

Applied Visualization

61.6 %: 99.19

104.19

86.72

72.48

Why do we do data visualization?

- Help **people** understand data and make decisions.
- Information transmission rates
 - Seeing: 10^7 bits/second
 - Touching: 10^6 bits/second
 - Hearing: 10^5 bits/second
 - Smelling: 10^5 bits/second
 - Tasting: 10^3 bits/second

Colormap should match data type

- Categorical



- Sequential



- Diverging



Rainbow Color Map (Still) Considered Harmful

David Borland
and Russell M.

Research has shown that the rainbow color map is rarely the optimal choice when displaying data with a pseudocolor map. The rainbow color map con-

mercials, weather forecasts, and even the IEEE Visualization Conference 2006 call for papers, just to name a few. The problem with this wide use of the rain-



Selecting a colormap with plotnine

Select a colormap for your plotnine graphs by adding:

```
+ p9.scale_color_cmap(colormap_name)
```

e.g.

```
+ p9.scale_color_cmap('plasma')
```

The set of allowed colors and details of the colormaps including luminosity changes is at:

matplotlib.org/tutorials/colors/colormaps.html

Tufte's principles of graphical integrity

- Representation of numbers should be proportional to their values.
- Use clear labels.
- Show data variation not design variation.
- Used standardized units for money over time.
- Number of information carrying dimensions in a figure should not exceed number of dimensions in the data.
- Graphics must not quote data out of context.

Tufte advice

Maximize the data-ink ratio, within reason:

$$\text{Data Ink Ratio} = \frac{\text{data ink}}{\text{total ink in graphic}}$$



Ten Simple Rules for Better Figures

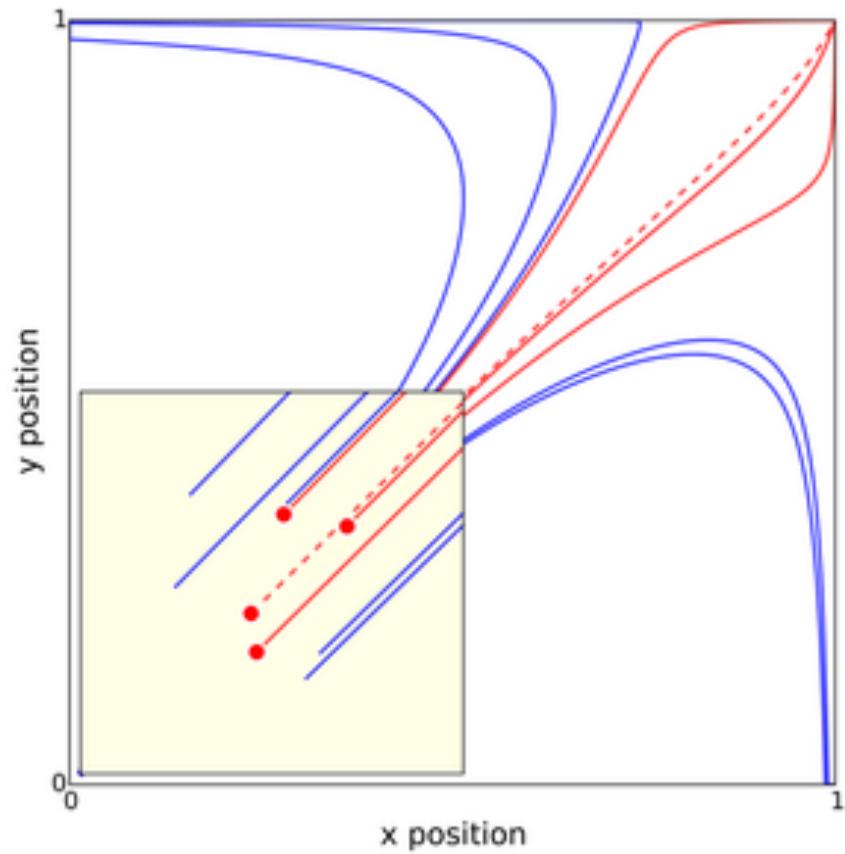
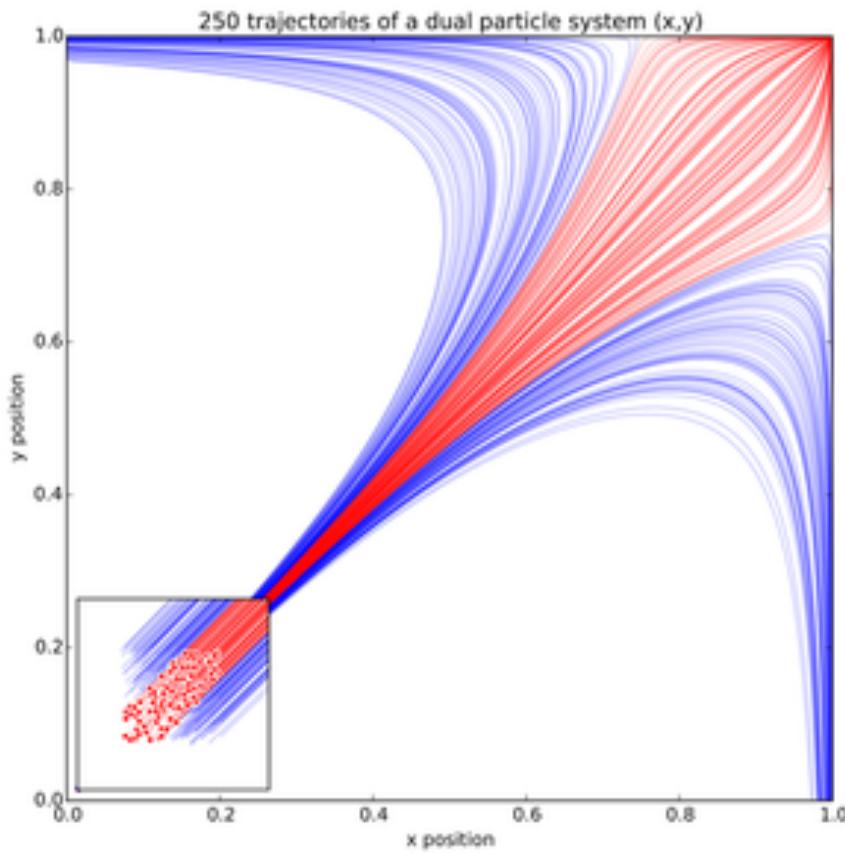
Nicolas P. Rougier^{1,2,3*}, Michael Droettboom⁴, Philip E. Bourne⁵

