Data Types: Multidimensional

- Abstract data
  - *Parallel coordinates* (A. Inselberg)
    - $N$ variables represented by $N$ parallel axes
    - Multivariate point depicted as a polyline connecting vertices on axes
    - Interaction
      - Limit range on axis
      - Scale axis
      - Reorder axes

E.g., http://www.parallelcoordinates.de/paco/

Tasks: Overview

- Panning/scrolling over display
- Separate “overview” display with “you are here” marker
  - E.g., Sublime Text 2

Tasks: Overview

- Focus+context
  - Handle overview and zoom tasks in same display
  - Focus items receive greater
    - Magnification and/or
    - Level-of-detail
  - Alternatively, two geometrically registered displays can be used
    - Feiner & Shamash, 91
    - Baudisch et al., 01
    - Jones et al., 13

S. Feiner & A. Shamash, UIST 91
Focus = flat panel;
Context = Head-worn display

P. Baudisch, N. Good, & P. Stewart, UIST 01
Focus = flat panel;
Context = projector
Tasks: Overview

- Focus+context
  - Handle overview and zoom tasks in same display
  - Focus items receive greater
    - Magnification and/or
    - Level-of-detail
  - Alternatively, two geometrically registered displays can be used
    - Feiner & Shamash, 91
    - Baudisch et al., 01
    - Jones et al., 13

B. Jones, H. Benko, E. Ofek, & A. Wilson, CHI 2013
Focus = flat panel TV
Context = projector illuminating room

Tasks: Zoom

- Current example: Prezi

Chris Fisher
Holly Lordpiece
Annie Nunn
Brittra Png
**Tasks: Filter**

- Narrow scope by eliminating (or de-emphasizing) "uninteresting" items
- Dynamic queries
  - Widgets specify queries
  - Satisfied interactively during manipulation
  - Google instant
- Examples in which filters are satisfied after widget manipulation
  - spotfire.tibco.com/demos
  - bluenile.com/diamond-search

**Tasks: Details-on-demand**

- Present additional information when requested
- Examples
  - Separate window/display
  - "Popup"/overlay/"tool tip"
  - Modify rendering of item to increase detail
Tasks: History

- Show historical evolution
- Support undo/redo
- Support creation of variants
- Range of examples
  - Single level undo/redo
  - Multilevel undo/redo
  - Photoshop history
    - Non-linear history
    - History brush
  - Editable Graphical Histories
  - Automatically generated tutorials

Tasks: History

- E.g., hypertext browsing history