Visualisation Rules of Thumb

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Previously in CSCM27...

- How should you use colour for categorical information?
- How should you use colour for ordered or continuous information?
- Colours for large areas should be...
- Colours for small areas should be...
- What is a chunk (memory)? Ideal chunking length?
- What is interference?

Previously in CSCM27... (2)

- We now move to more complex information visualisation elements
- In particular, initial rules of thumb

Rules of Thumb for Visualisation

Thanks

- Huge thanks to Tamara Munzner (my PhD adviser)
- Many of the figures are from her work
- This lecture is based off of her lectures

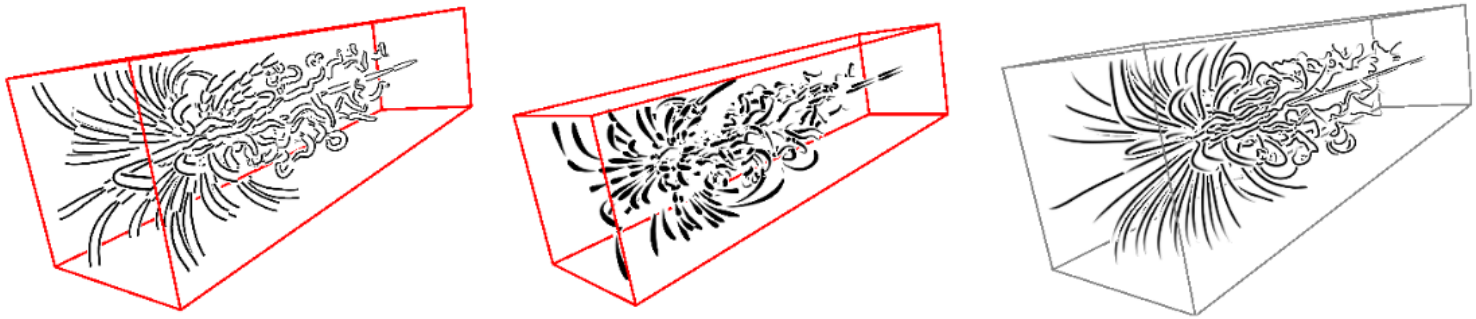
Laws of Visualisation?

- There are no laws of visualisation
  - there are only not so good and better visualisations
- These rules of thumb are based off of human perception
- Some people may disagree about the degree to which they should be applied
- most people think they are factors

Function Over Form

- Start with effectiveness information visualisations
- Then, make it look cool
- Get a functional, effective system working first
  - should support all of the major tasks of your users
  - doesn't need to be pretty
  - then work on *form* – get a graphic designer if needed
- Starting with important aesthetics constraints limit effectiveness of system

