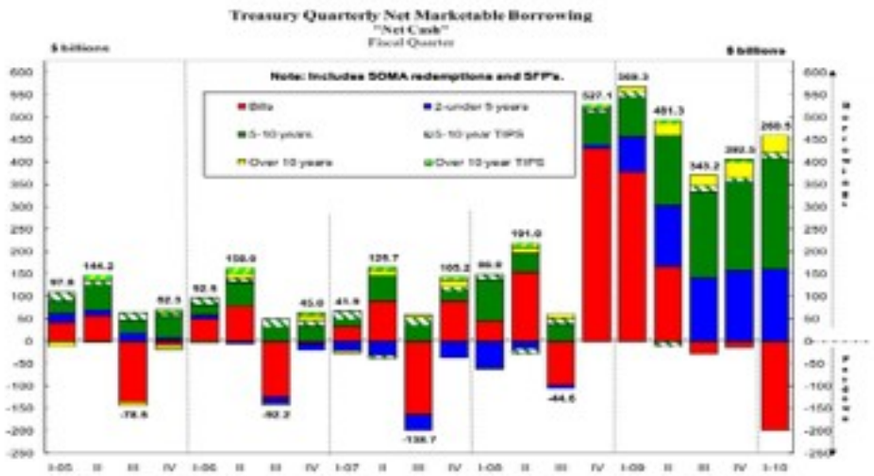
Excerpt from

Data Visualization: Supplementary slides

Sungkyu Jung

Effective Visualizations

Not Effective...



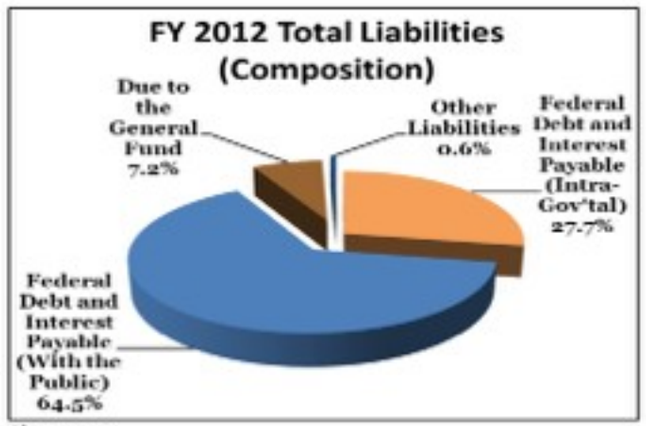
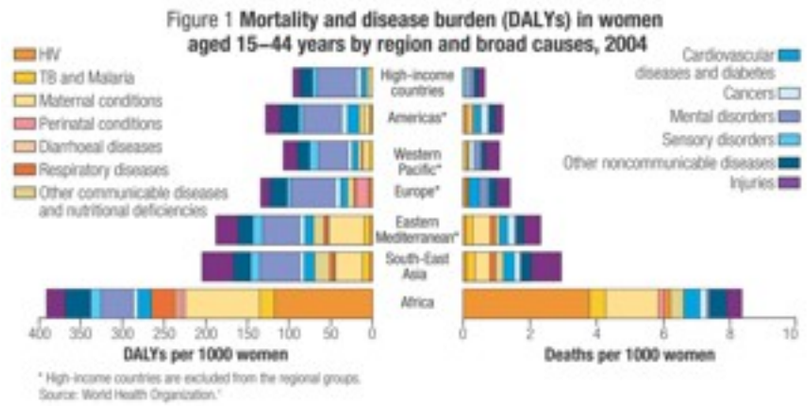
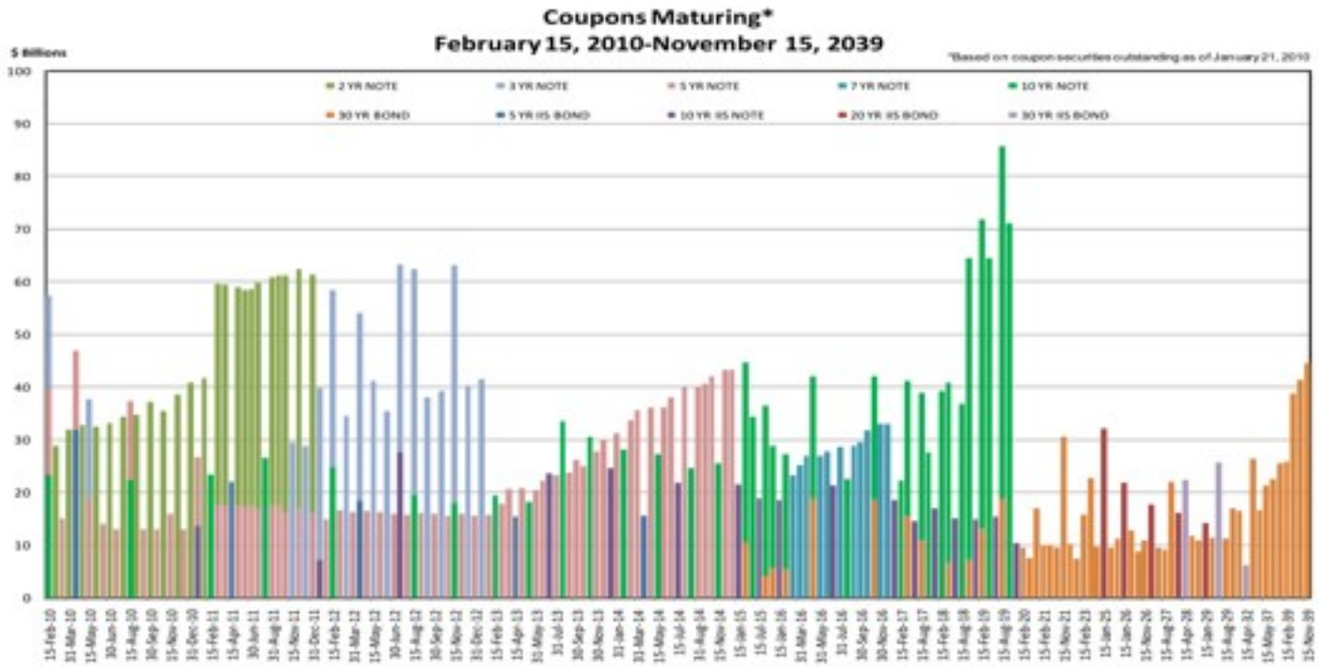


Figure 10





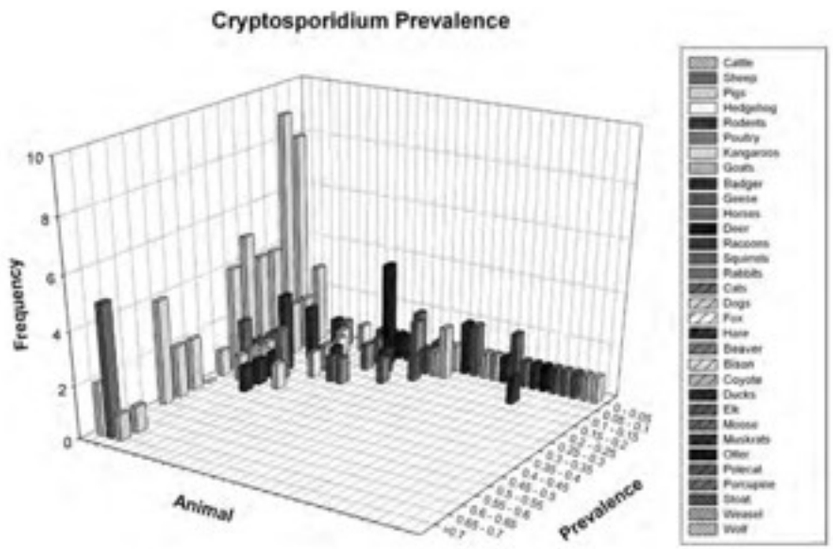
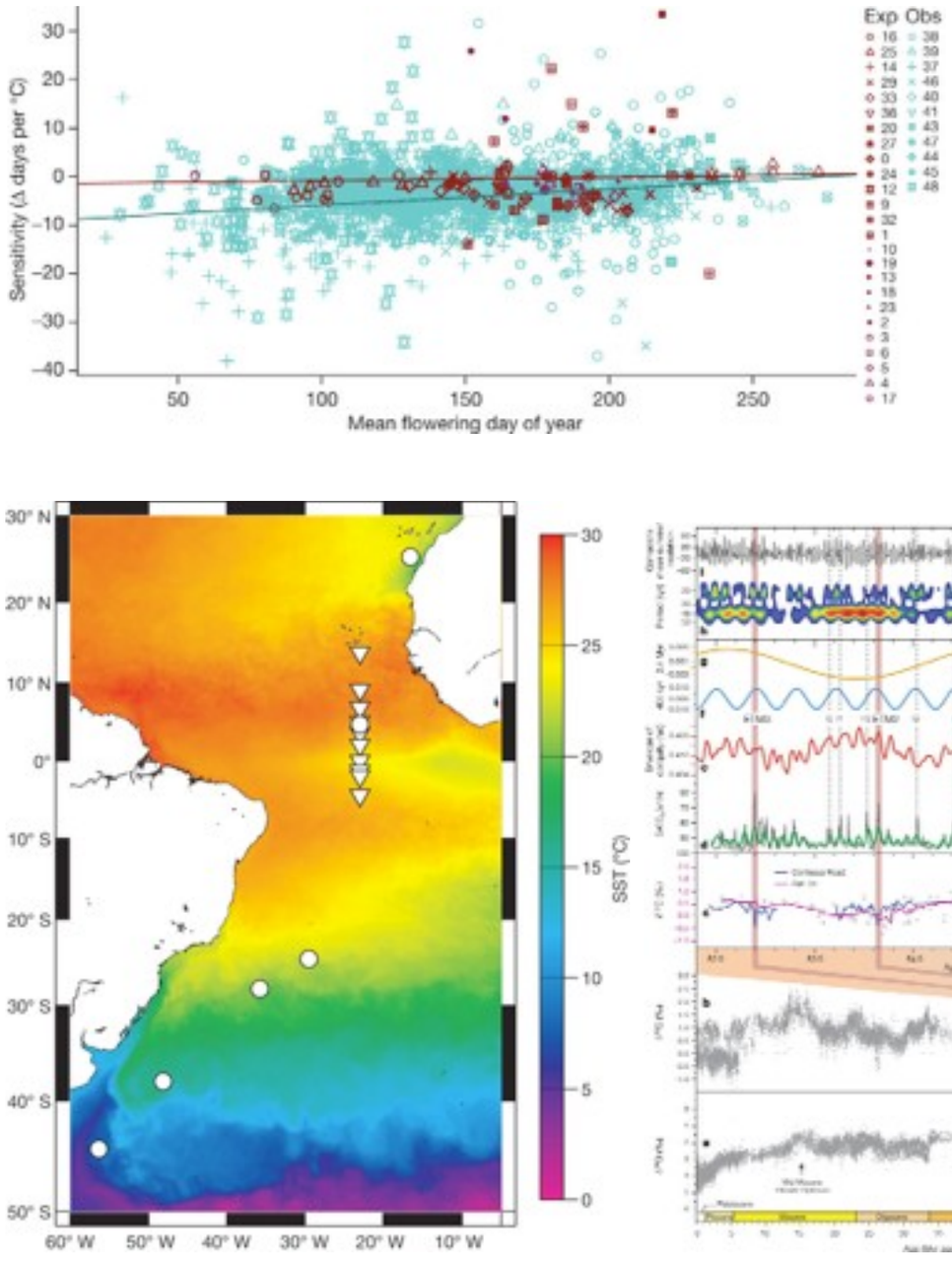
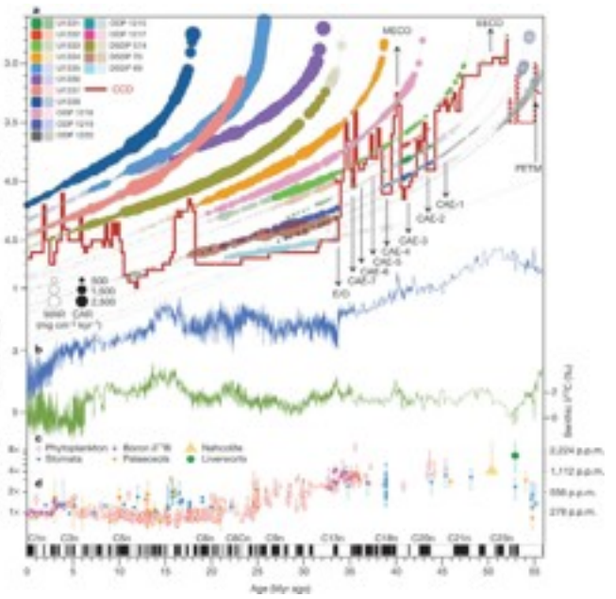


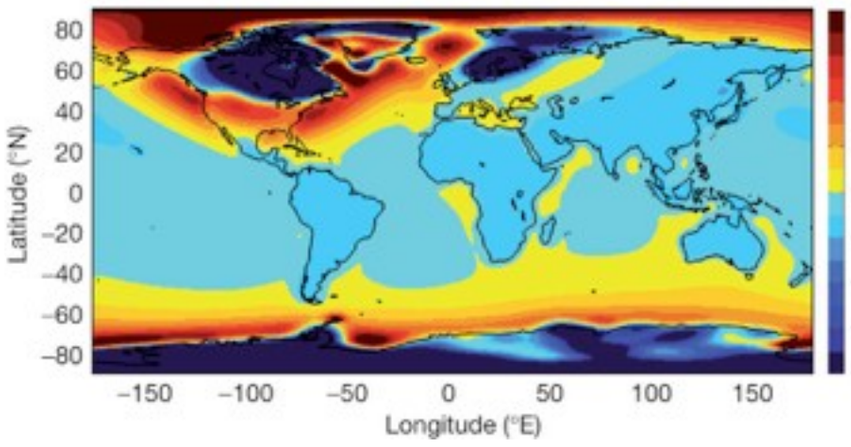
Figure 5.2 Mean prevalence rates of *Cryptosporidium* oocysts by animal species.

