

# DO'S AND DON'TS

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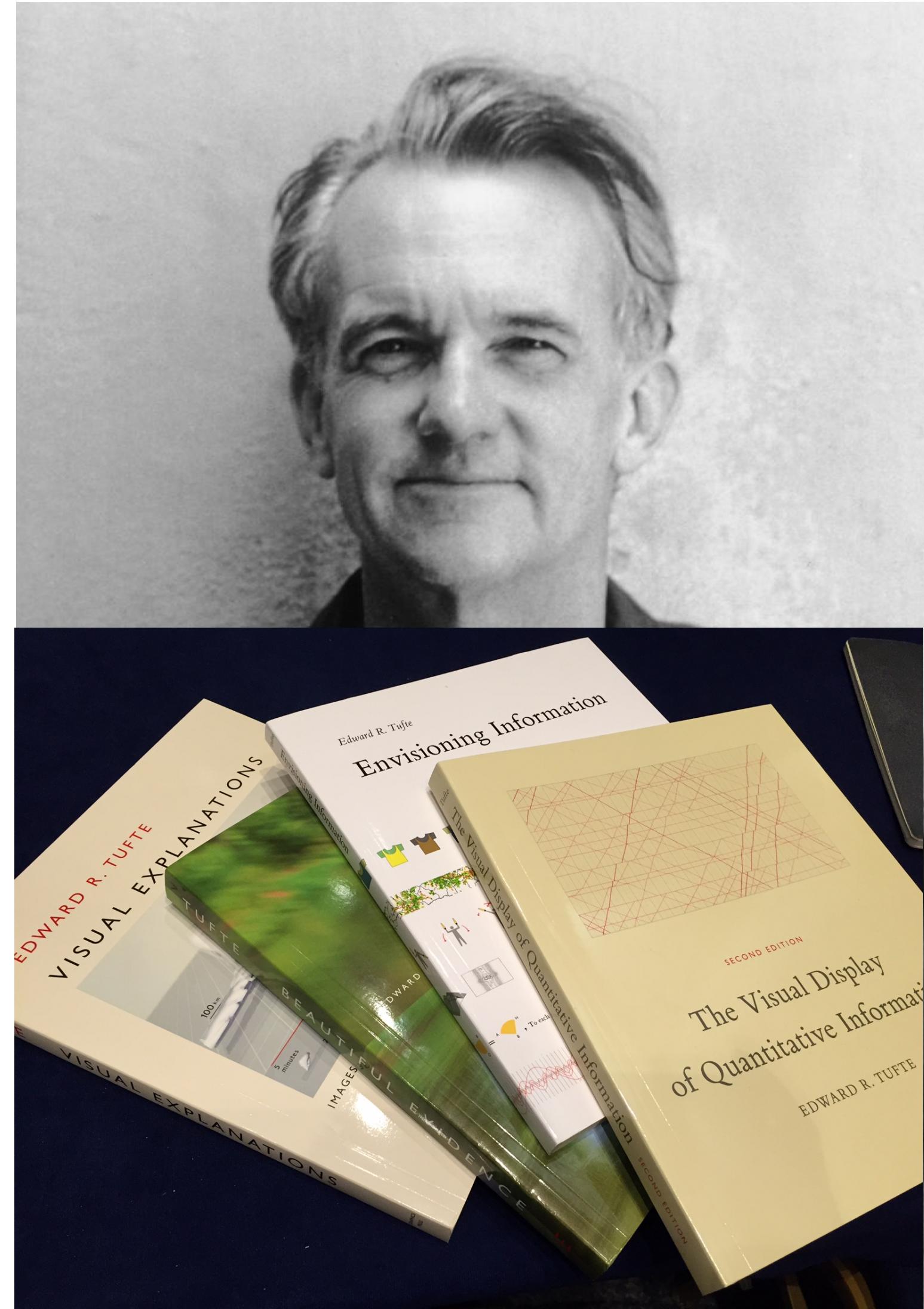