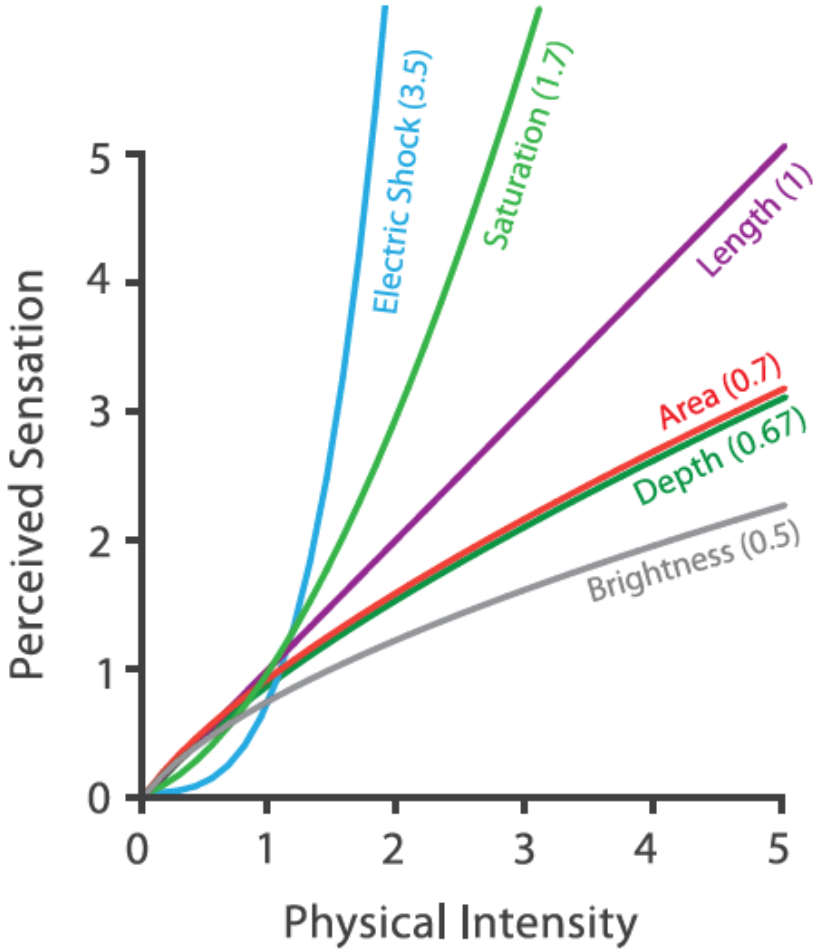
Use of 3D should be justified



Liya Li and Han-Wei Shen. 2007. Image-Based Streamline Generation and Rendering. IEEE Transactions on Visualization and Computer Graphics 13, 3 (May 2007), 630-640.

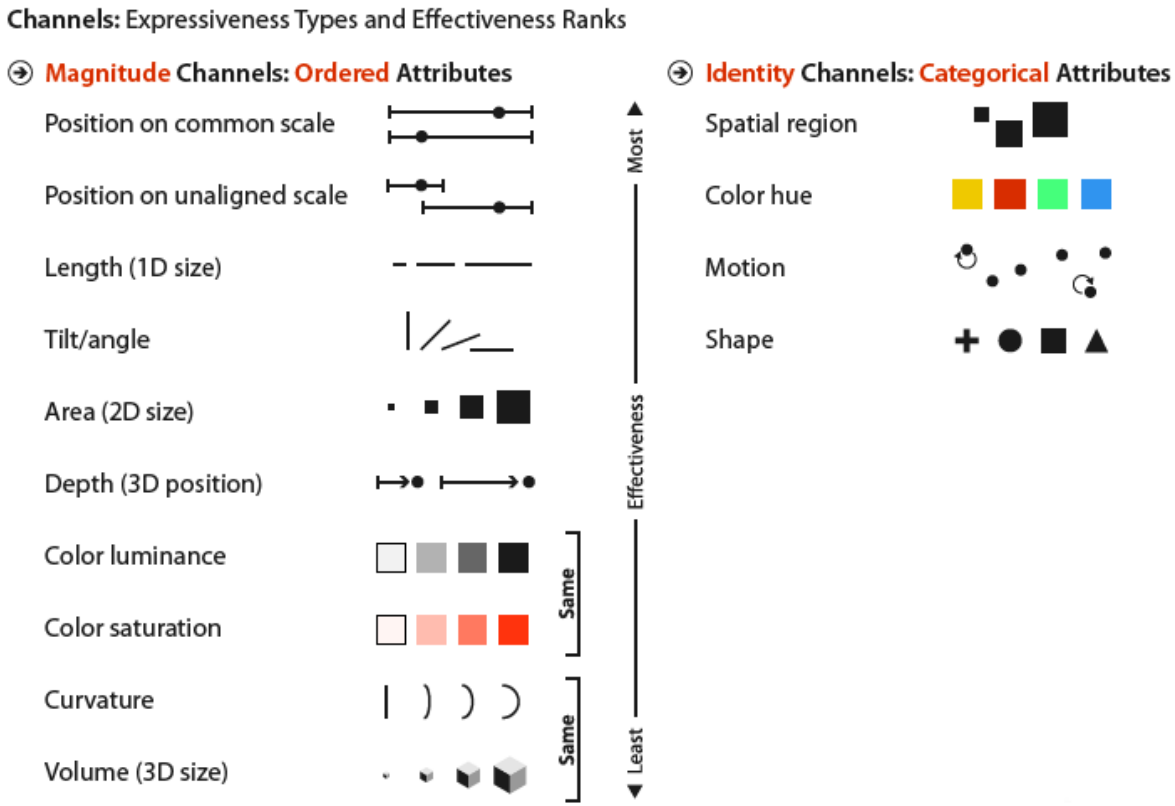
- If your data is 3D, sometimes you need to show 3D
  - helps in the perception of shape
  - system needs to be interactive to synthesise across 3D views

Use of 3D should be justified (2)