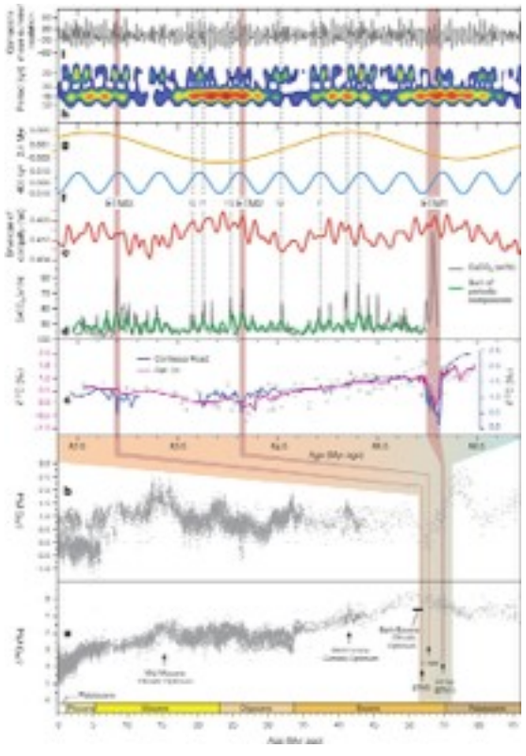
Sources: USTreasury and WHO reports

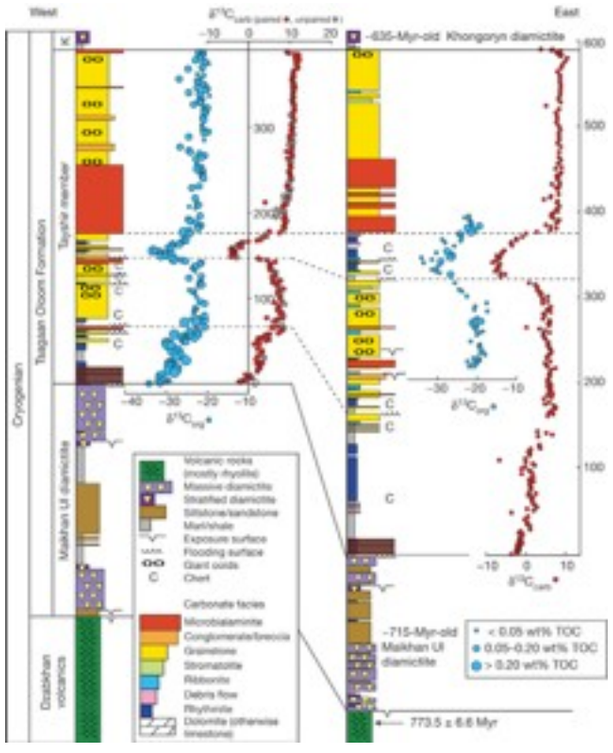
Also *not* effective...

