Data Visualization

Slides by Michael Hahsler
Chart Suggestions—A Thought-Starter

**Comparison**

*What would you like to show?*

**Relationship**

**Distribution**

**Composition**

- **Among Items**
  - **Bar Chart**
    - Many Items
    - Few Categories
  - **Circular Area Chart**
    - Cyclic Data
    - Many Periods
  - **Line Chart**
    - Non-Cyclical Data
    - Many Periods
  - **Column Chart**
    - Single or Few Categories
    - Few Periods
- **Over Time**
  - **Column Histogram**
    - Few Data Points
    - Single Variable
  - **Line Histogram**
    - Many Data Points
  - **Scatter Chart**
    - Two Variables
  - **3D Area Chart**
    - Three Variables
- **Composition**
  - **Stacked 100% Column Chart**
    - Only Relative Differences Matter
  - **Stacked Column Chart**
    - Relative and Absolute Differences Matter
  - **Stacked 100% Area Chart**
    - Only Relative Differences Matter
  - **Stacked Area Chart**
    - Relative and Absolute Differences Matter
  - **Pie Chart**
    - Simple Share of Total
  - **Waterfall Chart**
    - Accumulation or Subtraction to Total
  - **Stacked 100% Column Chart with Subcomponents**
    - Components of Components

- **Two Variables per Item**
  - **Variable Width Column Chart**
  - **Table or Table with Embedded Charts**
- **Many Categories**
  - **Among Items**
- **One Variable per Item**
  - **Scatter Chart**
  - **Bubble Chart**
- **Changing Over Time**
  - **Few Periods**
  - **Many Periods**
Important Components of Visualization

- **Symbols**: Circles, dots, lines, bars, ...
- **Position**: Axes and the origin (0/0) are important.
- **Size/Area**: Should only be used if it faithfully represents information.
- **Color**: One color should not overpower another.
- **Angle**: Human eyes are not good at comparing angles.
- All components of the plot need to convey information. E.g., don’t use color just to make it more colorful.
Data Visualization

Infoviz is a field of its own.

Eat **fruits** when they are in season!!!
Tools - Popularity

Rexer Analytics 2015

n = 1,220 analytic professionals


The map of Napoleon's Russian campaign

Created by M. Minard, Inspector General of Bridges and Roads (retired).
Paris, November 20, 1869.
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

Source: Bureau of labor statistic Graphics: RAJ
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 ...
You could use a bar chart instead
Sky News – Average UK life expectancy

81.2 Average UK life expectancy

- England: 79.5
- Scotland: 83.1
- Wales: 82.4
- N. Ireland: 82.3
# UK Life Expectancy (axes)

<table>
<thead>
<tr>
<th>Column1</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>79.5</td>
<td>83.1</td>
</tr>
<tr>
<td>Scotland</td>
<td>77.1</td>
<td>81.2</td>
</tr>
<tr>
<td>Wales</td>
<td>78.4</td>
<td>82.4</td>
</tr>
<tr>
<td>N. Ireland</td>
<td>78.5</td>
<td>82.3</td>
</tr>
</tbody>
</table>

**Recommended Chart**

After fixing the y-axis

**UK Life Expectancy**

- England: Male, Female
- Scotland: Male, Female
- Wales: Male, Female
- N. Ireland: Male, Female
Axes

![Graph of vinyl sales since 1993](image1)

**Vinyl Sales Since 1993**

**Millions of Units**

<table>
<thead>
<tr>
<th>Year</th>
<th>1993</th>
<th>96</th>
<th>99</th>
<th>02</th>
<th>05</th>
<th>08</th>
<th>11</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>800</td>
</tr>
</tbody>
</table>

Source: RIAA

![Graph of vinyl sales since 1973](image2)

**Vinyl Sales Since 1973**

**Millions of Units**

<table>
<thead>
<tr>
<th>Year</th>
<th>1973</th>
<th>78</th>
<th>81</th>
<th>84</th>
<th>87</th>
<th>90</th>
<th>93</th>
<th>96</th>
<th>99</th>
<th>02</th>
<th>05</th>
<th>08</th>
<th>11</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>600</td>
<td>450</td>
<td>300</td>
<td>150</td>
<td>100</td>
<td>50</td>
<td>20</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend:
- Vinyl single (45)
- Vinyl LP/EP