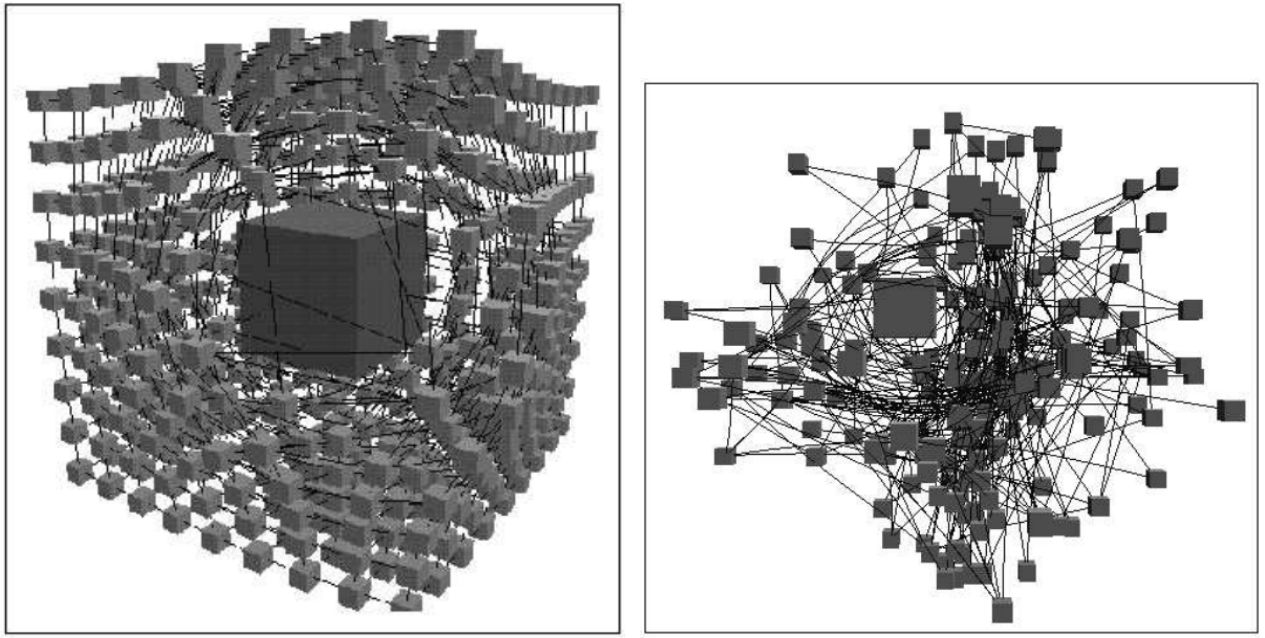
- Depth has sublinear perception and can bee less effective

Use of 3D should be justified (3)



- For ordered attributes, depth is not all that effective

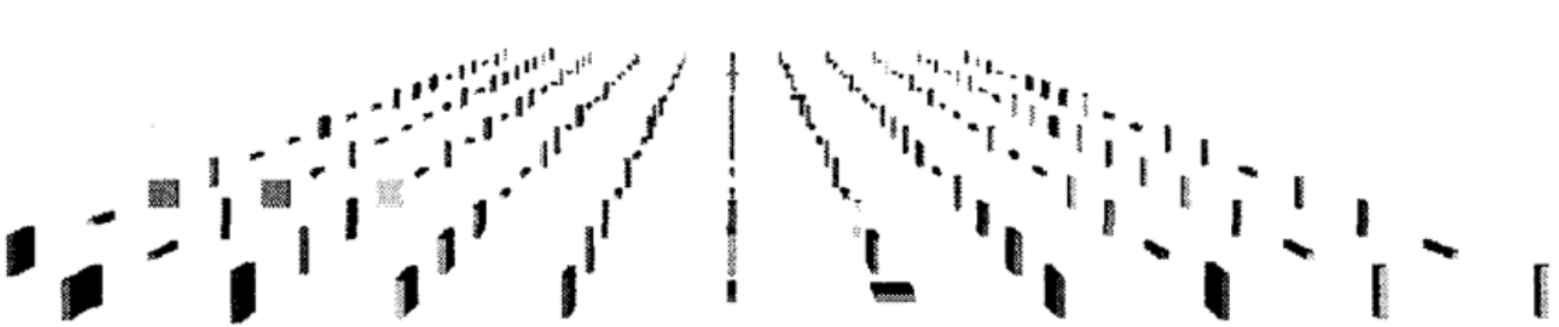
3D has occlusion problems



M. S. T. Carpendale, D. J. Cowperthwaite, and F. D. Fracchia. 1996. Distortion viewing techniques for 3-dimensional data. In Proceedings of the 1996 IEEE Symposium on Information Visualization (INFOVIS '96) (INFOVIS '96).

