Data Visualization

Slides by Michael Hahsler
Chart Suggestions—A Thought-Starter

**Comparison**
- What would you like to show?

**Relationship**
- Among Items
- Composition
  - Changing Over Time
  - Few Periods
  - Many Periods
  - Only Relative Differences Matter
  - Relative and Absolute Differences Matter
  - Stacked 100% Column Chart
  - Stacked 100% Area Chart

**Distribution**
- Over Time
- Few Periods
- Many Categories
- Single or Few Categories
- Many Periods
- Non-Cyclical Data
- Cyclical Data
- Line Chart
- Column Chart
- Circular Area Chart

**Composition**
- Static
- Two Variables
- Three Variables
- Many Data Points
- Few Data Points
- Simple Share of Total
- Accumulation or Subtraction to Total
- Components of Components
- Stacked 100% Column Chart
- Stacked Column Chart
- Stacked Area Chart
- Pie Chart
- Waterfall Chart
- 3D Area Chart
- Scatter Chart

www.ExtremePresentation.com
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Important Components of Visualization

Components

- **Symbols**: Circles, dots, lines, bars, ...
- **Position**: Axes (labels and units) and the origin (0/0) are important.
- **Length, Size and Area**: Should only be used if it faithfully represents information.
- **Color**: A color should not overpower another. Limit to 3 or 4 colors.
- **Angle**: Human eyes are not good at comparing angles!

Goals

- All components of the plot need to convey information. E.g., do not use color just to make it more colorful.
- Good visualizations show patterns clearly and need little explanation.
Data Visualization

Information visualization is a field of its own.

Eat **fruits** when they are in season!!!
Do you notice the slight flaw?
Tools - Popularity

Rexer Analytics 2015

n = 1,220 analytic professionals

Driving from Kaunas to Moscow

Source: Google Maps
The map of Napoleon's Russian campaign

The map of Napoleon's Russian campaign 1812 ~ 1813

Figurative Map of the successive losses in men of the French Army in the Russian campaign 1812 ~ 1813


The numbers of men present are represented by the widths of the colored zones at a rate of one millimeter for every ten thousand men; they are further written across the zones. The red designates the men who enter Russia, the black those who leave it. —— The information which has served to draw up the map has been extracted from the works of M.M. Thiers, de Séguir, de Fersenac, de Chambray and the unpublished diary of Jacob, the pharmacist of the Army since October 28th. In order to better judge with the eye the diminution of the army, I have assumed that the troops of Prince Jérôme and of Marshal Davout, who had been detached at Minsk and Mogilev and have rejoined near Orsha and Vitebsk, had always marched with the army.

Translated from French (source: https://edspace.american.edu/visualwar/minard/)

Economy at a Glance

The recent failure in the housing and credit markets have resulted in a slowdown in the US economy. 2007 GDP growth was estimated at 2.2% but in 2008 it is projected to be just 0.9%.

1. UNEMPLOYMENT RATE: In percentage, seasonally adjusted
2. PAYROLL EMPLOYMENT: Number of jobs, in thousands, seasonally adjusted
3. AVG. HOURLY EARNINGS: For production and non-supervisory workers on private nonfarm payrolls, seasonally adjusted
4. CONSUMER PRICE INDEX: All items, U.S. city average, all urban consumers, 1982-84 = 100, 1-month % change, seasonally adjusted
5. PRODUCERS PRICE INDEX: Finished goods, 1982 = 100, 1-month % change, seasonally adjusted
6. U.S. IMPORT PRICE INDEX: All imports, 1-month percentage change, not seasonally adjusted
7. PRODUCTIVITY: Output/hour, nonfarm business, quarterly data, % change from previous quarter at annual rate, seasonally adjusted

Fox News – 2012 presidential race

2012 PRESIDENTIAL RUN

GOP CANDIDATES

70% BACK PALIN

63% BACK HUCKABEE

60% BACK ROMNEY

SOURCE: OPINIONS

DYNAMIC
Forget pepperoni - mushroom is Britain's most liked pizza topping (65%), followed by onion (62%) and then ham (61%)
yougov.co.uk/news/2017/03/0 ...

Is this pie a pie chart?
You could use a bar chart instead
Axes
Sky News – Average UK life expectancy

81.2 Average UK life expectancy

England: 79.5
Scotland: 83.1
Wales: 81.2
N. Ireland: 82.3
UK Life Expectancy (fixed)

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<th>Female</th>
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<tr>
<td>N. Ireland</td>
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Recommended Chart

After fixing the y-axis