Data Visualization: A Picture’s Worth a Thousand Numbers

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Agenda

- Why Data Visualization?
- Basic Principles
- Considerations for Approach
- Examples
- Community of Practice
Why Visualization? Brain Rules:

🌟 #10: Vision trumps all other senses.

🌟 #9: Stimulate more of the senses at the same time.

🌟 #4: People don’t pay attention to boring things.
In addition to the well known social issues of illiteracy and innumeracy, there also should be such a concept as “inmapparancy,” meaning insufficient geographical knowledge.

A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose “1-2 billion” and “largest in the world”, respectively.

Even with Asian and European college students, geographical estimates were often off by factors of 2-3. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as Mercator).

A particularly extreme example is the worldwide misjudgement of the true size of Africa. This single image tries to embody the massive scale, which is larger than the USA, China, India, Japan and all of Europe...... combined!
the power of data visualization...
The Value of Data Visualization

- Two basic types
  - Exploration – find a story in the data
  - Explanation – tell a story to an audience
- Represent large quantities of data in a comprehensible way
- Help the user see relationships in the data
Four Pillars of Effective Visualizations

<table>
<thead>
<tr>
<th>Formatting: useful?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure: correct?</td>
</tr>
<tr>
<td>Content: (only) the right information</td>
</tr>
<tr>
<td>Purpose: clear and focused?</td>
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A Few of Tufte’s Principles

🌟 Above all else, show the data
🌟 Maximize the data to ink ratio
  - Data ink is the ink on a graph that represents data
🌟 Erase non-data ink
🌟 “Do no harm” with color – color used poorly is worse than no color at all
Maximize Data-Ink Ratio

10 grids

20 grids
Lots of Non-Data Ink

A

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In ut mauris quis tellus

B

Lorem ipsum dolor sit amet, consectetur adipiscing elit. In ut mauris quis tellus
Erase Non-Data Ink

Improved

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Lorem ipsum dolor sit amet, consectetur adipiscing elit. In ut mauris quis tellus
Erase Non-Data Ink

chart junk

visually concise
Common Data Visualization Issues

🌟 Inappropriate display choices that distort reality, e.g., pie charts, 3-D charts
🌟 Variety for the sake of variety
🌟 Poorly designed display choices that use noisy fill patterns, line styles, saturated/bright colors
🌟 Inconsistent ordering and placement
🌟 Inconsistent or reversed scales
🌟 Proportional axis scaling
Visualization Options / Many Eyes

- See Relationships Among Data Points
  - Scatterplot; Matrix Chart; Network Diagram
- Compare a set of values
  - Bar Chart; Block Histogram; Bubble Chart
- Track changes (rises/falls) over time
  - Line Graph; Stack Graph; Stack Graph for Categories
Visualization Options (continued)

🌟 See the Parts of a Whole
  – Pie Chart; Treemap

🌟 Analyze Text
  – Word Tree; Tag Cloud; Phrase Net; Word Cloud Generator

🌟 See the World
  – Maps
Factors to Consider for Data Visualizations
**Purposes:**
Data exploration
Establish a conceptual framework for how to understand data
Presentation
Pattern checking
Modeling for local programs
Reporting/public awareness

**Audiences (internal and external stakeholders):**
State level staff
Families
Monitoring groups
Local programs
Advocacy groups
Legislators

**Level of investment:**
Free applications, easy-to-use, quick
Free-to-inexpensive, might have to learn how to do something, more ambitious
Costs $$$, complex or need to contract with an outside party
<table>
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<tr>
<th>Audience</th>
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**Investment**:
- $0 ~
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- $$ ~
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**Public Reporting**
- Assessment Verification
- Training Presentation
- Audience

**Purpose**
- Public Reporting
- Internal Users
- Families General Public
- Legislators Research
- Research
- General Public
- Legislators
- Families
- Public
- Audience
- Purpose
Resource List
Questions
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