Charles Joseph Minard's Map (1869), https://commons.wikimedia.org/wiki/File:Minard.png

Visualization allows people to offload cognition to the perceptual system, using carefully designed images as a form of external memory. The human visual system is a very high-bandwidth channel to the brain, with a significant amount of processing occurring in parallel and at the pre-conscious level. We can thus use external images as a substitute for keeping track of things inside our own heads.

Data Visualization
Information Visualization
Visual Analytics


Colin Ware, *Visual thinking for design* (Burlington, MA: Morgan Kaufmann, 2008).

“Visual analytics solutions provide technology that combines the strengths of human and electronic data processing. Visualization becomes the medium of a semi-automated analytical process, where humans and machines cooperate using their respective distinct capabilities for the most effective results.

Visual Information Seeking Mantra:
Overview first, zoom and filter, then details-on-demand.

Type by Task Taxonomy (TTT):
Seven data types
- 1-, 2-, 3-dimensional data, temporal and multi-dimensional data, and tree and network data
Seven tasks
- overview, zoom, filter, details-on-demand, relate, history, extract

Preattentive Features and Tasks (Healey)

https://youtu.be/wnvoZxe95bo

Christopher G. Healey, "Perception in Visualization", http://www.csc.ncsu.edu/faculty/healey/PP/
3 February Two Thousand and Sixteen, Dear journal today I saw four chickadees and heard two more calling from afar.

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Visualization Catalogues

- Period Table of Visualization Methods, [http://www.visual-literacy.org/periodic_table/periodic_table.html](http://www.visual-literacy.org/periodic_table/periodic_table.html)
- A Visual Bibliography of Tree Visualization 2.0, [https://treevis.net](https://treevis.net) [http://vcg.informatik.uni-rostock.de/~hs162/treeposter/poster.html](http://vcg.informatik.uni-rostock.de/~hs162/treeposter/poster.html)
Viz Resources

- Flowingdata, http://flowingdata.com/
- Infovis Wiki, http://www.infovis-wiki.net/

Negative Examples

- WTF Visualizations, http://viz.wtf/
Simple Web Based Tools

- Data Wrapper, https://datawrapper.de/
- Charted, http://www.charted.co/
- Write your own:
  - D3 (html+js), http://d3js.org/
  - Bokeh (Python), http://bokeh.pydata.org/

Bigger Tools

- RapidMiner (data mining background), https://rapidminer.com/
Tableau

- Academic program, [http://www.tableau.com/academic](http://www.tableau.com/academic)
  - Free for students and teachers
  - Not free for administration, [http://www.tableau.com/solutions/higher-ed](http://www.tableau.com/solutions/higher-ed)
- Tableau Public, [https://public.tableau.com/s/](https://public.tableau.com/s/)
- Tutorials:
  - Training videos, [https://www.tableau.com/learn/tutorials/on-demand/getting-started](https://www.tableau.com/learn/tutorials/on-demand/getting-started)
  - Short course, [https://www.tableau.com/learn/starter-kit](https://www.tableau.com/learn/starter-kit)
  - Gallery examples, [http://www.tableau.com/learn/gallery](http://www.tableau.com/learn/gallery)