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# Edward Tufte

American statistician expert in the presentation of information

Has invented several terms: chartjunk, data-ink ratio, data density



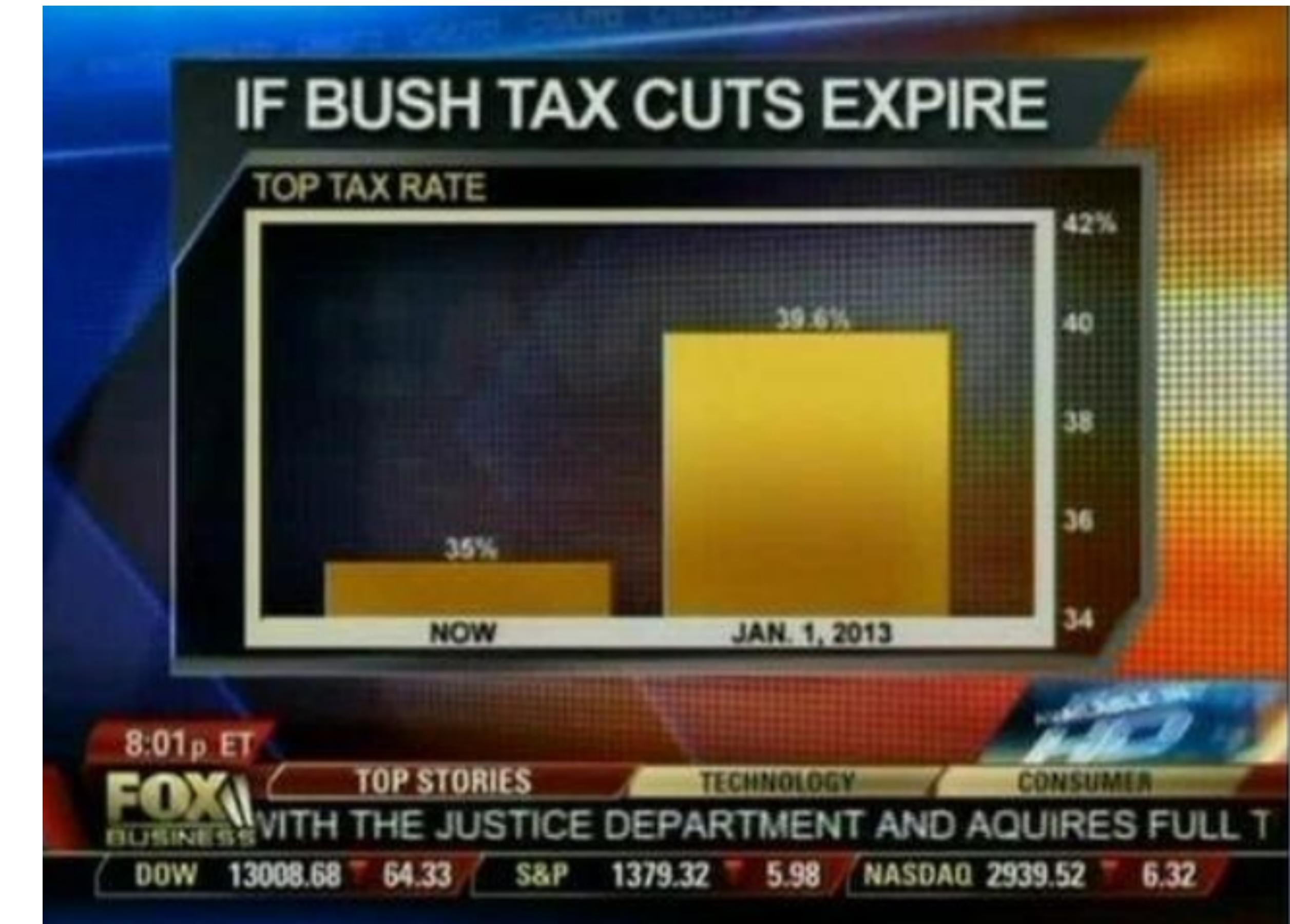
# Aim for graphical excellence

*“Well-designed presentations of interesting data are a matter of substance, of statistics, and of design.”*