- Stuff blocks other stuff in 3d (occlusion)
- It is really hard to see connections between items
- Screens are 2D and we need to project

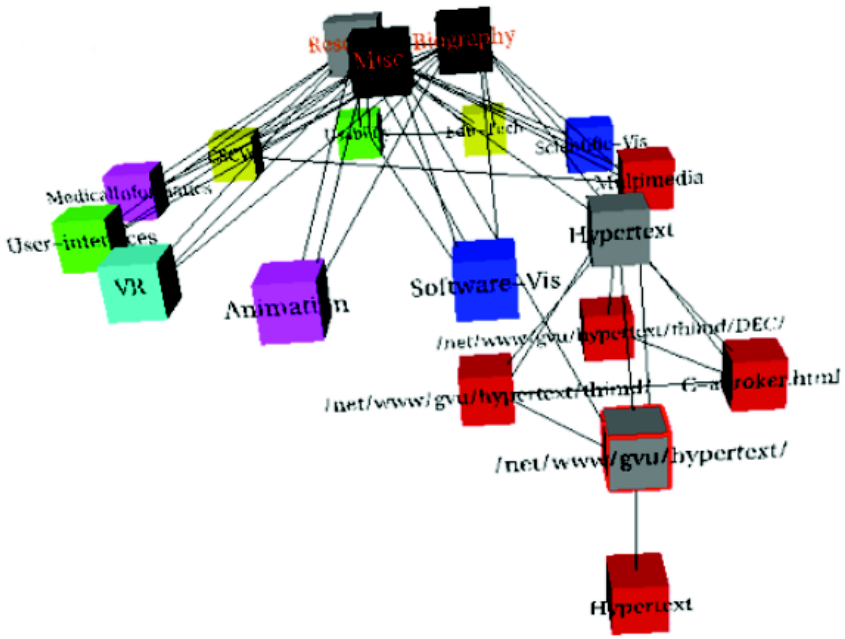
Perspective Projection Interference



S. Mukherjea, K. Hirata and Y. Hara, "Visualizing the results of multimedia Web search engines," Information Visualization ’96, Proceedings IEEE Symposium on pp. 64-65.

- Makes it very difficult to compare height and length

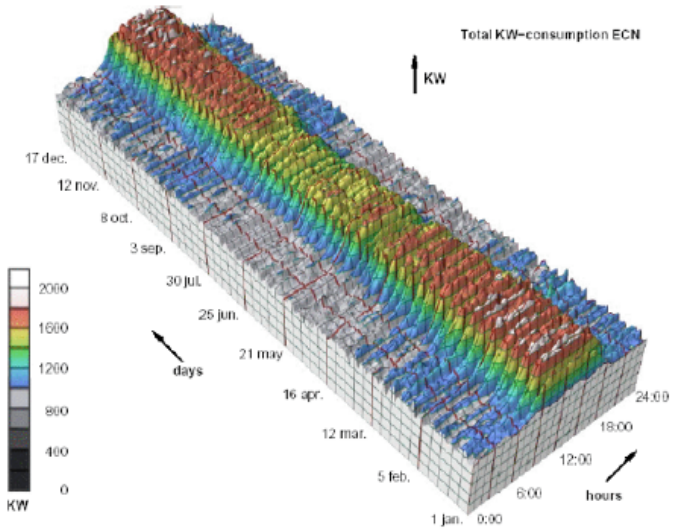
3D Text Reading Hard



S. Mukherjea and J. D. Foley. 1995. Visualizing the World-Wide Web with the navigational view builder. In Proceedings of the Third International World-Wide Web conference on Technology, 1075-1087.