1 INRIA Bordeaux Sud-Ouest, Talence, France, **2** LaBRI, UMR 5800 CNRS, Talence, France, **3** Institute of Neurodegenerative Diseases, UMR 5293 CNRS, Bordeaux, France,

4 Space Telescope Science Institute, Baltimore, Maryland, United States of America, **5** Office of the Director, The National Institutes of Health, Bethesda, Maryland, United States of America

- Know your audience.
- Identify your message.
- Adapt the figure to the support medium.
- Captions are not optional.
- Do not trust the defaults.
- Use color effectively.
- Do not mislead the reader.
- Avoid “chart junk”.
- Message trumps beauty.
- Get the right tool.

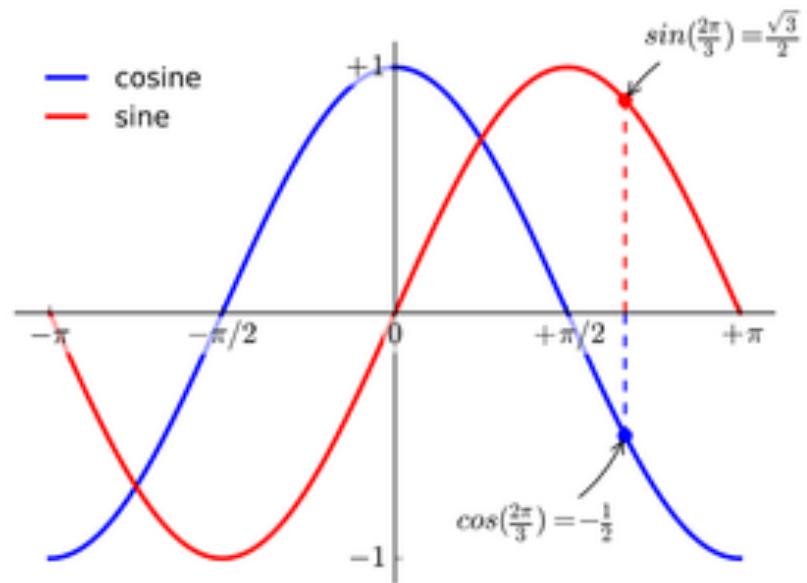
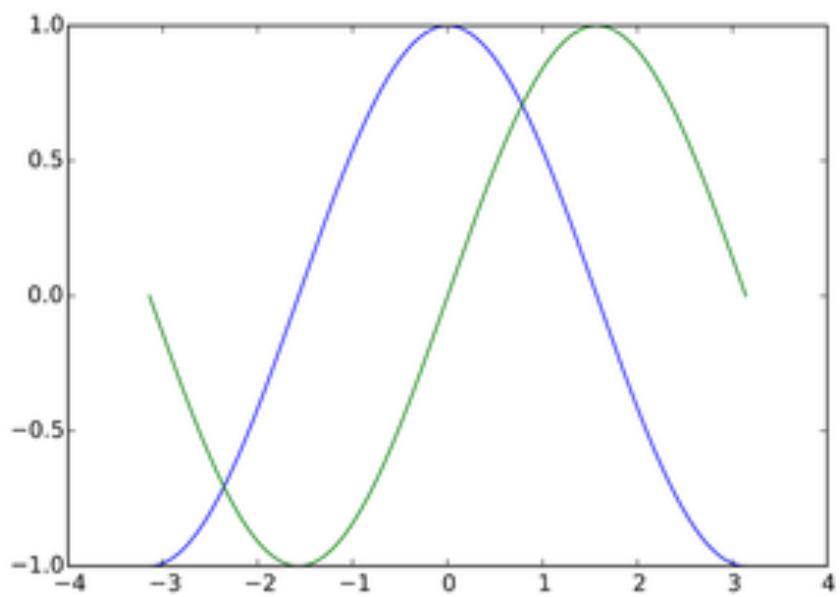
Figure 3. Adapt the figure to the support medium.



Rougier NP, Droettboom M, Bourne PE (2014) Ten Simple Rules for Better Figures. PLOS Computational Biology 10(9): e1003833.
<https://doi.org/10.1371/journal.pcbi.1003833>

<https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1003833>

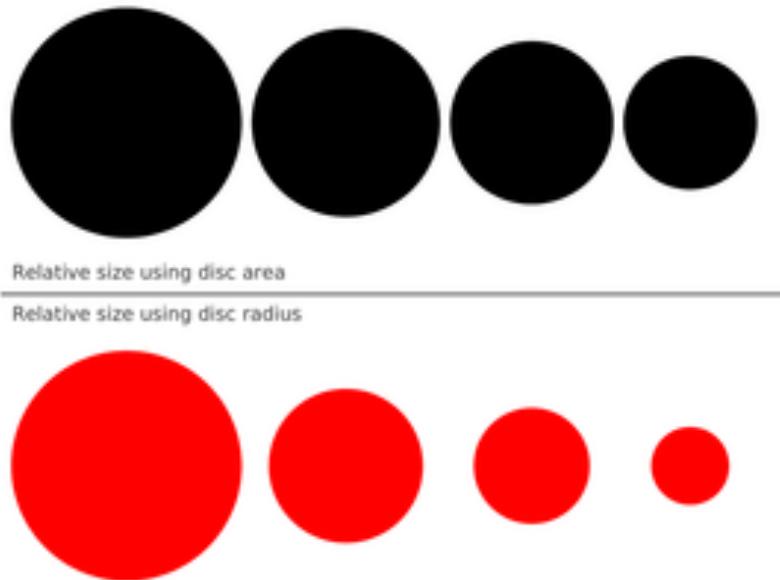
Figure 4. Do not trust the defaults.