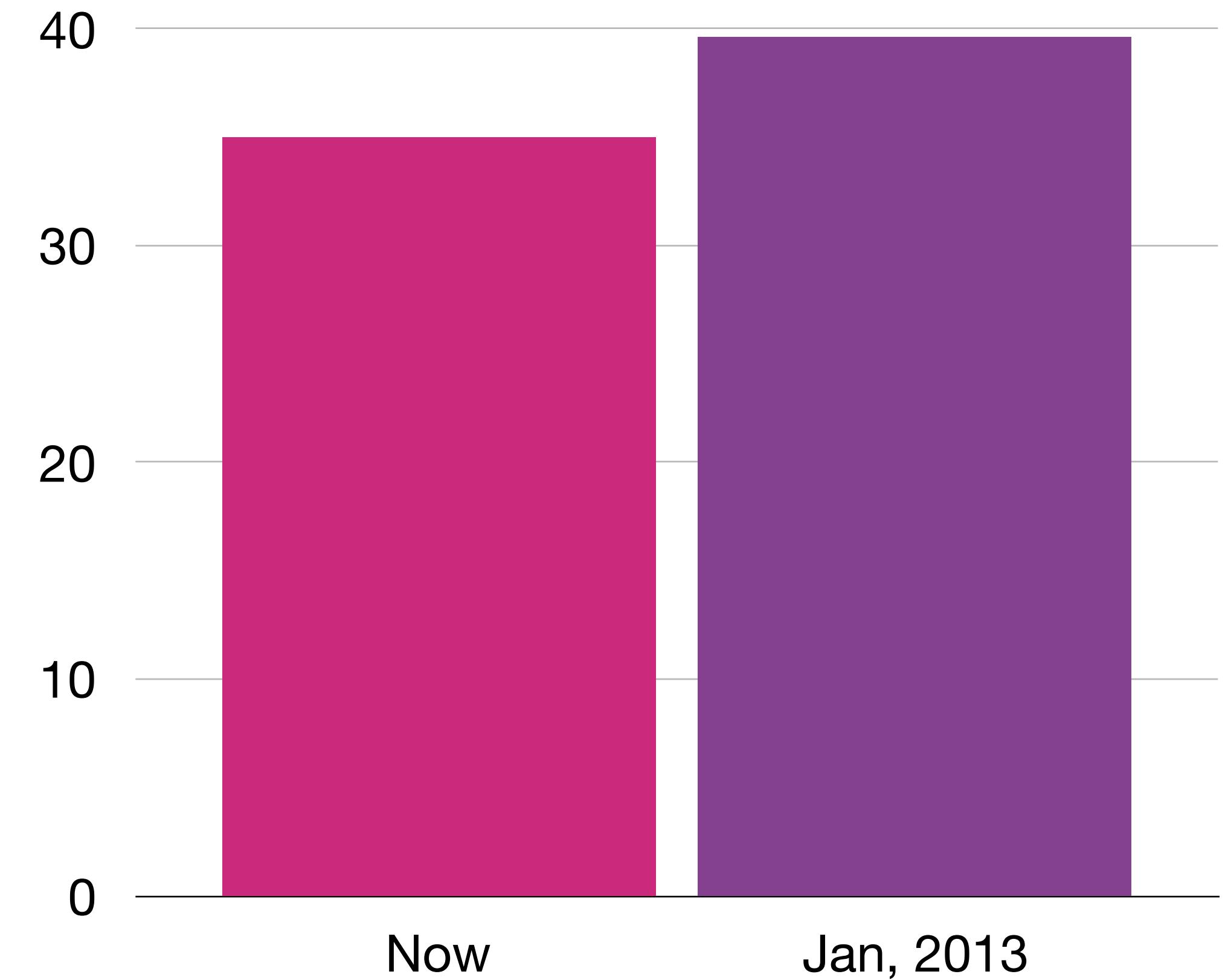
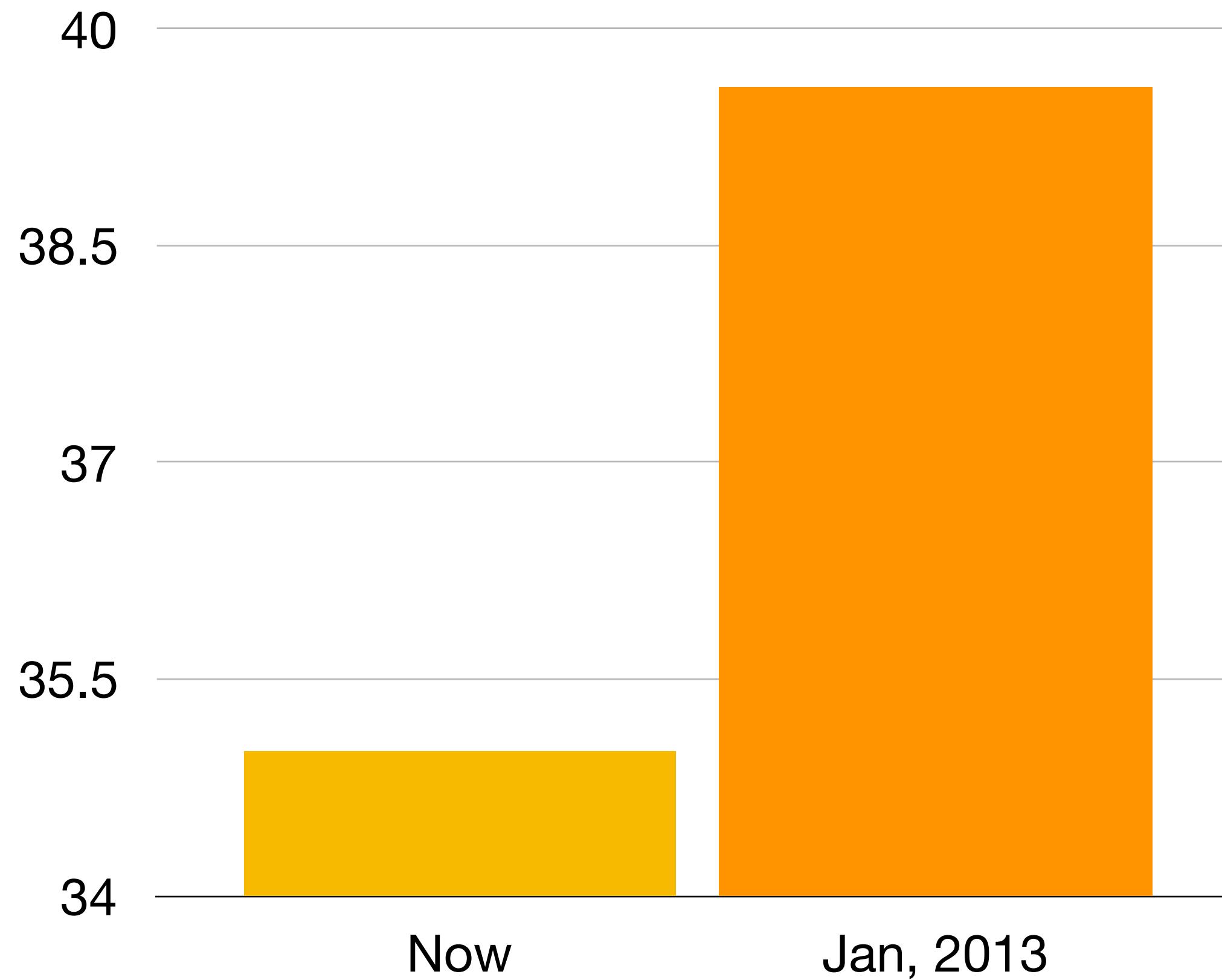
*“Graphical excellence consists of complex ideas communicated with clarity, precision and efficiency.”*

