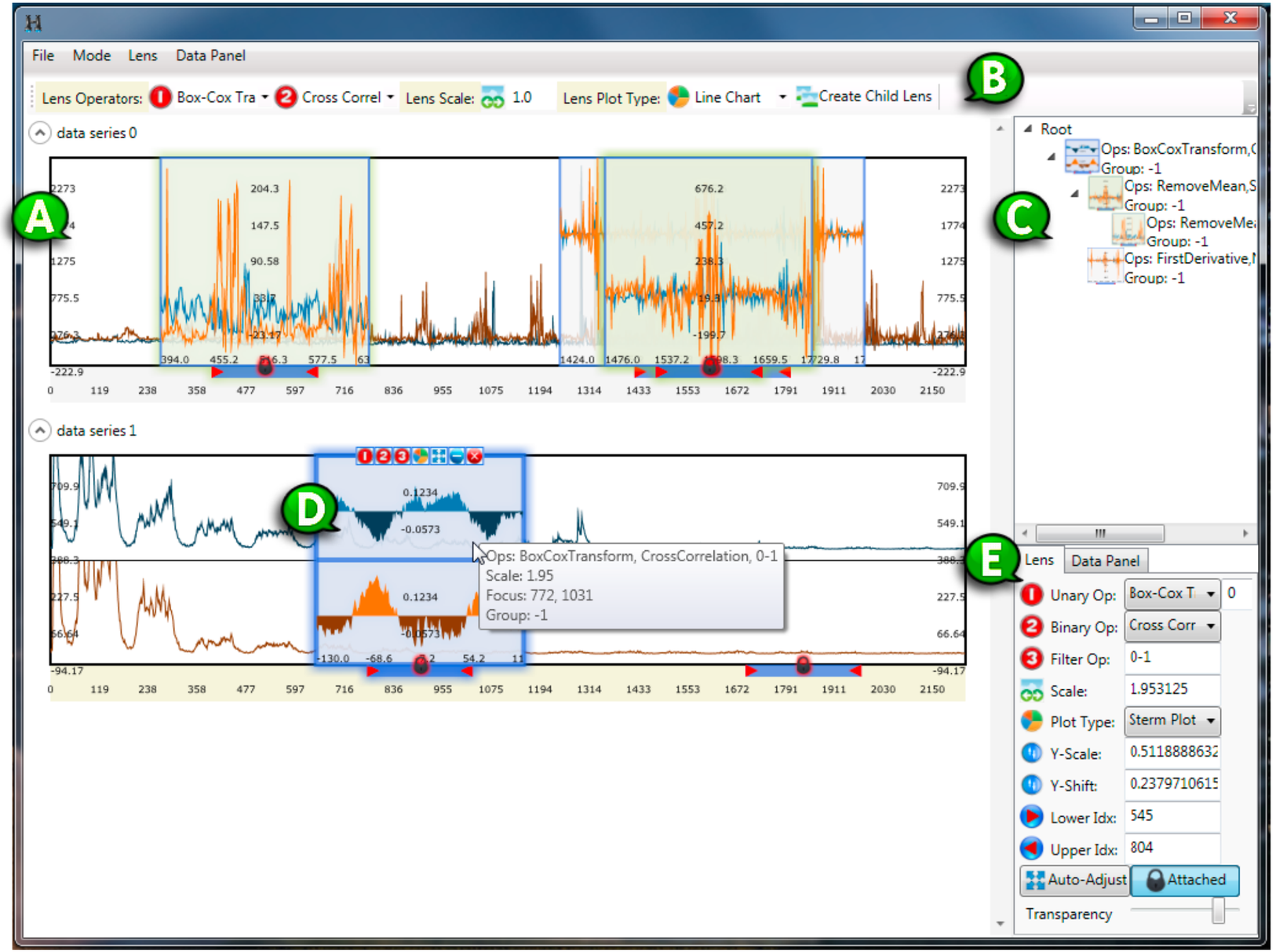
https://youtu.be/dK0De4XPm5Y

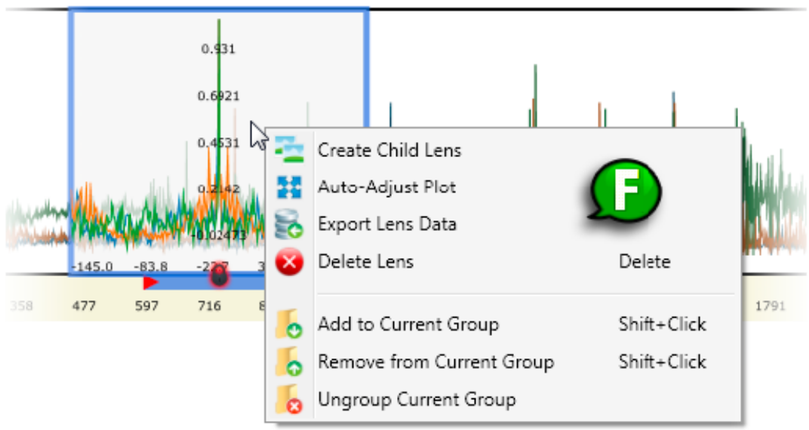


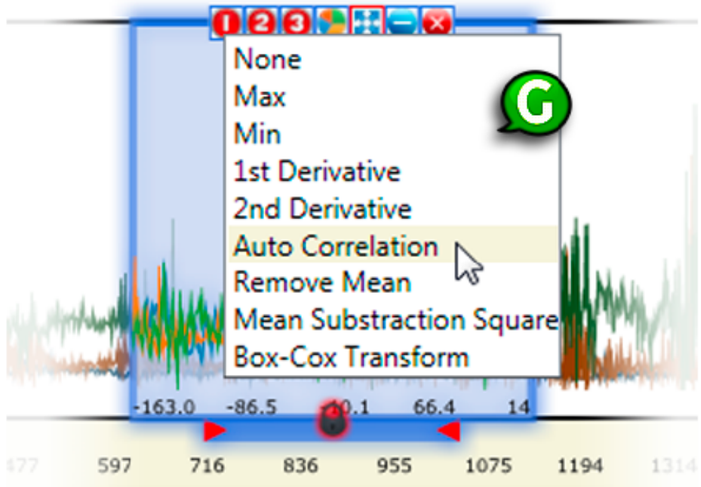
[Stack Zooming for Multi-Focus Interaction in Time-Series Data Visualization. Javed and Elmqvist. Proc PacificVis 2010, p 33-40.]