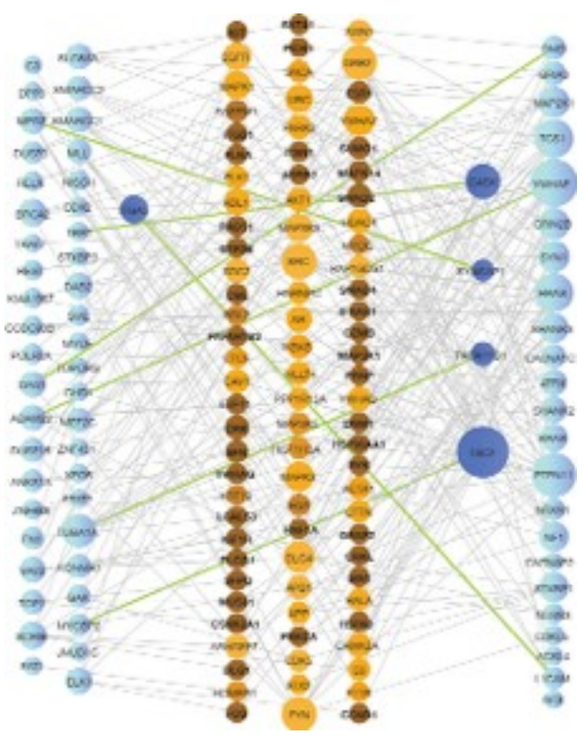






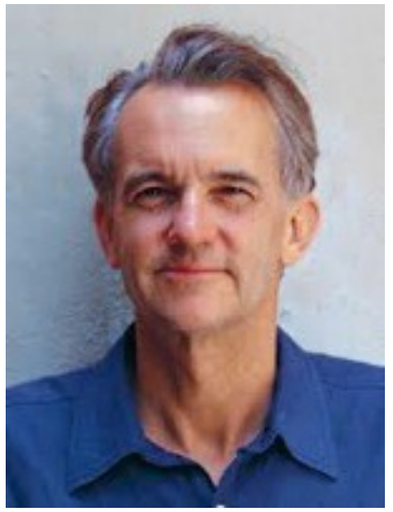


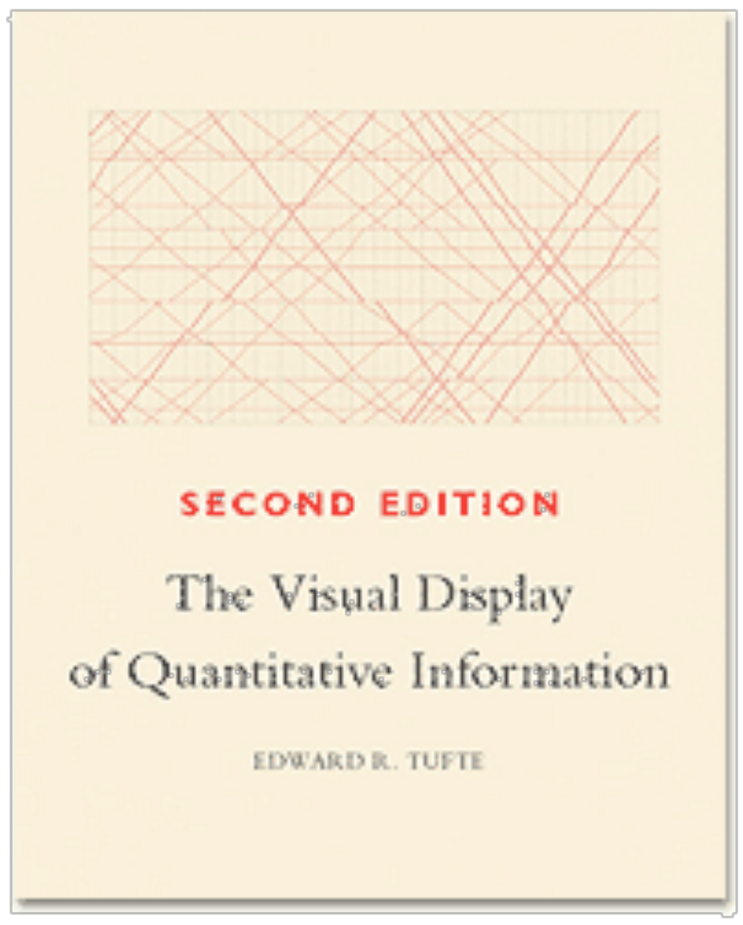


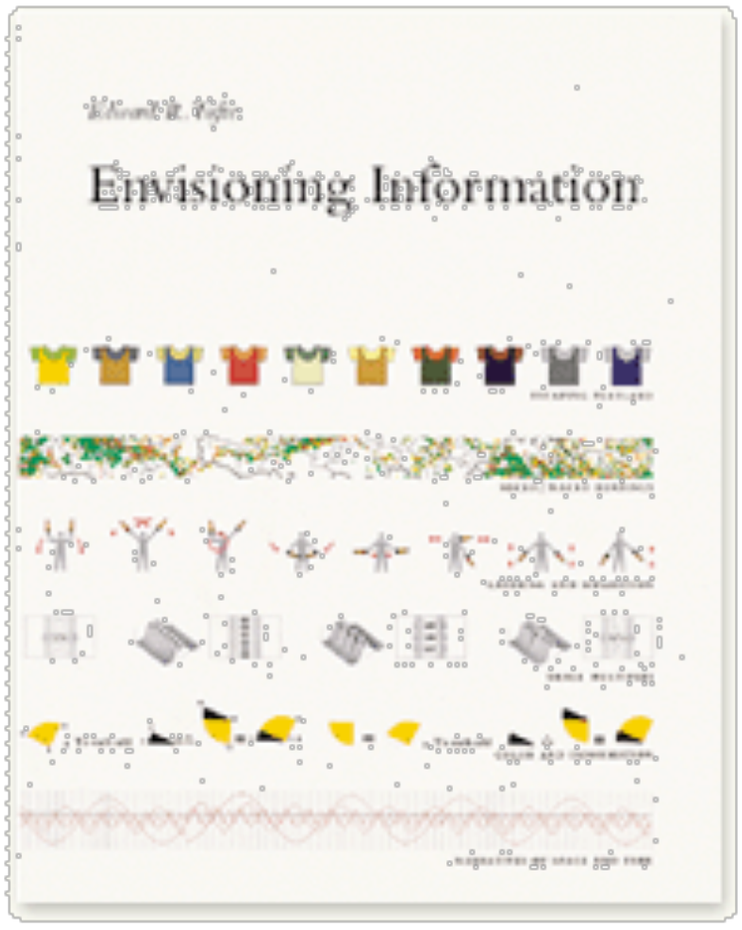


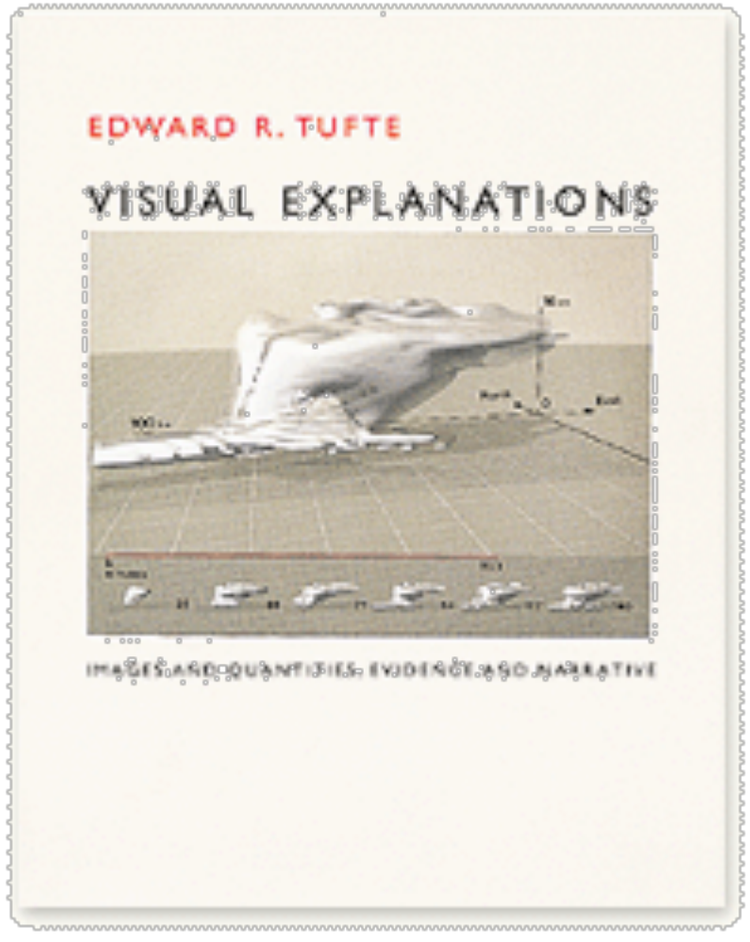
Source: Nature

Edward Tufte



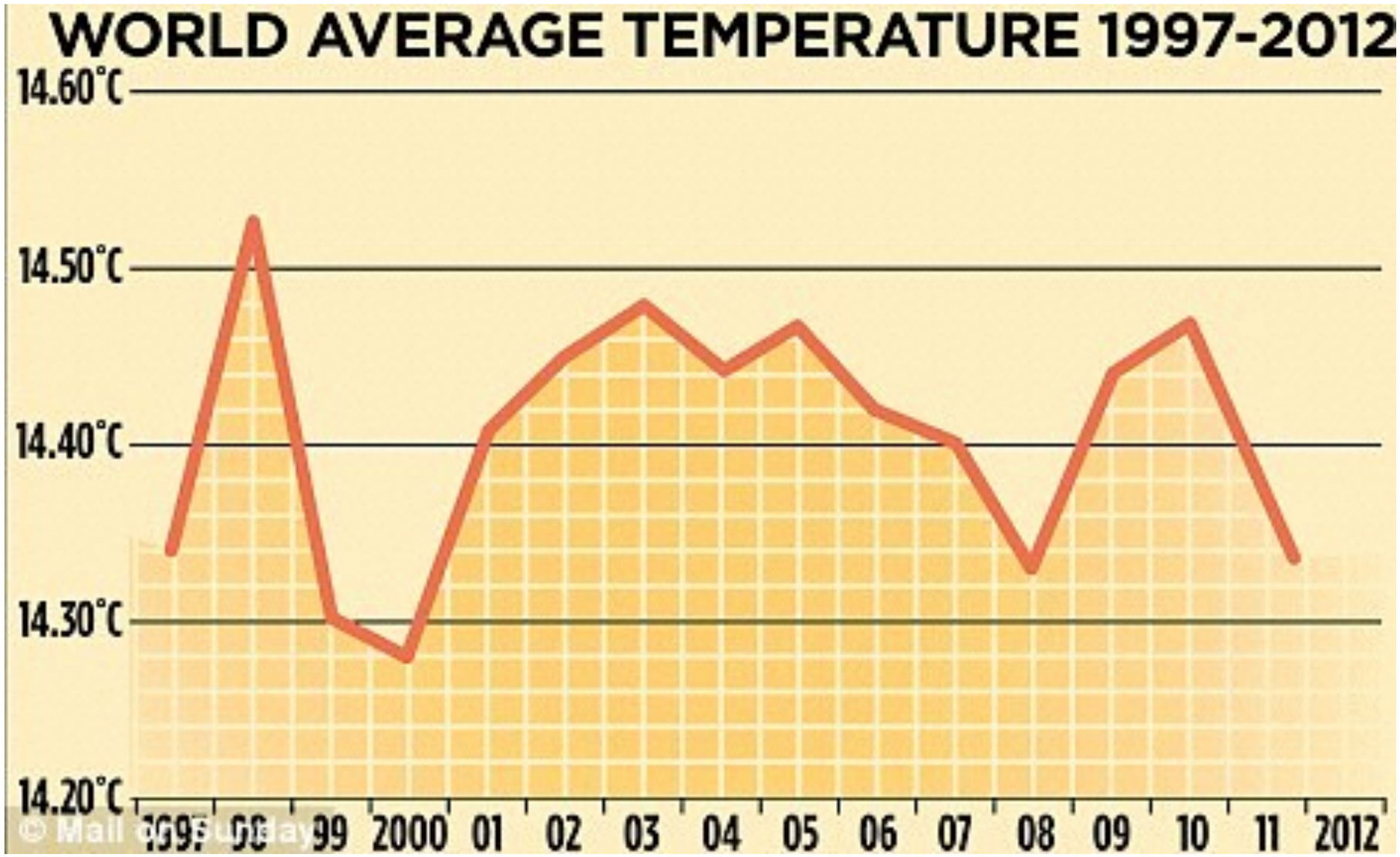






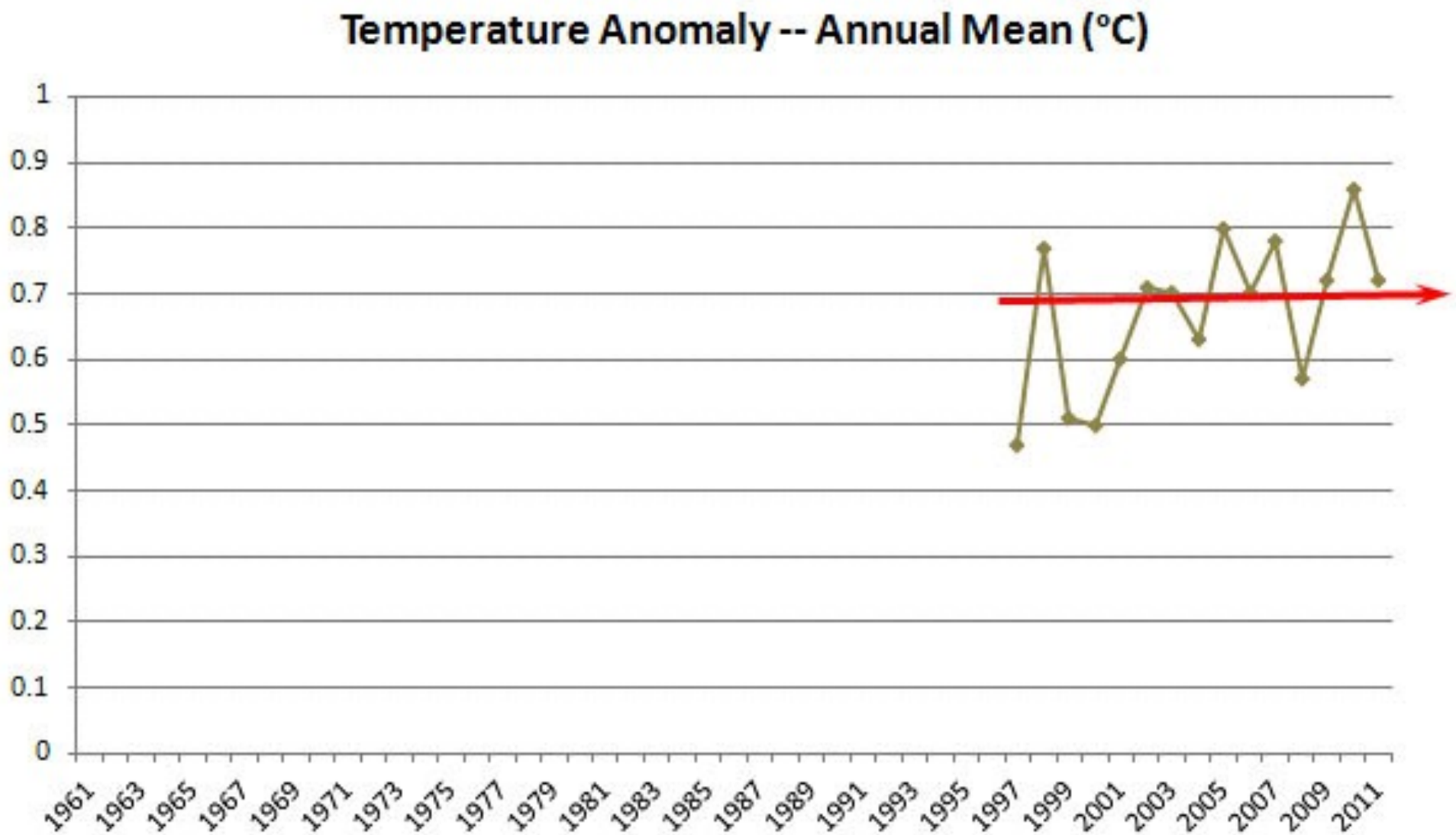
Scale Distortions

Global Warming?



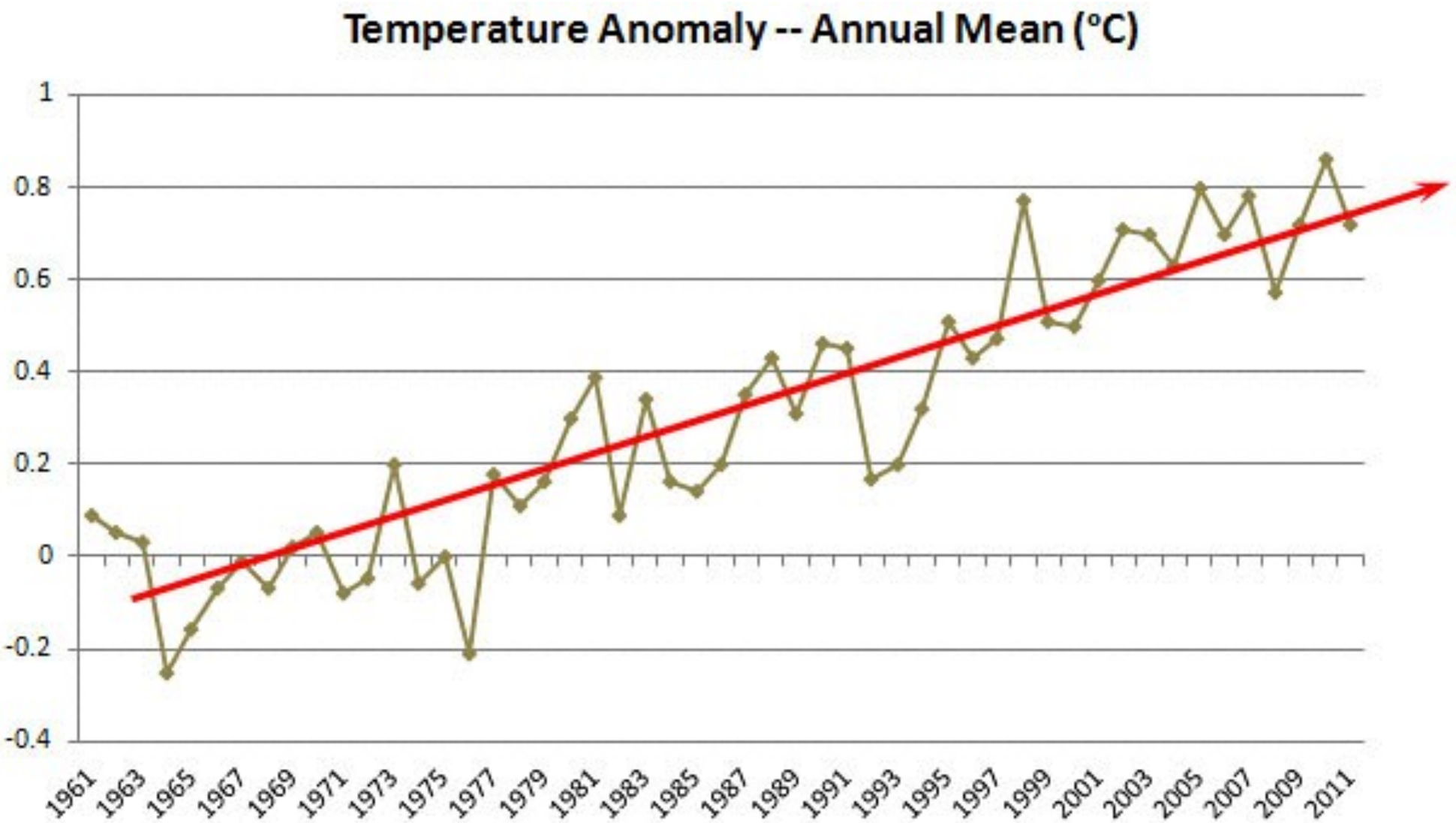
The Daily Mail, UK,Jan 2012

Global Warming?



Mother Jones

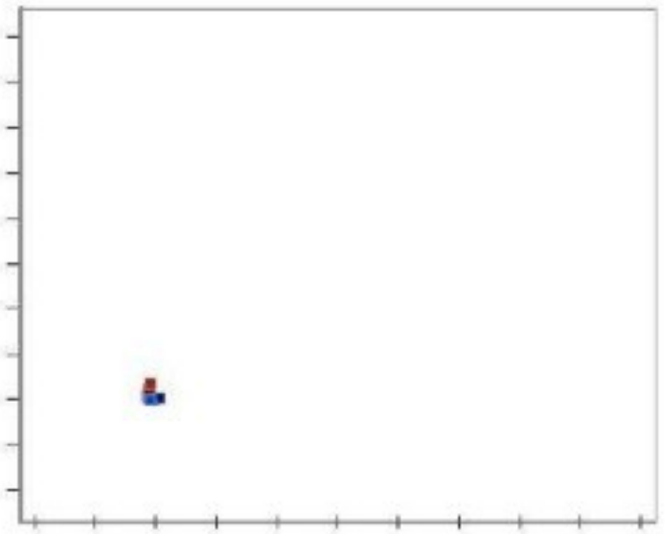
Global Warming!



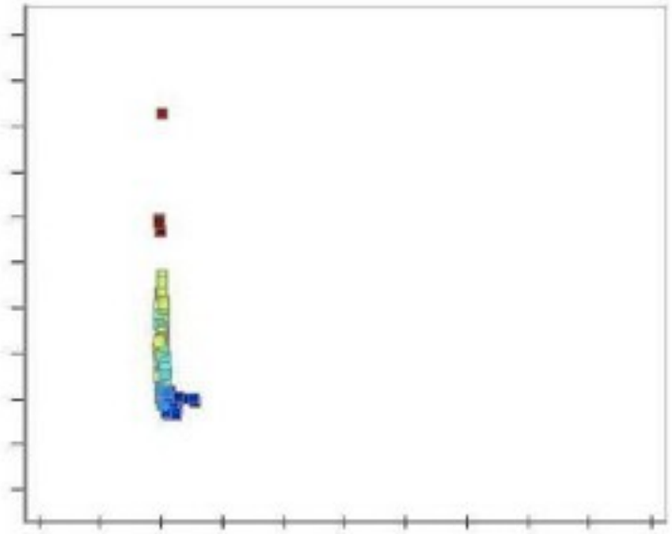
Mother Jones

Lying with Scales

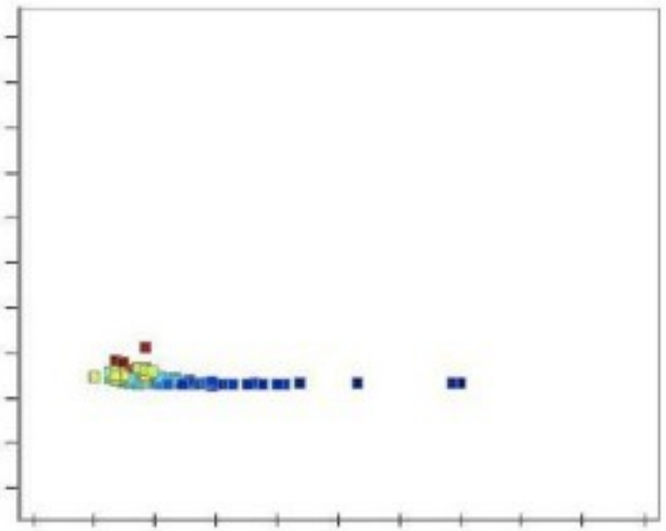
Same data - different scales



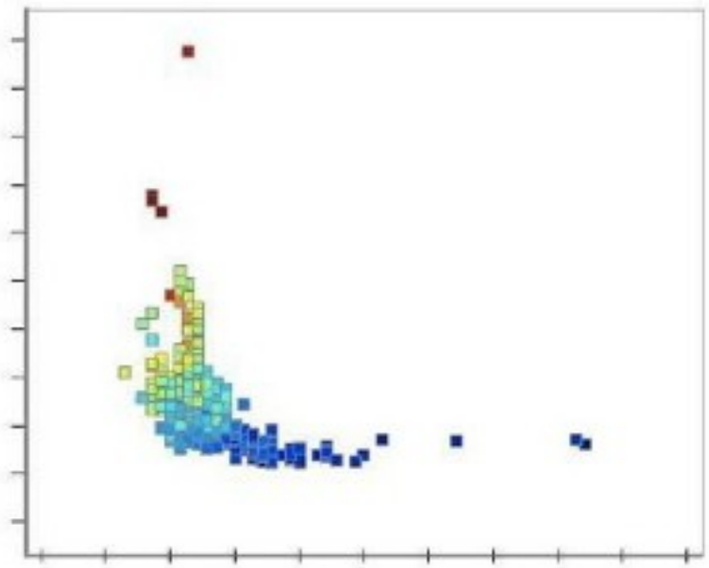
Uniform scale in both *x* and *y*



Larger scale in y



Larger scale in x



Larger scale in x and y

Ward, Grinstein, Keim, 2011

Scales are critical!

What are your bounds – upper and lower?

What scale works?