- 3D text is hard to read
- Harder when the model is tilted

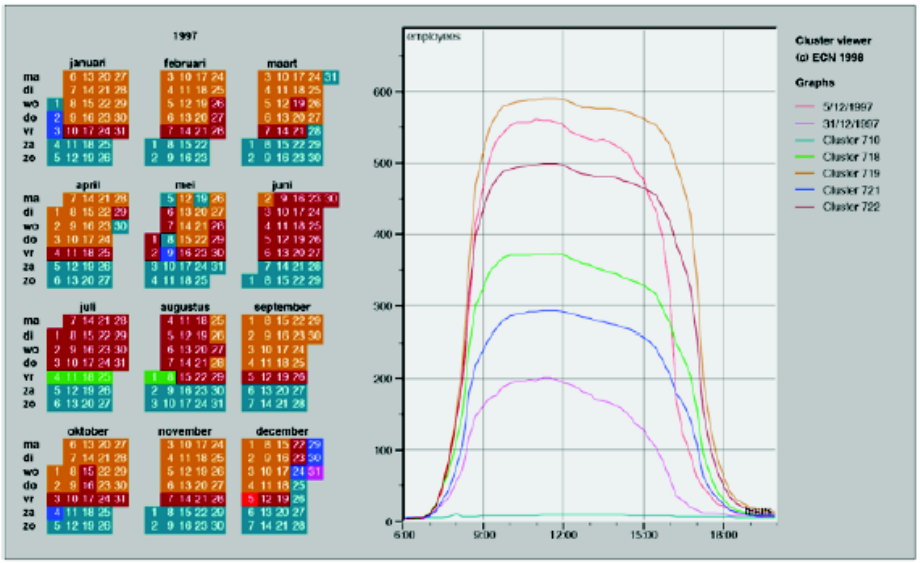
Encoding of Calendar Data in 3D



J. J. van Wijk and E. R. van Selow. 1999. Cluster and Calendar Based Visualization of Time Series Data. In Proceedings of the 1999 IEEE Symposium on Information Visualization (INFOVIS '99).

- Does this provide an overview of electricity over time?

Encoding of Calendar in 2D



J. J. van Wijk and E. R. van Selow. 1999. Cluster and Calendar Based Visualization of Time Series Data. In Proceedings of the 1999 IEEE Symposium on Information Visualization (INFOVIS '99).

- Visualisation that is more effective for this data set

For Non-Spatial Data Be Careful of 3D

- 3D okay for 3D spatial data
- Enthusiasm in 1990s for 3D visualisation on non-spatial data
- High scepticism for this encoding nowadays
- Be careful for networks and point clouds