Case C: ChronoLenses

https://youtu.be/k7pI8ikczqk

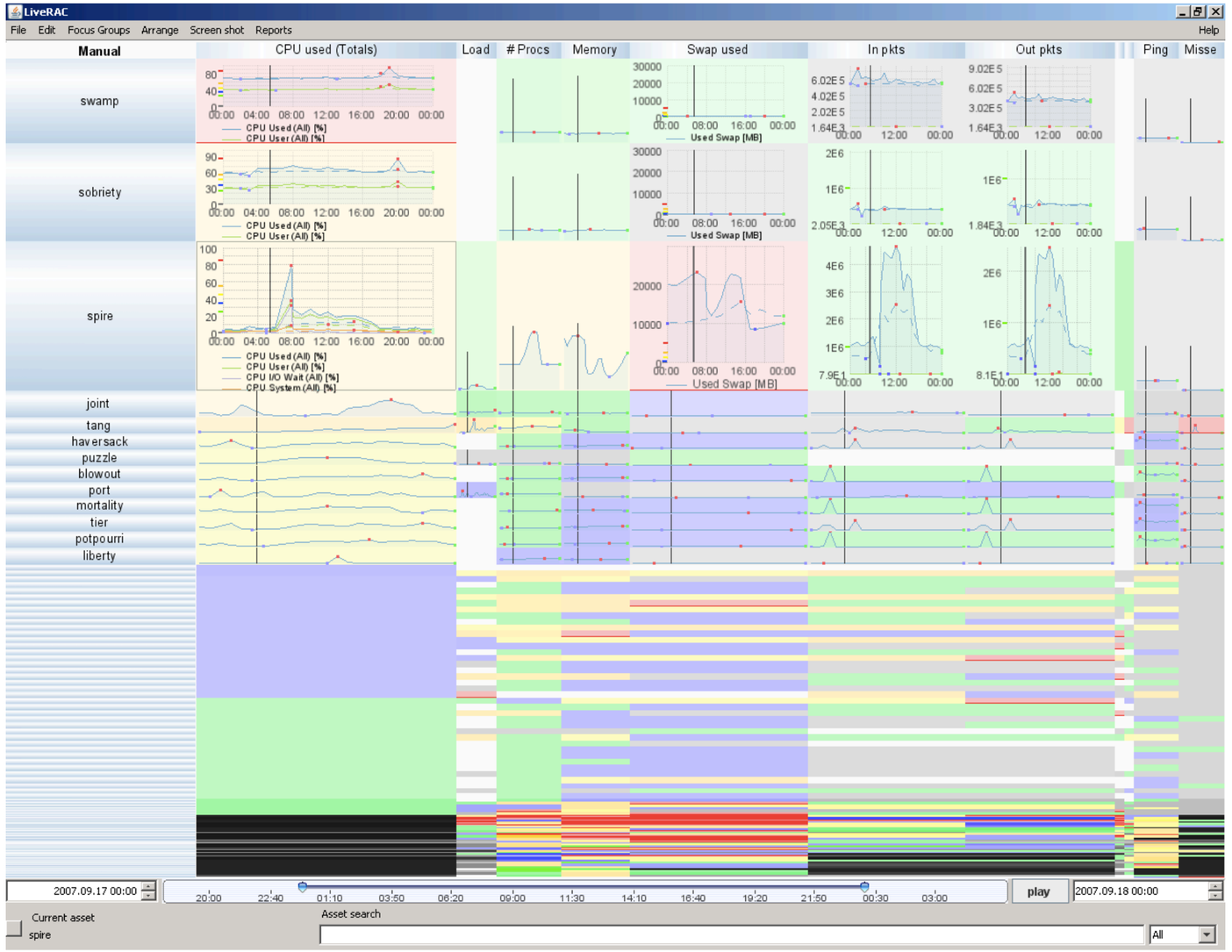






[Exploratory Analysis of Time-Series with ChronoLenses. Zhao, Chevalier, Pietriga, and Balakrishnan. IEEE TVCG 17(12):2422-2431 (Proc. InfoVis 2011).]

Case C: LiveRAC video



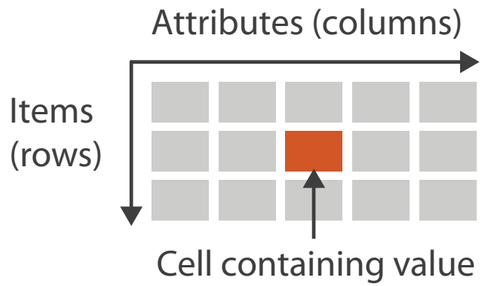
http://youtu.be/ld0c3H0VSkw

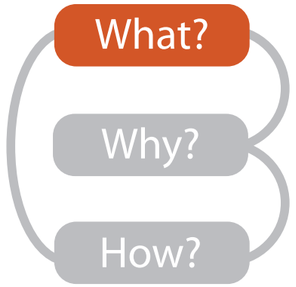
[LiveRAC - Interactive Visual Exploration of System Management Time-Series Data. McLachlan, Munzner, Koutsofios, North. Proc. Conf. on Human Factors in Computing Systems (CHI) 2008, pp 1483-1492.]

Case C: LiveRAC data abstraction

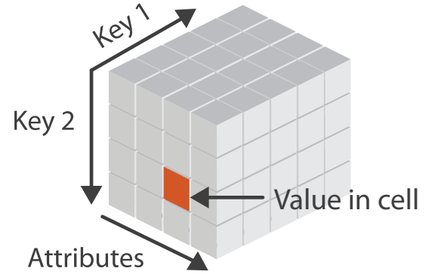
- multidimensional table: time series data
  - key attributes
    - time
      - 50,000: 5-minute intervals over 6 months
      - multi-scale levels of interest
    - devices
      - 4000
    - parameters
      - 20
      - ex: CPU usage, memory load, network traffic, alarms, ...
  - value attributes
    - parameter value for device at time point
      - quantitative
    - device groups
      - categorical