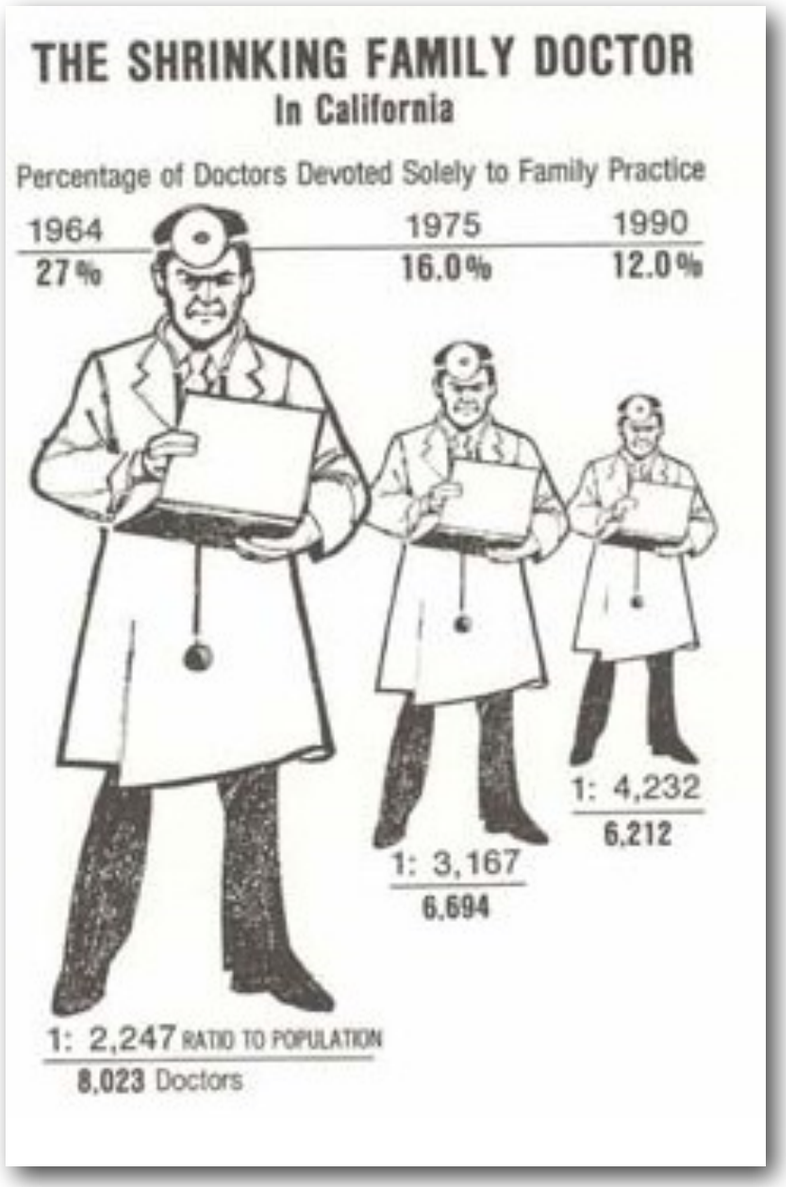
- Linear? Log? Clipping? Breaks?

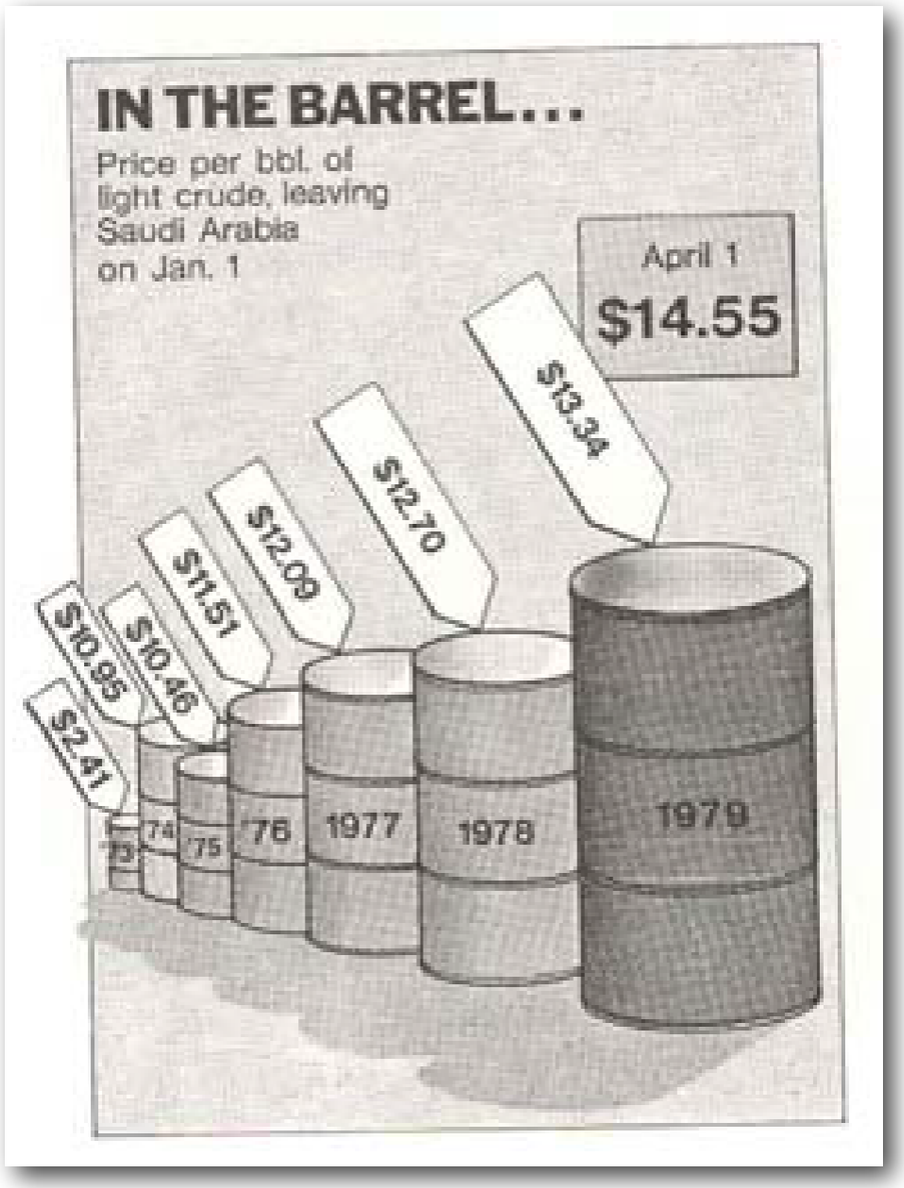
Relative or absolute values?

How can you make things comparable?