# Graphical integrity

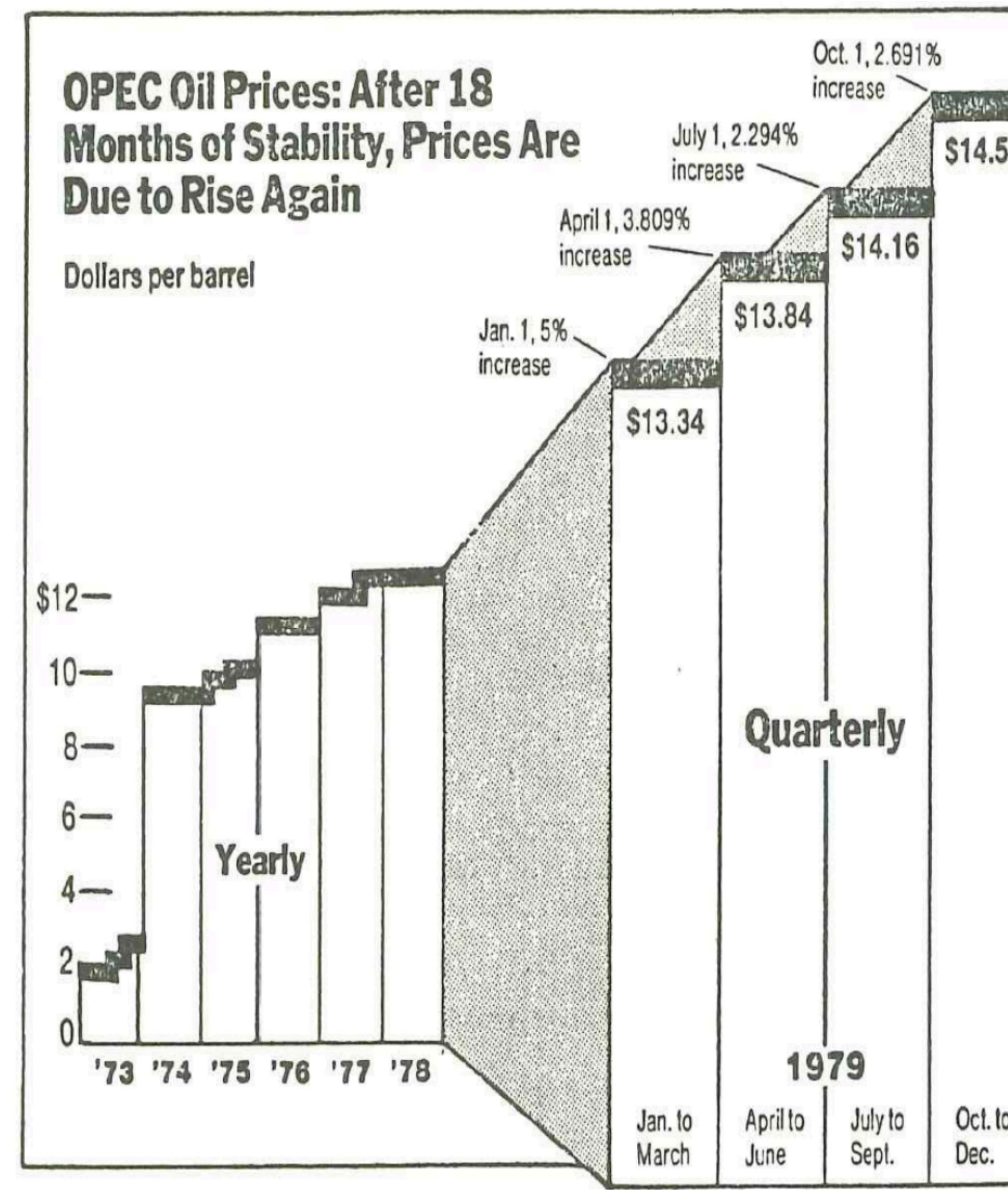
Magnitude in data must correspond to magnitude of mark