➔ Tables





➔ *Multidimensional Table*



➔ **Attribute Types**

➔ Categorical

➔ Ordered

➔ *Quantitative*

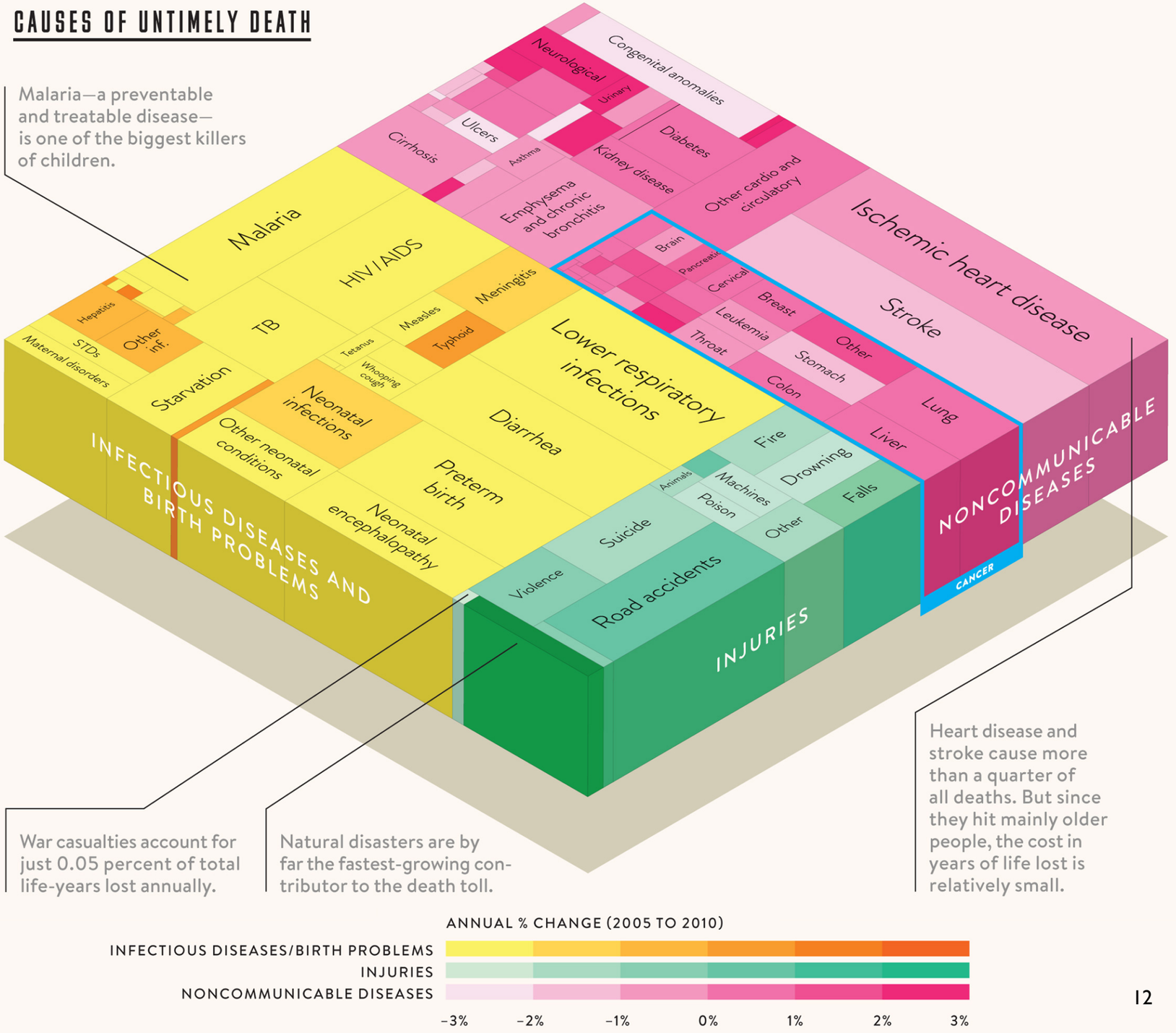
Exercise in class

Graph of the year:

"I love this graph because it shows that while the number of people dying from communicable diseases is still far too high, those numbers continue to come down. [...] But there remains much to do to cut down the deaths in that yellow block even more dramatically. We have the solutions. But we need to keep up the support where they're being deployed [...]"