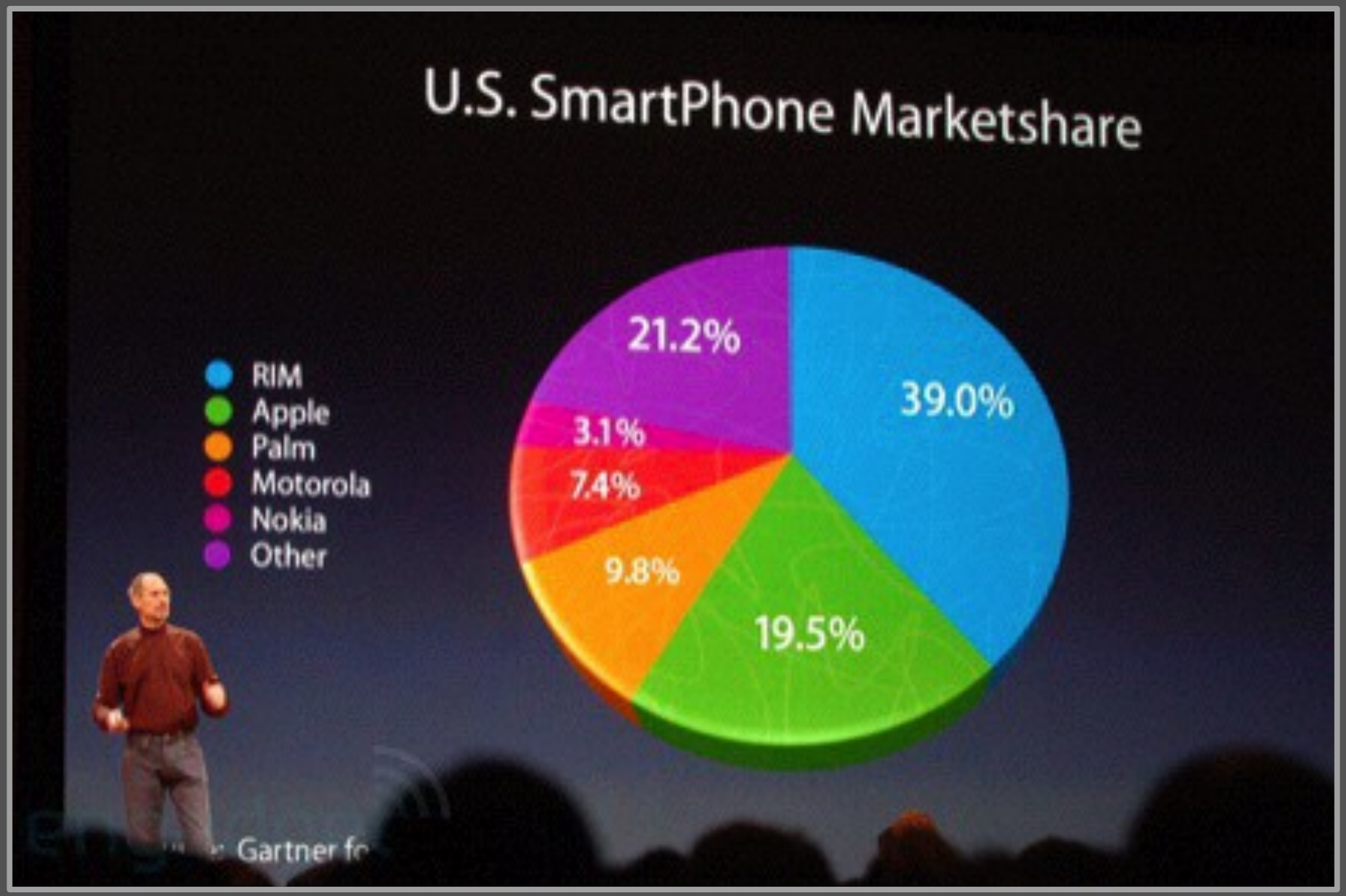
The Lie Factor

$$\frac{\text{Size of effect shown in graphic}}{\text{Size of effect in data}}$$

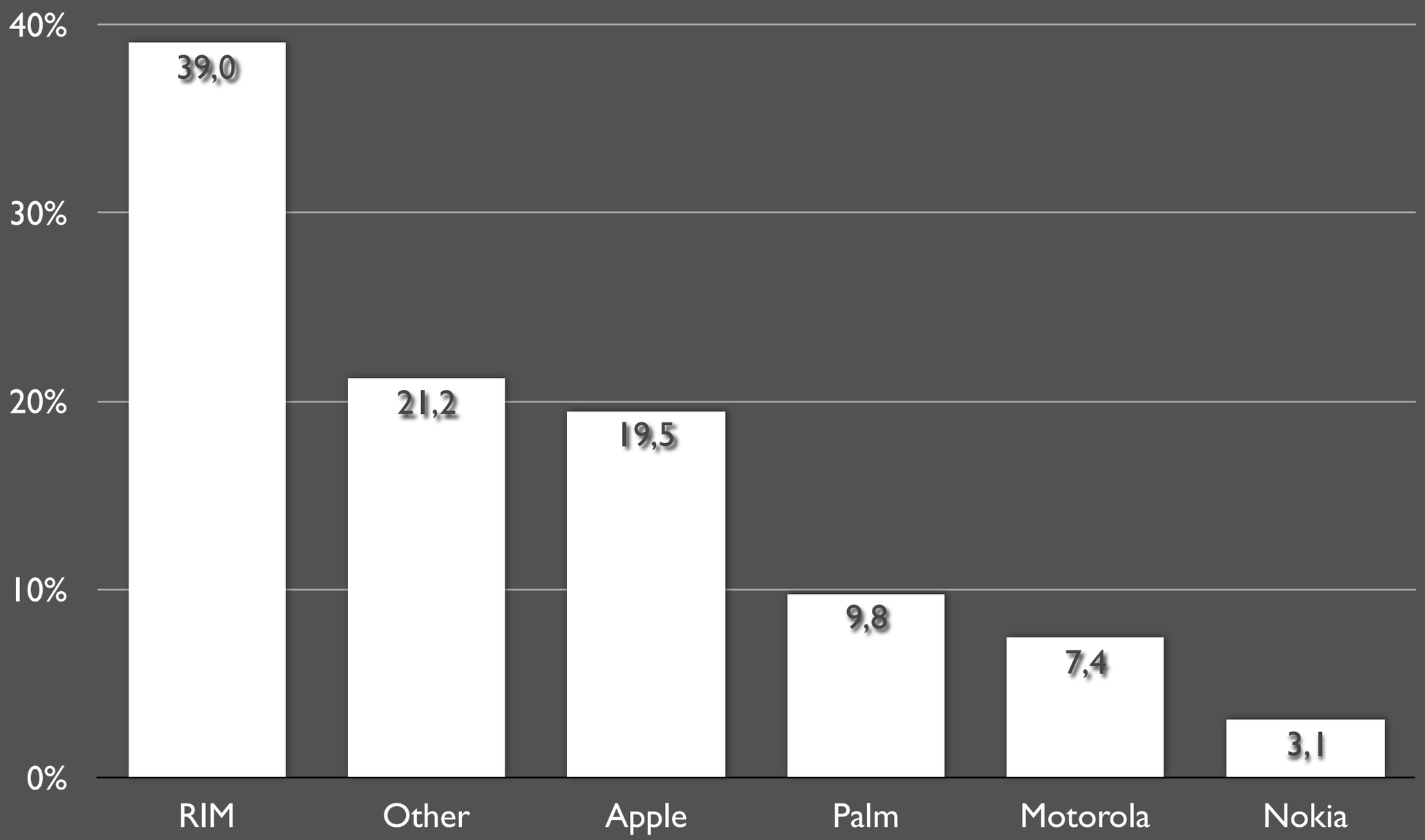




Tufte,VDQI

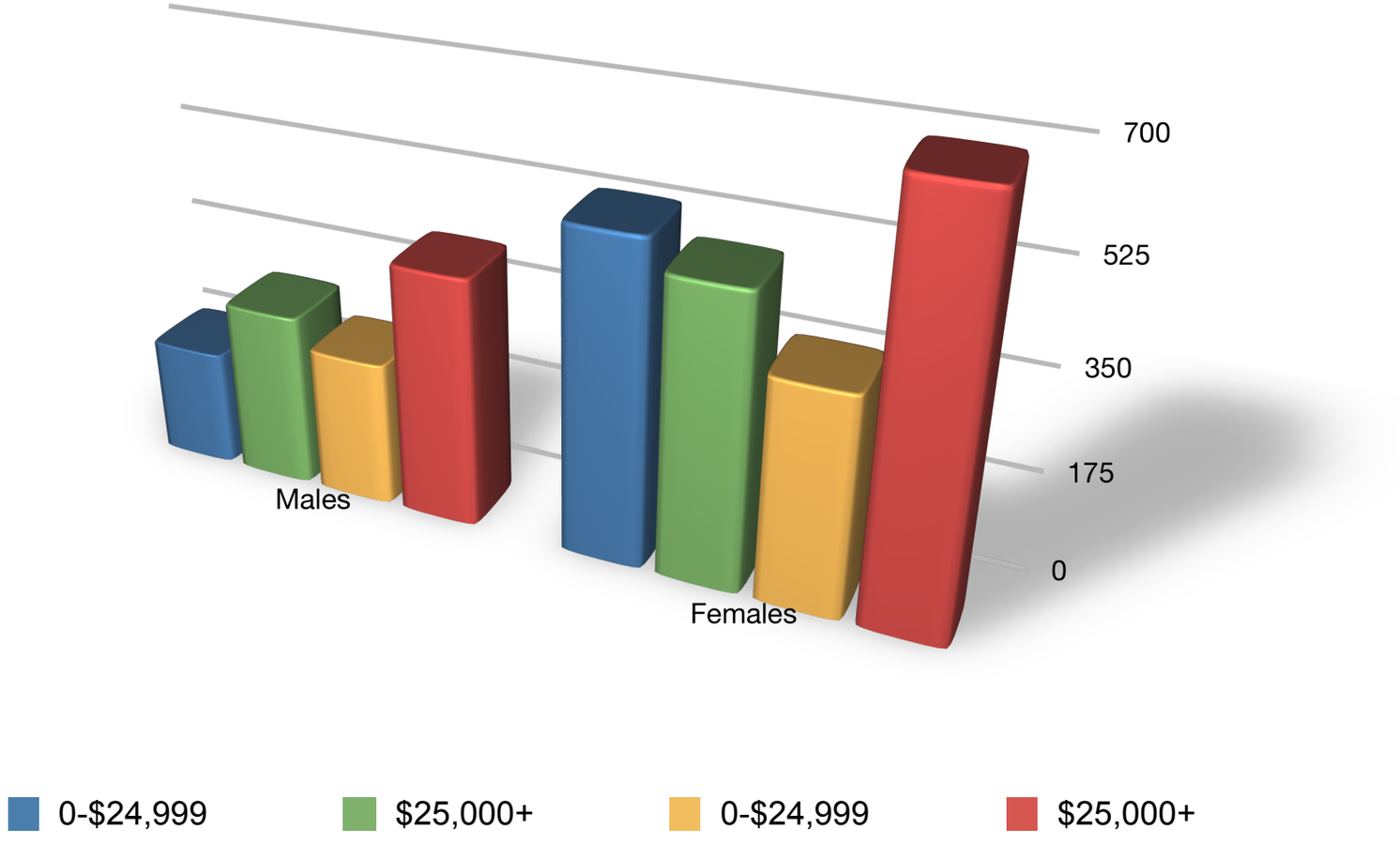

U.S. SmartPhone Marketshare
RIM
Apple
Palm
Motorola
Nokia
Other
39.0%
19.5%
9.8%
7.4%
3.1%
21.2%
Gartner fo

U.S. SmartPhone Marketshare



Maximize Data-Ink Ratio

$$\text{Data-Ink Ratio} = \frac{\text{Data ink}}{\text{Total ink used in graphic}}$$



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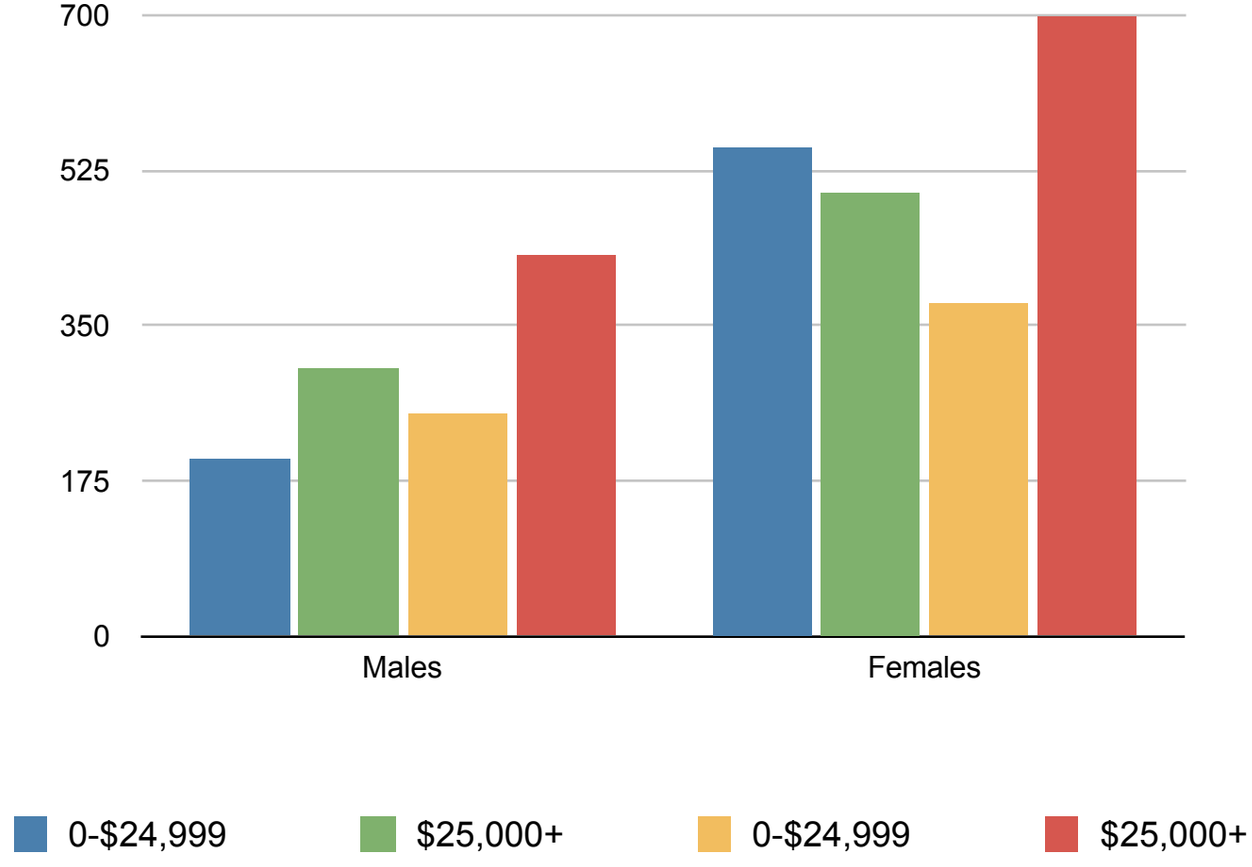
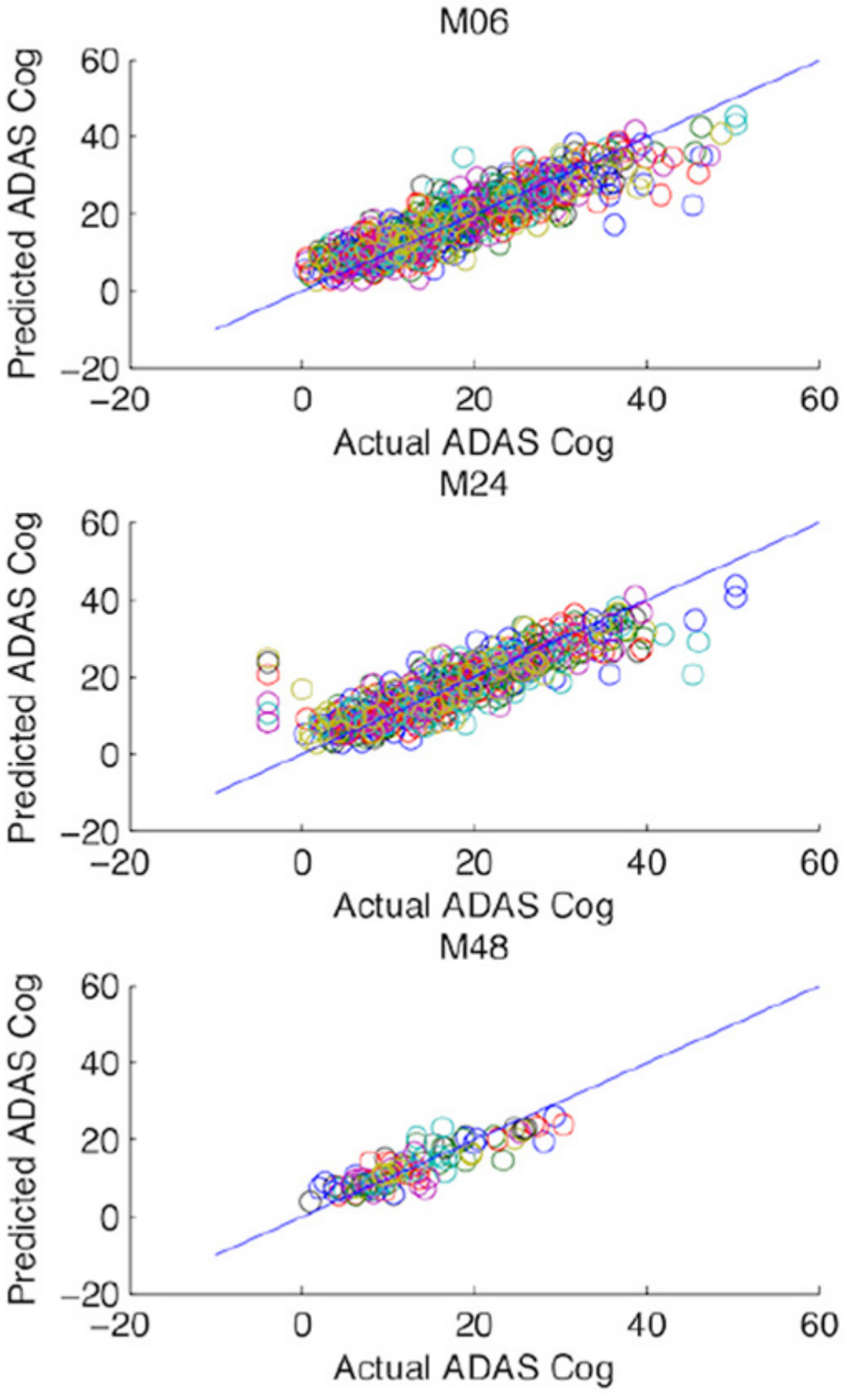
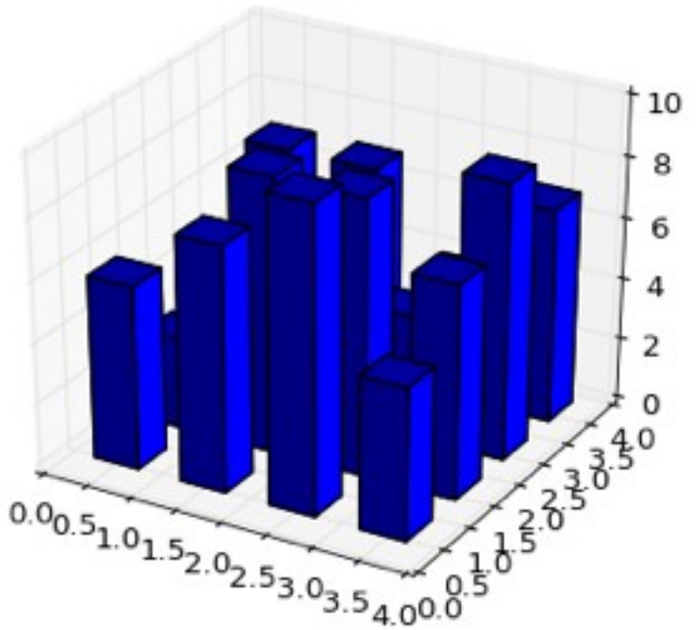


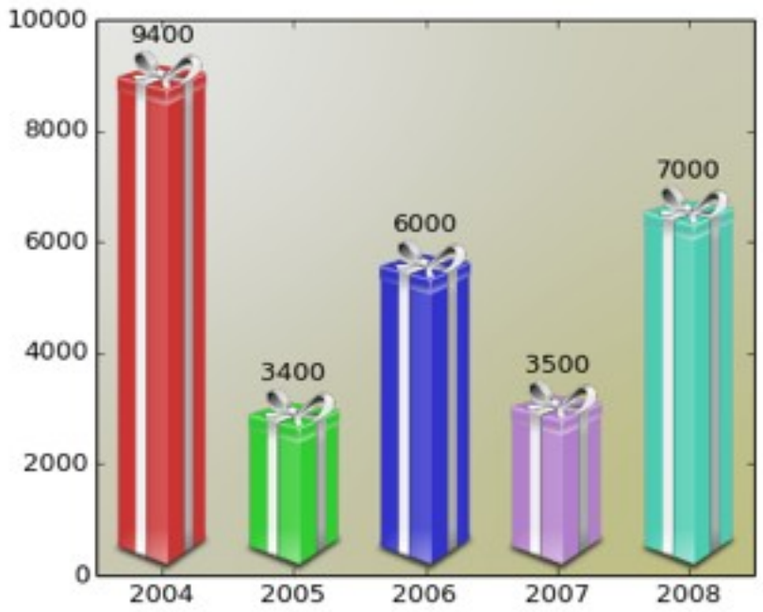
What do colors mean?