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<https://doi.org/10.1371/journal.pcbi.1003833>

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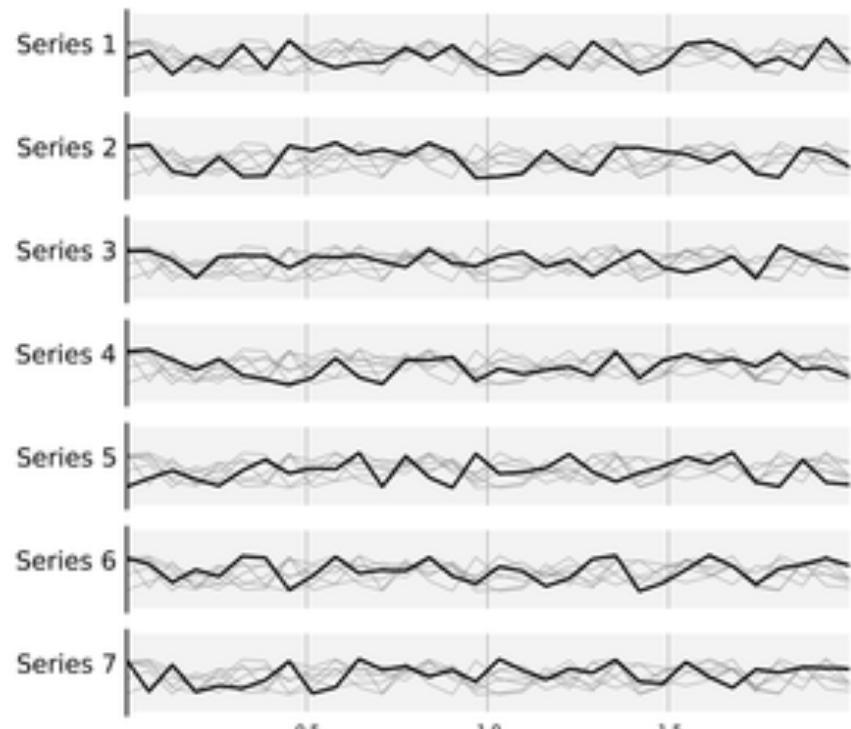
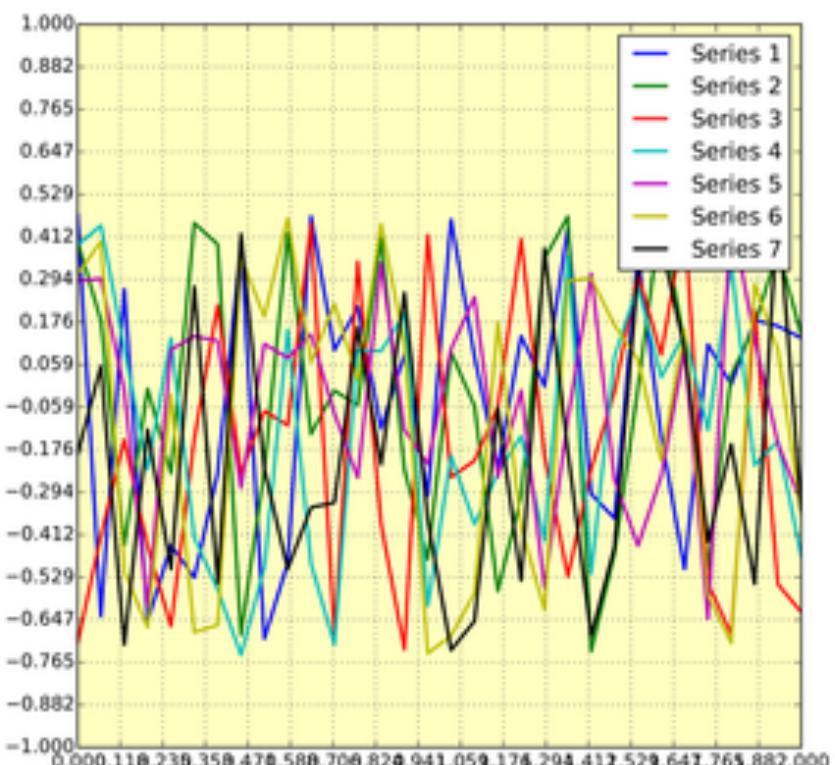
Figure 6. Do not mislead the reader.



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Figure 7. Avoid chartjunk.



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