Bill Gates

http://goo.gl//W7ac3m



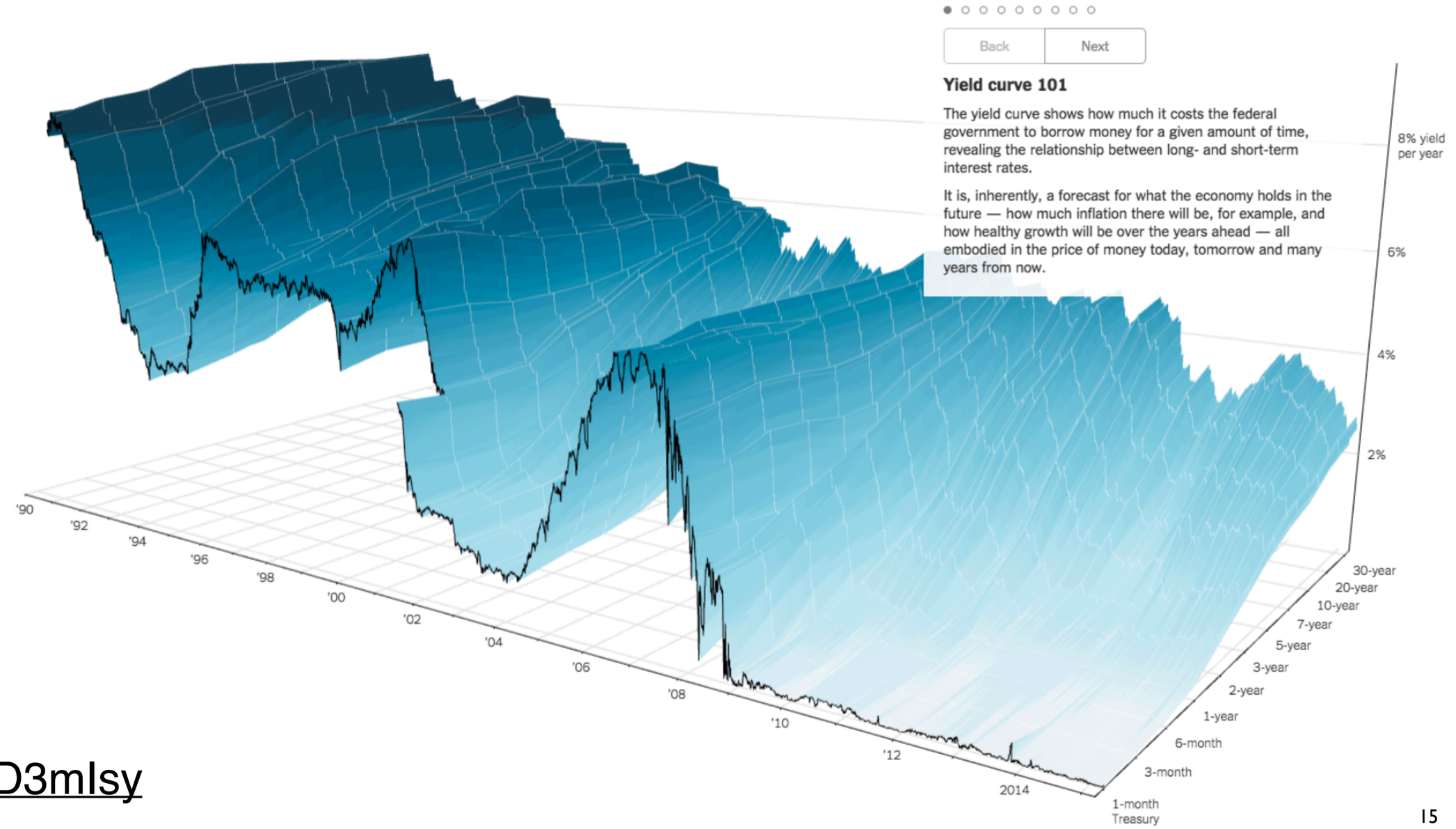
Exercise in class - Graph of the year

- In your discussion group (2-3 people) please answer the following questions:
  - Who is the audience?
  - What questions does this visualization answer?
  - What data are visualized? Make data abstraction
  - What tasks are supported? Make task abstraction
  - What design principles best describe why it is good / bad?
  - Why do you like / dislike this visualization?
  - Can you suggest any improvements? How would you redesign it?