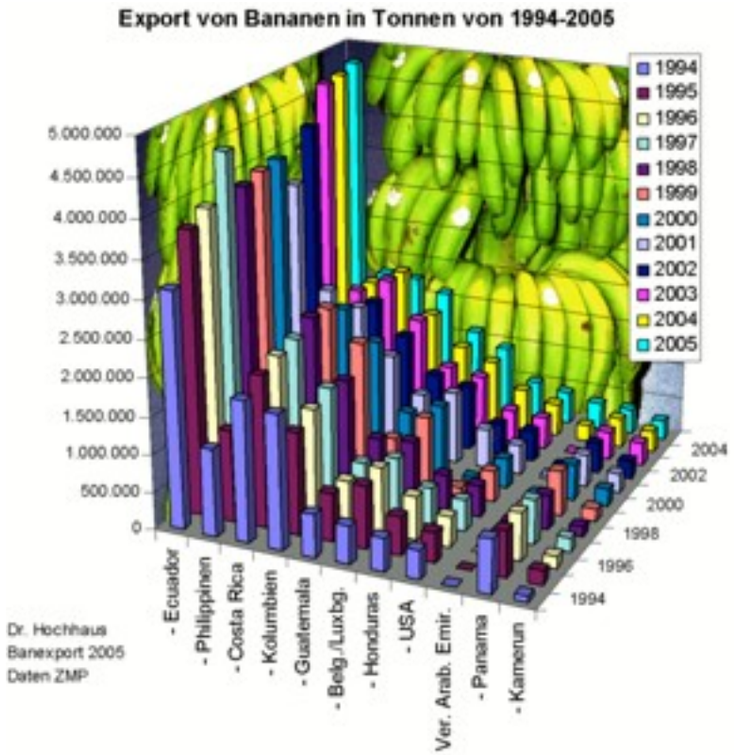
Proc SPIE Int Soc Opt Eng. 2014 Mar 21; 9034: 90342L.
Published online 2014 Feb 15. doi: 10.1117/12.2042720

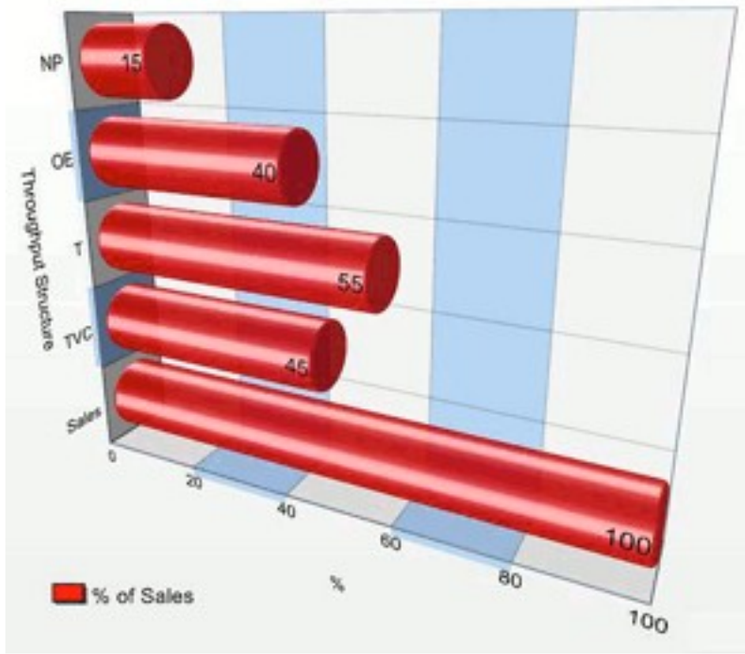
Don’t Use 3D





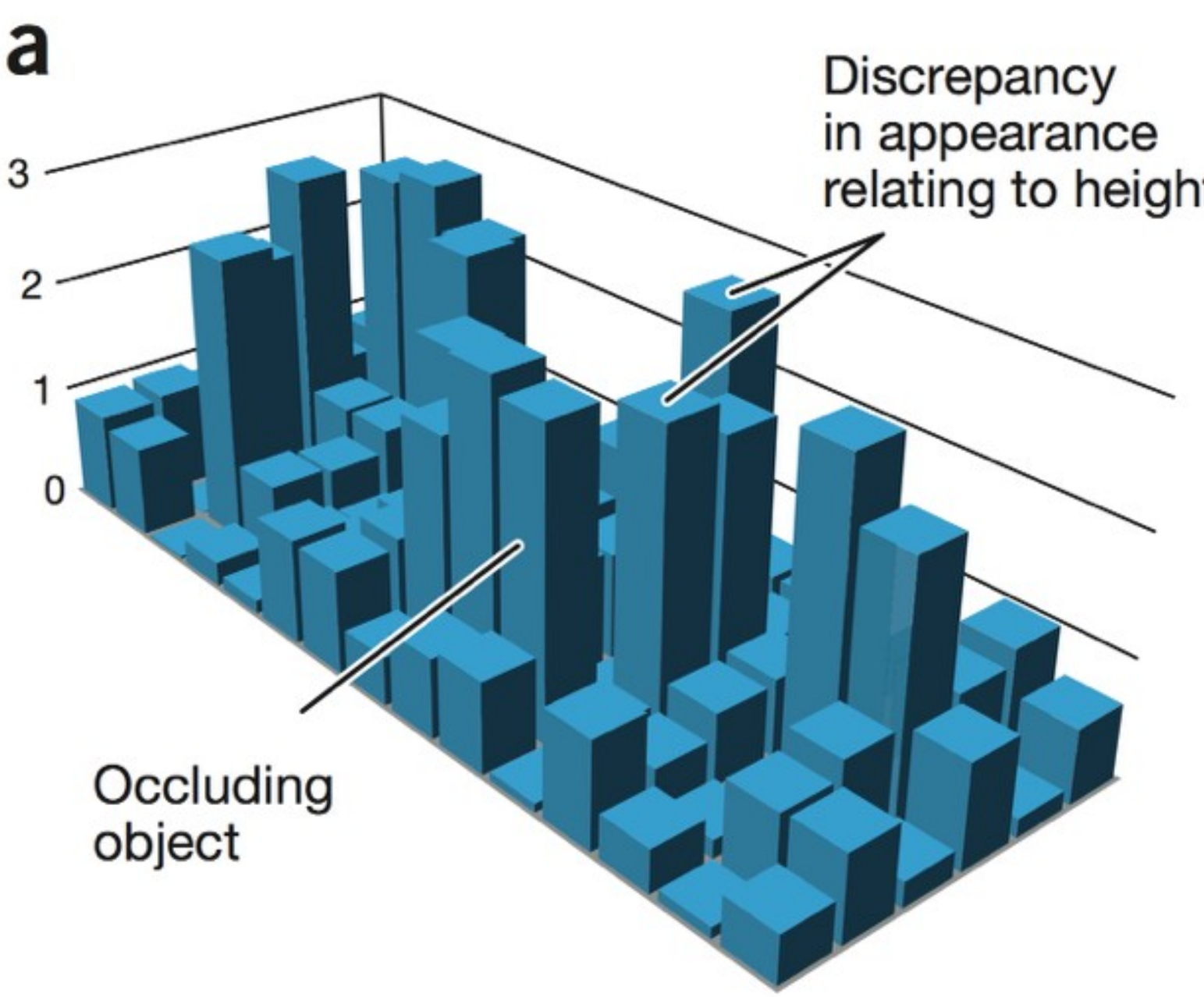
matplotlib gallery

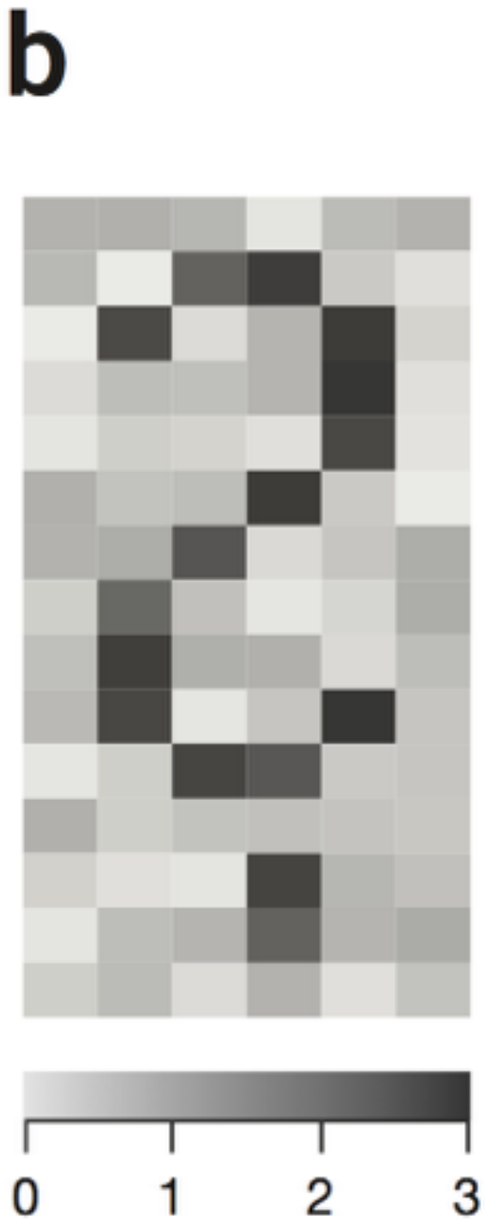




Excel Charts Blog

3D Bar Plot

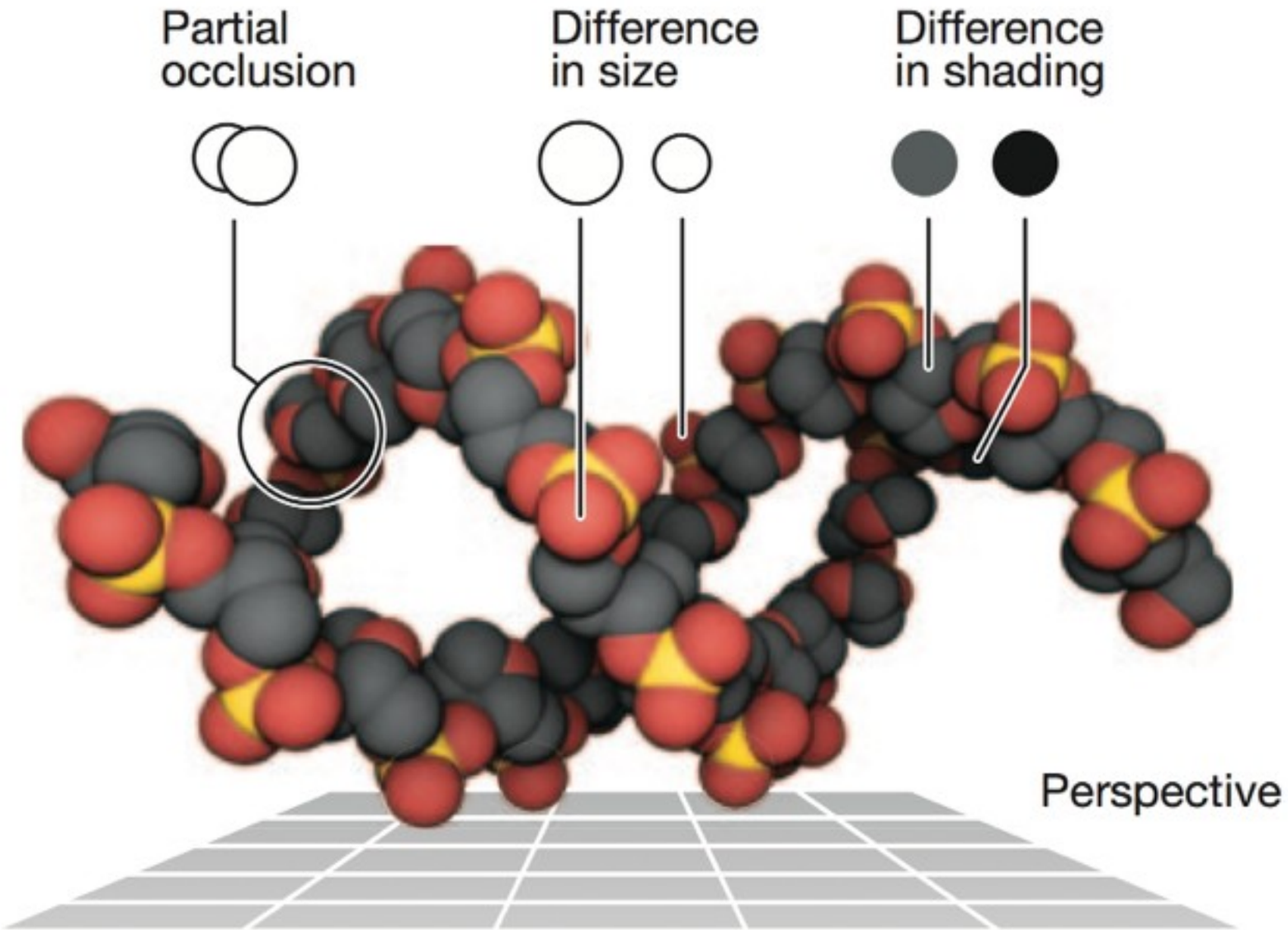




Which one is the tallest bar?
What is the pattern in the data?

