Using Space Effectively: 2D II

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Effectiveness of space

Which graph is better?


Effective use of space

Scale break vs. Log scale

Both increase visual resolution
- Log scale - easy comparisons of all data
- Scale break – more difficult to compare across break

Linear scale vs. Log scale

Log scale
- Small fluctuations
- Percent change
\( d(10,20) = d(30,60) \)

[William S. Cleveland
The Elements of
Graphing Data]
Johannes Lambert used graphs to study the rate of water evaporation as function of temperature [from Tufte 83].

**Announcements**

**Final project**

**Design new visualization method**
- Pose problem, implement creative solution

**Deliverables**
- Implementation of solution
- 8-12 page paper in format of conference paper submission
- 2 design discussion presentations

**Schedule**
- Project proposal: 3/14
- Project presentation: 4/4
- Final paper and presentation: TBD

**Grading**
- Groups of up to 3 people, graded individually
- Clearly report responsibilities of each member

**Zooming**

[Link to Eames' Powers of Ten](http://www.powersoft10.com)
**Overview + details**

[Hornbæk et al. 2002]

**Interactive zooming**

[Pad++ [Bederson and Hollan 94]]

**Pad++**

TableLens [Rao & Card 94]

[http://www.youtube.com/watch?v=WyPiRAC5FfU]

**Semantic zooming**

Change visual representations as zoom level changes

[PAD [Perlin and Fox 93]]

**Date lens**

[Bederson et al. 04]
Distortion

Single view detail + context
- Focus area – local details
- De-magnified area – surrounding context
- Like a rubber sheet with borders tacked down

Nonlinear Magnification Infocenter [http://www.cs.indiana.edu/~tkeahey/research/nlm/nlm.html]

Bifocal display [Leung and Apperley 94]

Multifocal display [Leung and Apperley 94]

Fisheye [Leung and Apperley 94]

Nonlinear magnification [Leung and Apperley 94]
3D pliable surface  [Carpendale & Montagnese 01]

Aligned and sheared  [Carpendale & Montagnese 01]

Aligned with viewer

Sheared

6 types of distortions  [Carpendale & Montagnese 01]

Gaussian, Cosine, Hemisphere, Linear, Inverse Cosine and Manhattan. Top row shows transition from focus to distortion, bottom row from distortion to context.

Cartographic Distortions

Cartograms: Distort areas

Scale area by data
[From Cartography, Dent]

Election 2004 map

http://www-personal.umich.edu/~mejn/election/
Election 2004 map

Statistical map with shading

Rectangular cartogram

Framed rectangle chart

Rectangular cartogram
Dorling cartogram

States as nodes in a graph

Distorting distances

London underground

Comparison to geographic map

Summary

- Spatial layout is the most important visual encoding
- Geometric properties of spatial transforms support geometric reasoning
- Show data with as much resolution as possible
- Use distortions to emphasize important information