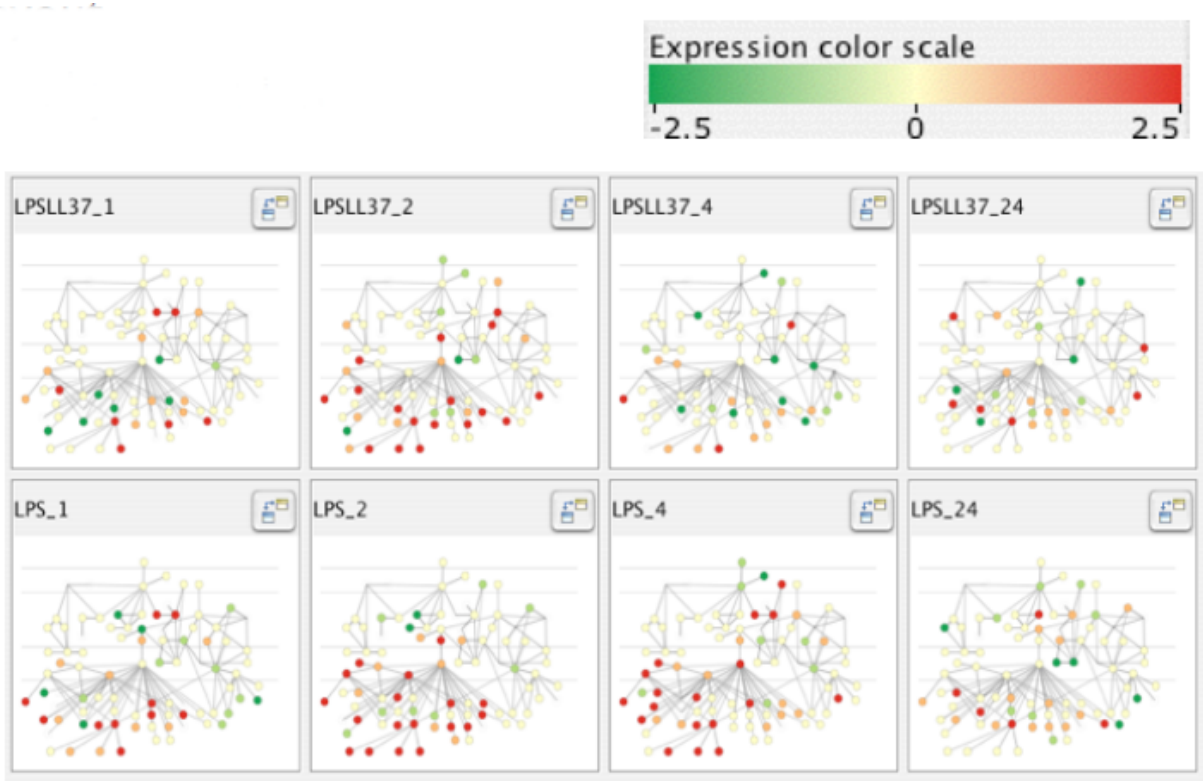
Make Good Use of 2D

- If reading text is important, maybe a list?
  - file drop downs are easy to use
  - Google is a list and quite effective
  - Why use 2D in this case
- Many tasks require 2D (eg reading network diagrams)
- Think if your task requires 2D

Eyes Better Than Memory

- It is easy to compare two side-by-side views
- It is hard to memorise one view and apply it to the other
- Animation (keep it short)
  - Great for explanatory visualisation and story telling
  - Great for detecting changes in a small number of frames
  - Great to transition between two states
  - Bad for long time series

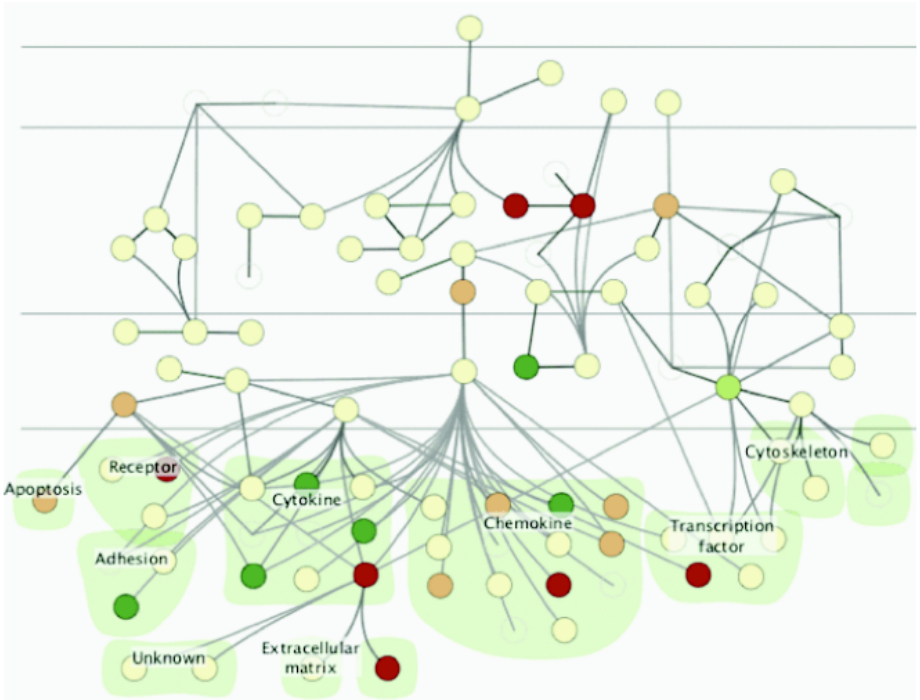
Example: Cerebral



A. Barsky, T. Munzner, J. Gardy and R. Kincaid, "Cerebral: Visualizing Multiple Experimental Conditions on a Graph with Biological Context," in IEEE Transactions on Visualization and Computer Graphics, vol. 14, no. 6, pp. 1253-1260, 2008.

- Same layout of biological network
- Colour nodes differently based on the condition

Example: Cerebral (2)



A. Barsky, T. Munzner, J. Gardy and R. Kincaid, "Cerebral: Visualizing Multiple Experimental Conditions on a Graph with Biological Context," in IEEE Transactions on Visualization and Computer Graphics, vol. 14, no. 6, pp. 1253-1260, 2008.

- Animation makes it very difficult to compare adjacent frames
- Too many changes going on (Christmas Tree)

Shneiderman Mantra

- Overview = summary of data
- Finer details
  - If more than two levels of structure, multiscale
  - Don’t forget browsing local neighbourhoods (for graphs)