Gehlenborg & Wong, PoV, Nature Methods, 2012

Exception: 3D Phenomena



Depth cues enable us to perceive 2D images as 3D objects

Gehlenborg & Wong, PoV, Nature Methods, 2012

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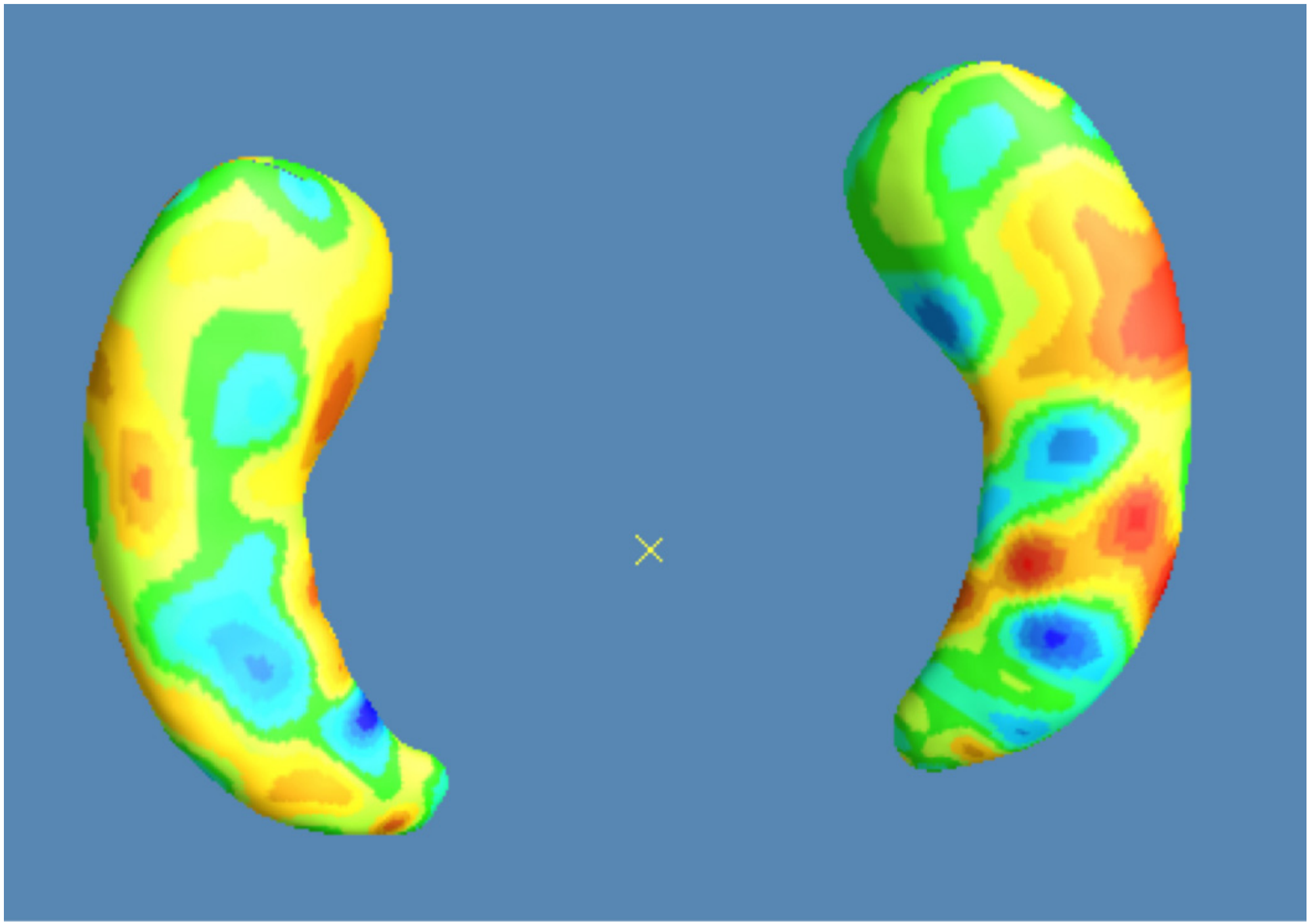

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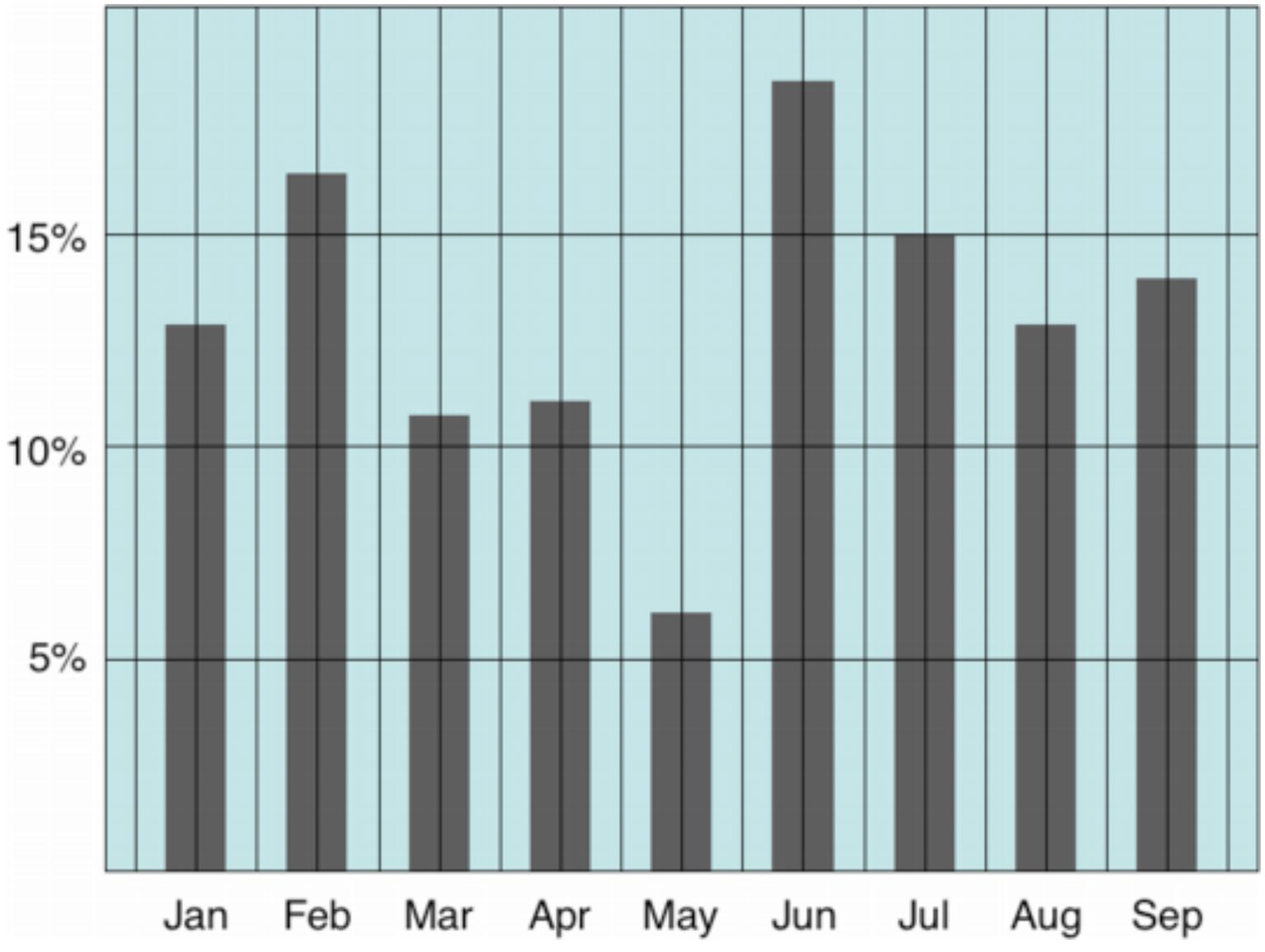
Avoid Chart Junk

Extraneous visual elements that distract from the message



ongoing, Tim Brey

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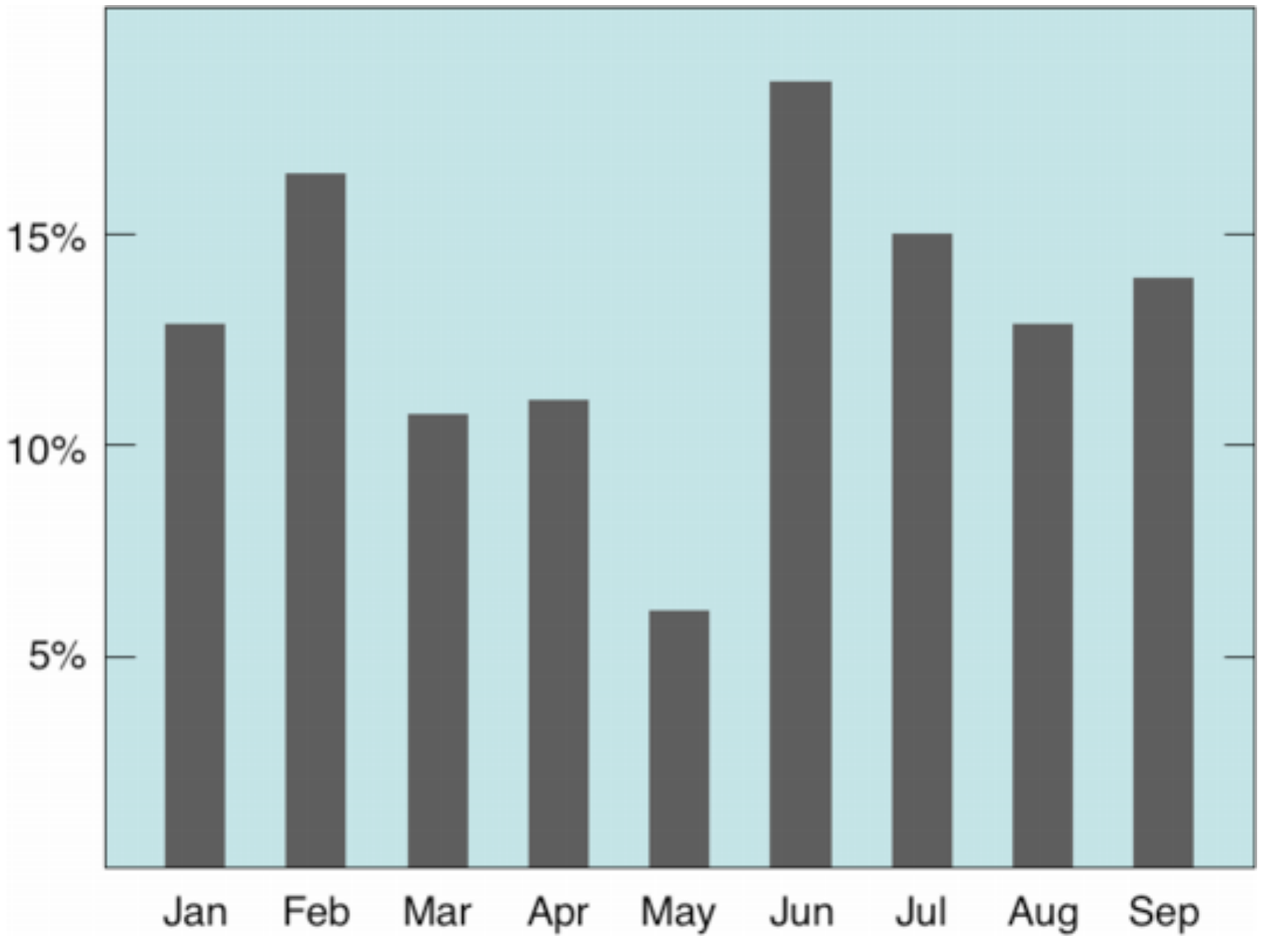

ongoing,Tim Brey

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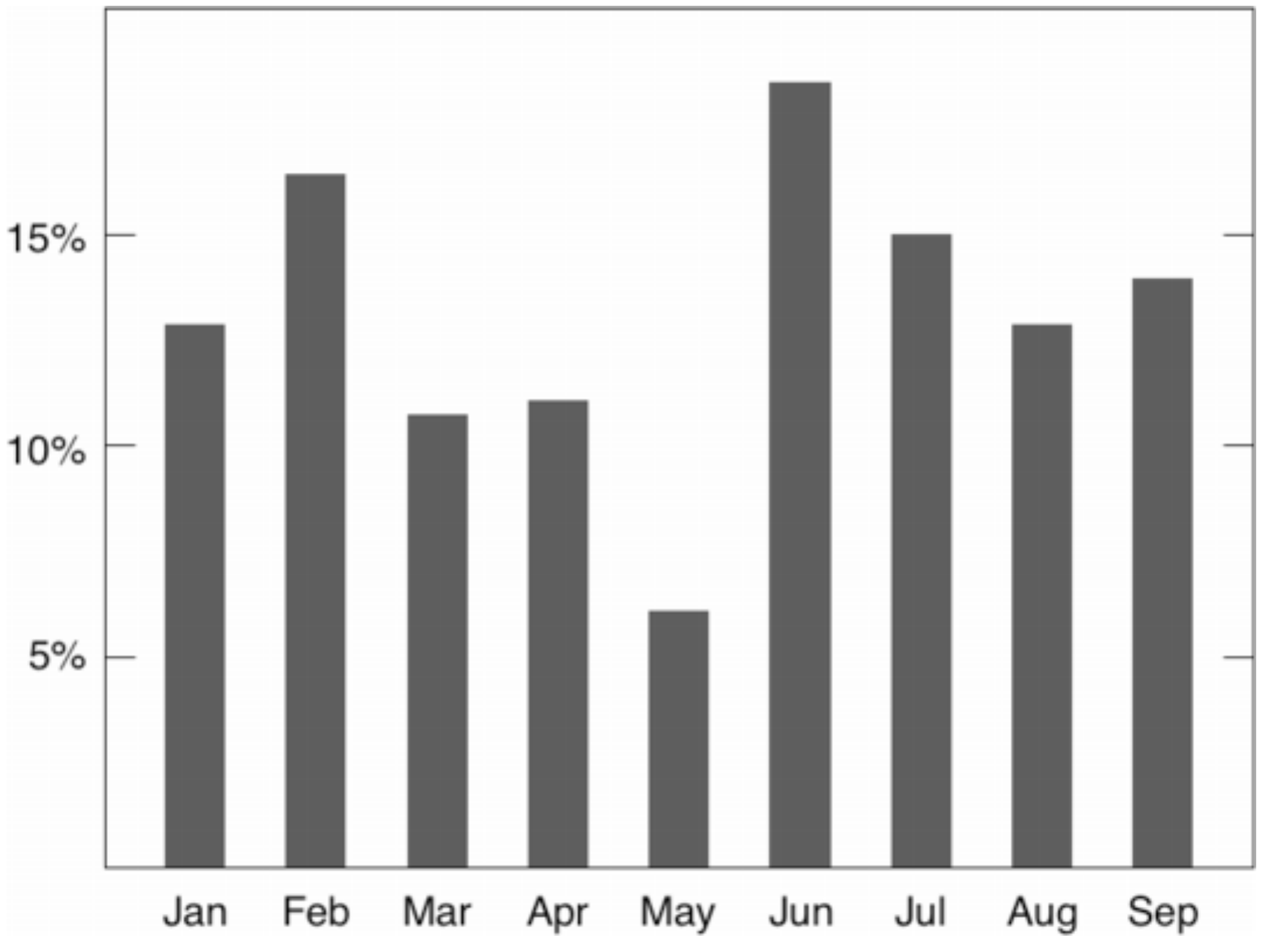