3D Chart

Design critique

- 3D chart



http://goo.gl/D3mIsy

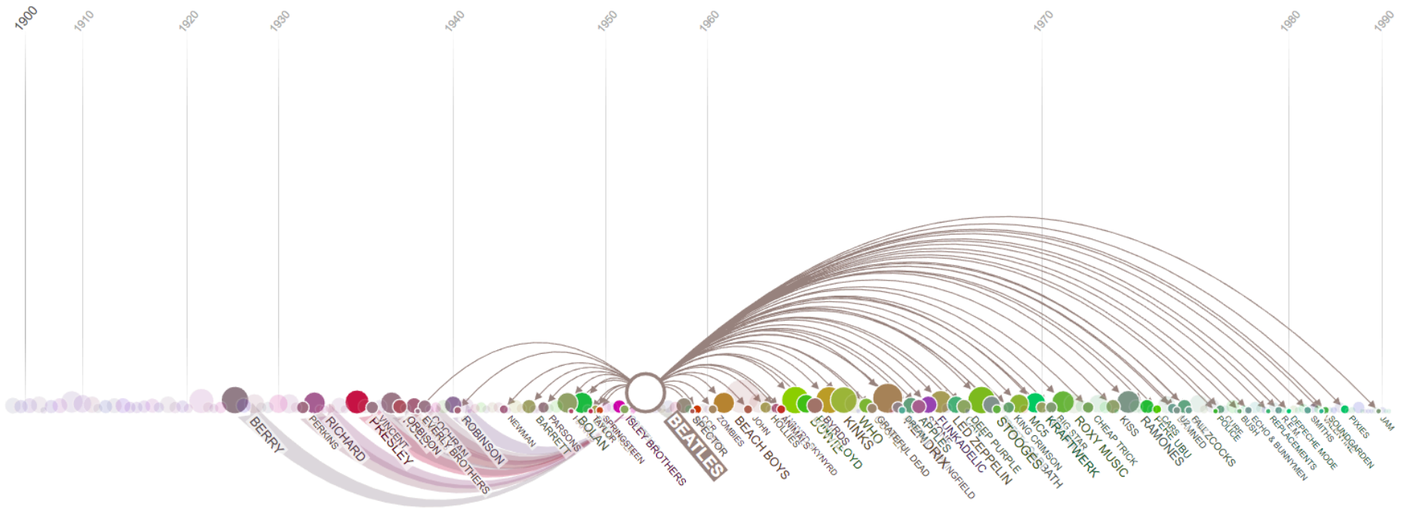
Design critique

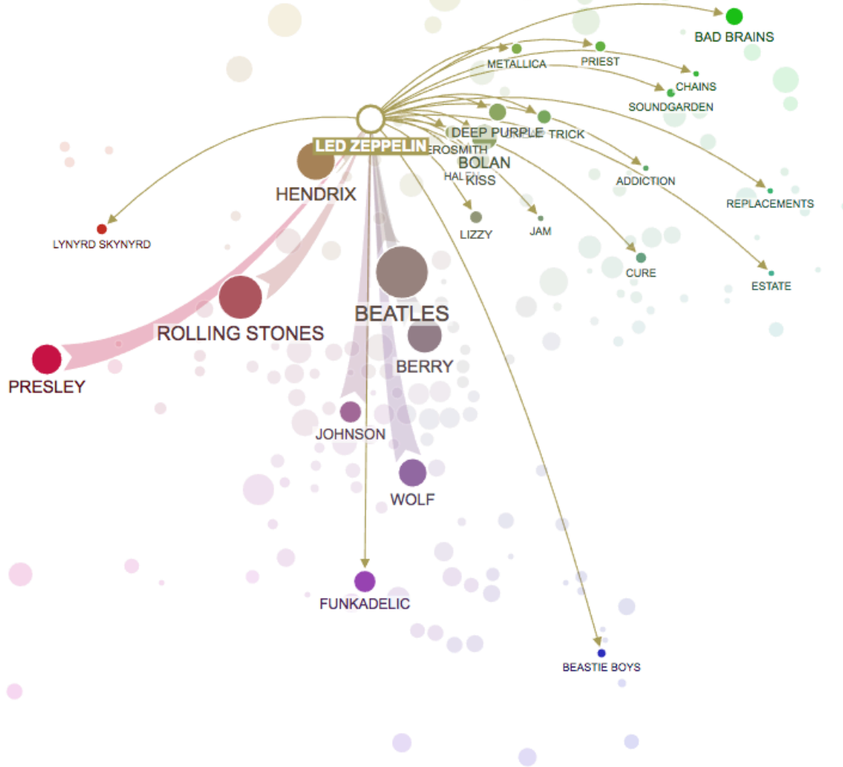
- In your breakout group, discuss the following questions:
  1. What are the data shown in the visualization?
  2. Which marks and channels are used?
  3. What is the value of 3D? What are the problems of 3D?
  4. What is the role of interactivity?
  5. How is the story told?
  6. Do you find the visualization effective?
  7. Why do you like / dislike this visualization?

Edgemaps

Design critique

- Edgemaps





http://mariandoerk.de/edgemaps/demo/

Design critique

- In your breakout group, discuss the following questions:
  1. What are the data shown? How could they be acquired?
  2. Which marks and channels are used?
  3. How is interaction used? Why is interaction used?
  4. Compare the timeline view to the similarity view. Which tasks do these views address?
  5. In the timeline view, do you notice something about the scales? What and why?
  6. Is animation important/effective?
  7. Why do you like / dislike this visualization?