ongoing, Tim Brey

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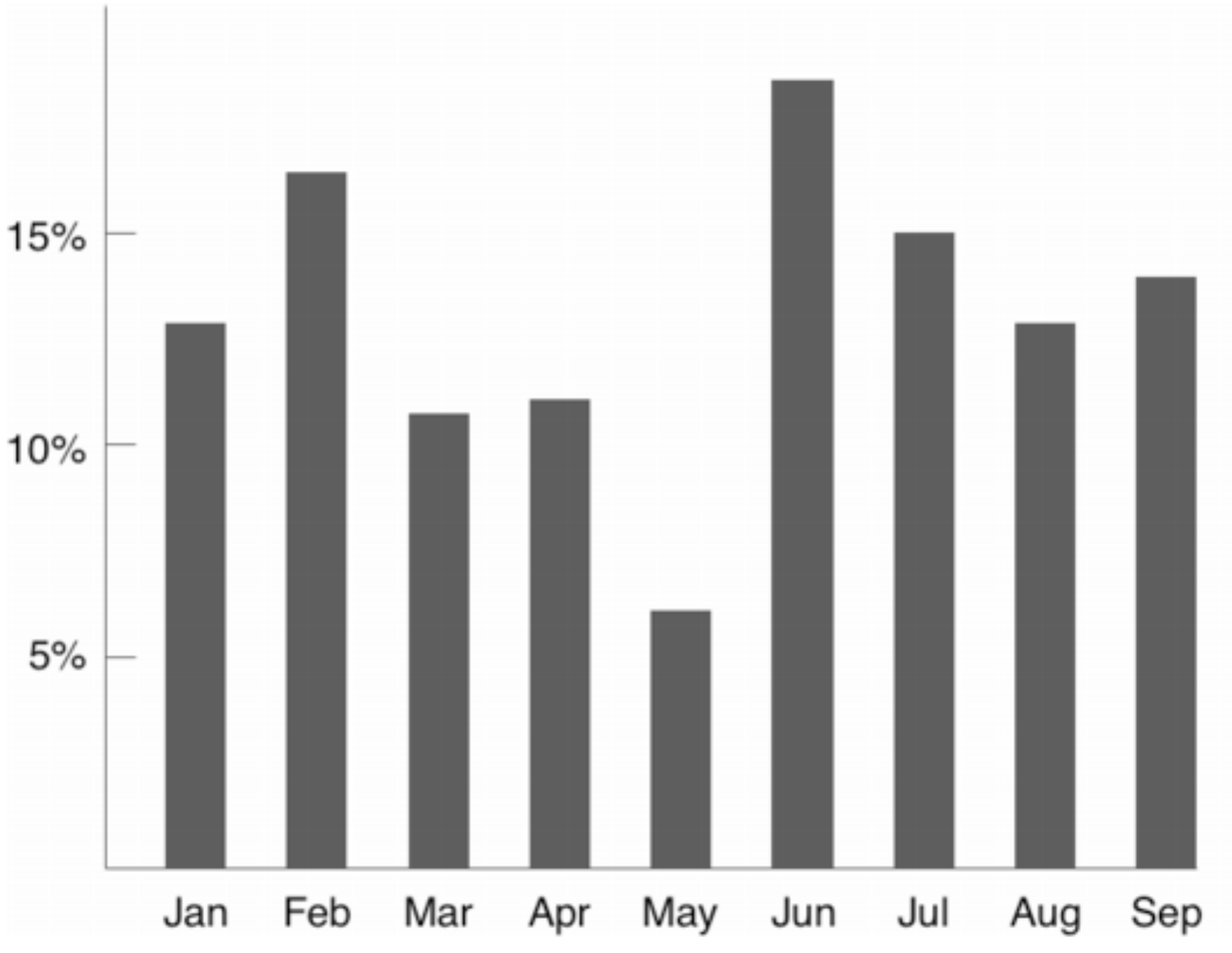

ongoing, Tim Brey

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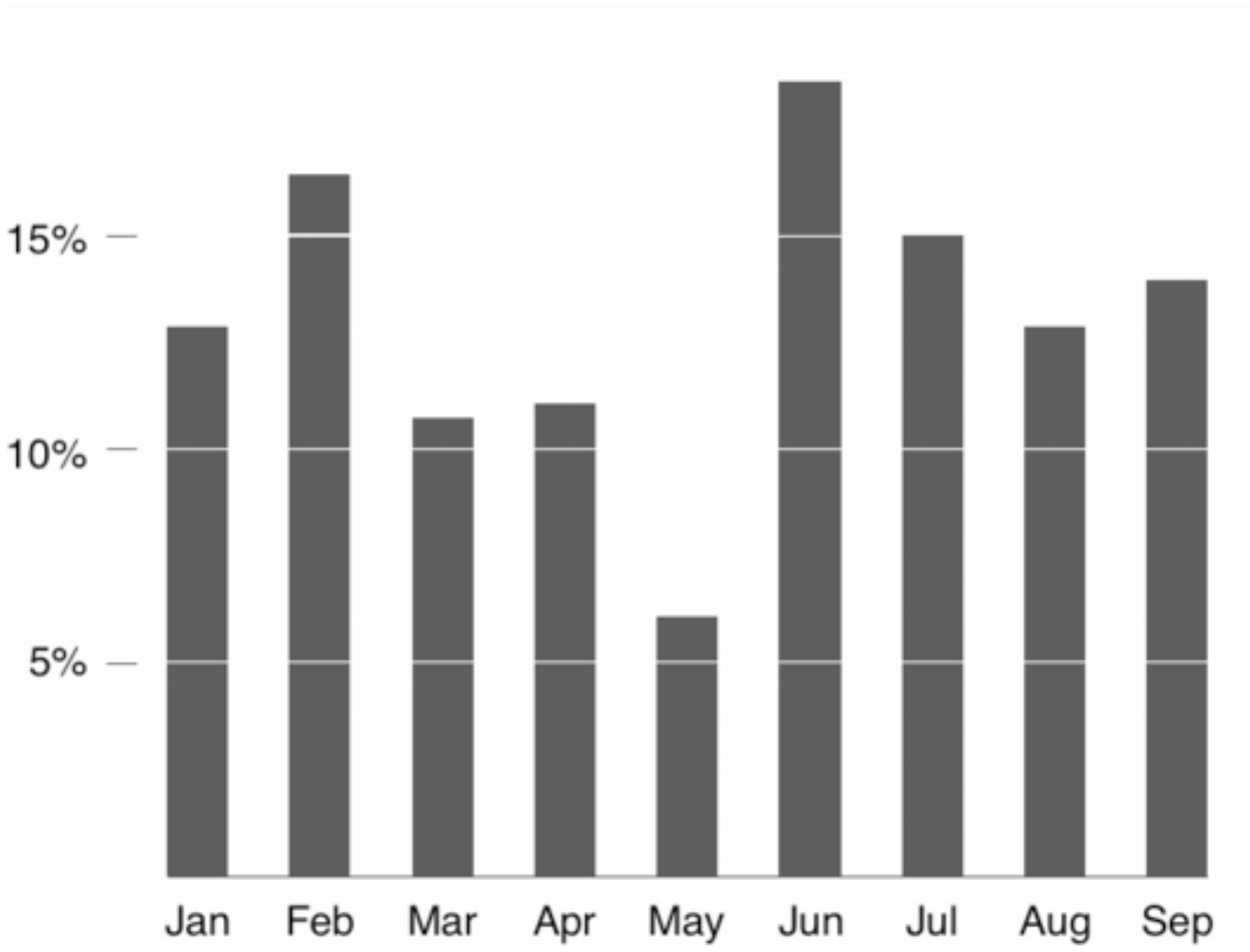

ongoing, Tim Brey

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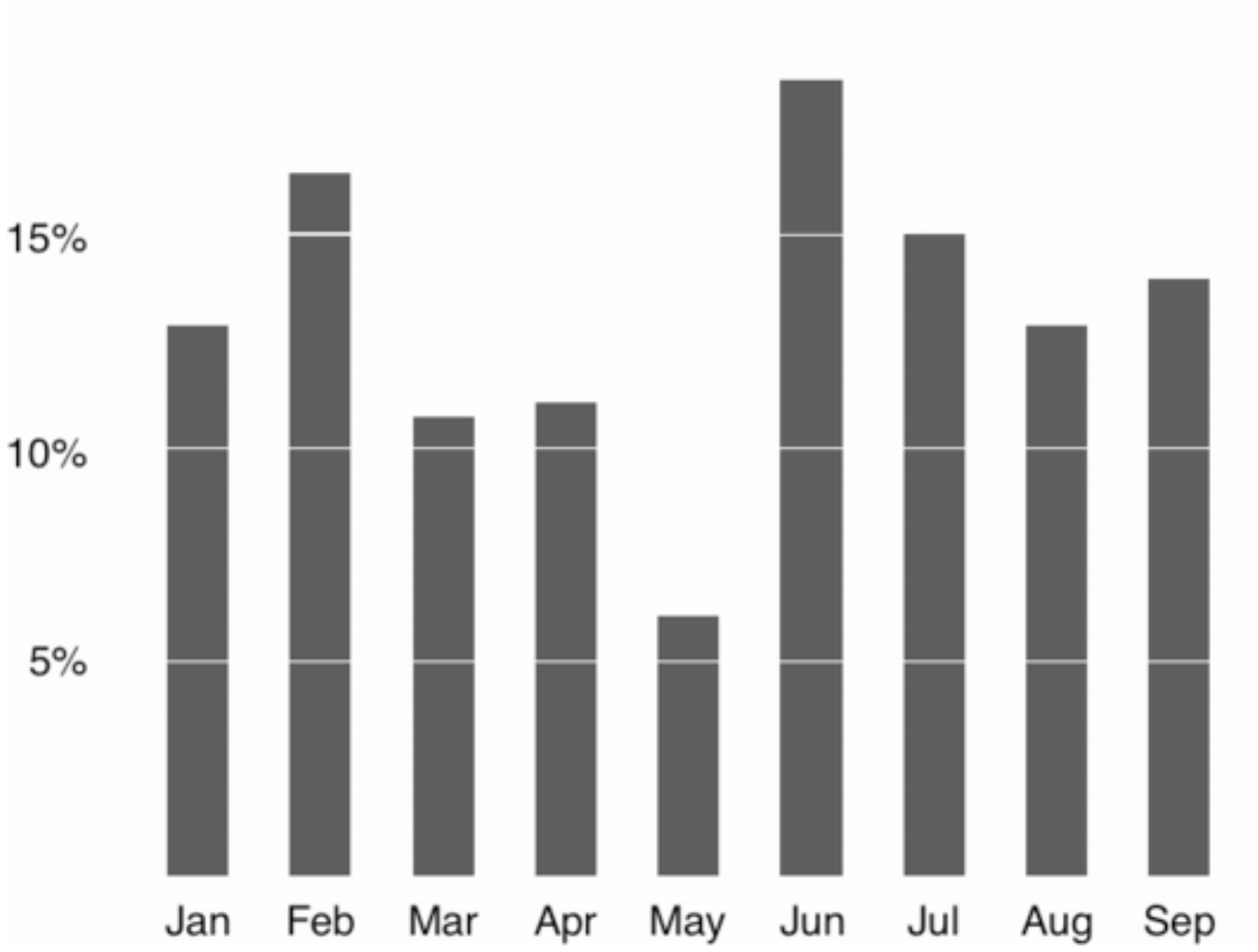
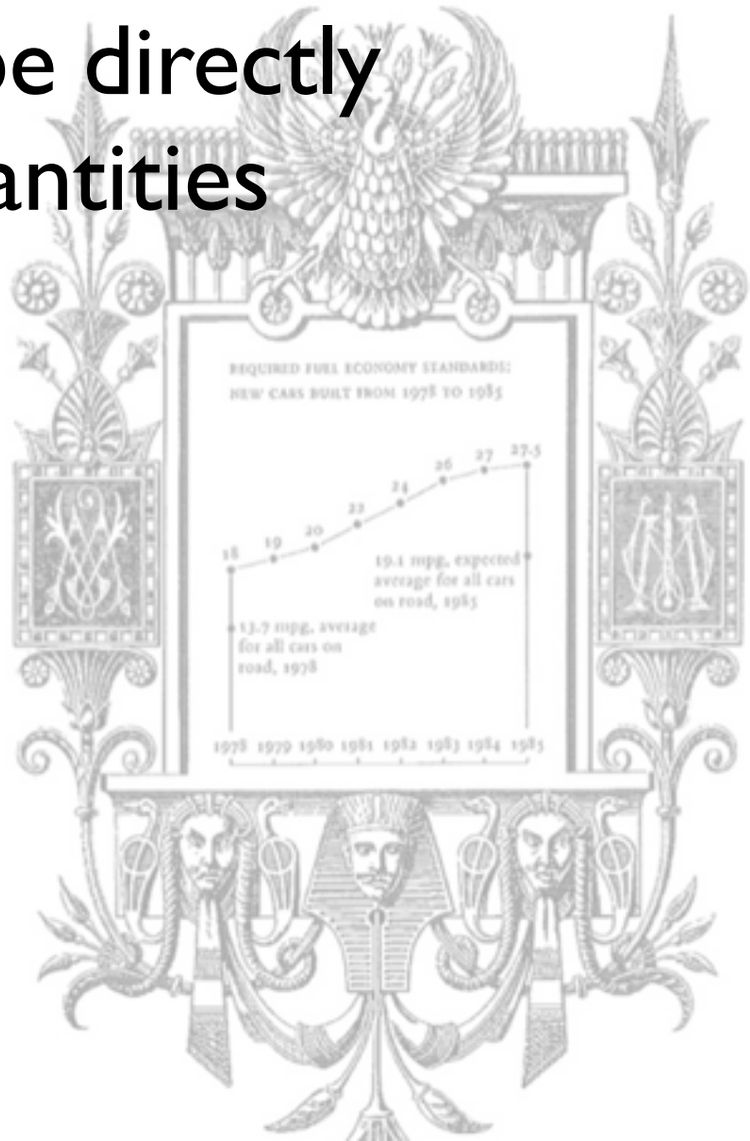


ongoing, Tim Brey

Tufte's Design Principles

Clear, detailed,and thorough labeling and appropriate scales

Size of the graphic effect should be directly proportional to the numerical quantities ("lie factor")

Maximize data-ink ratio

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