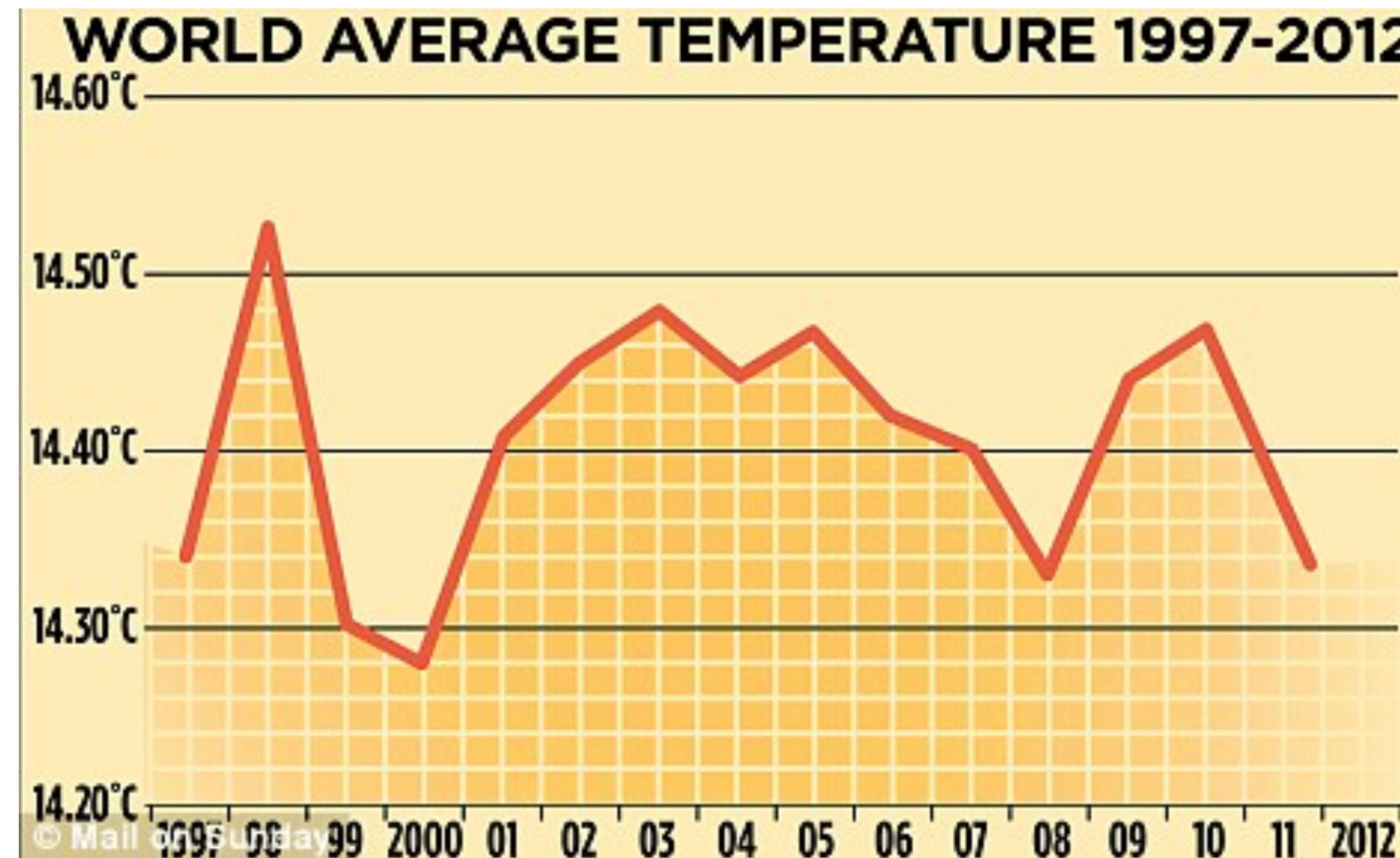
# Cheating on the scale



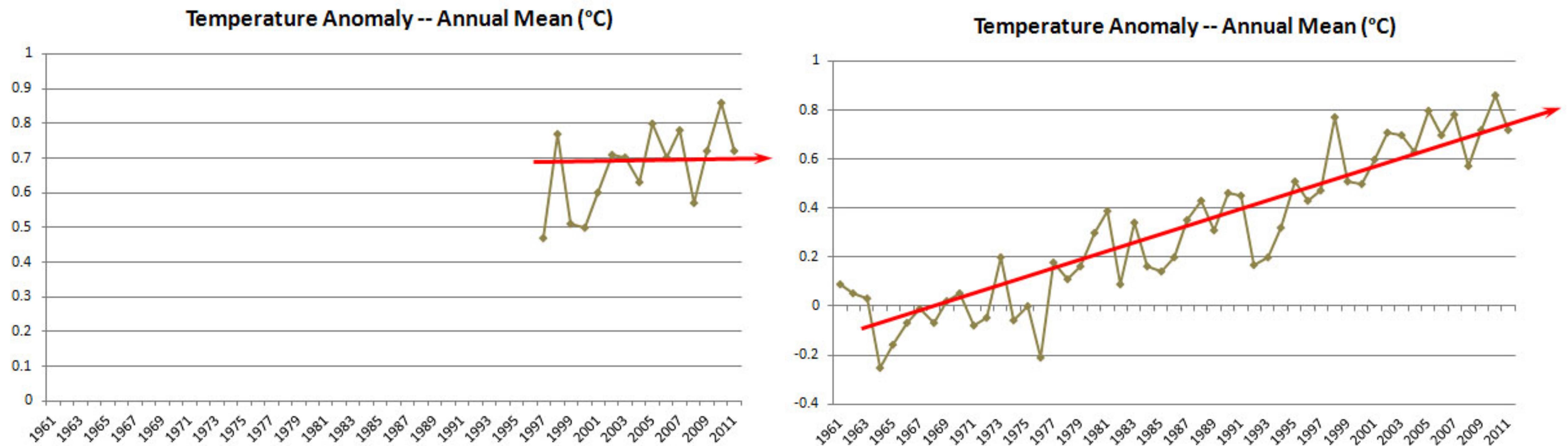
# Have consistent intervals



# Global warming?

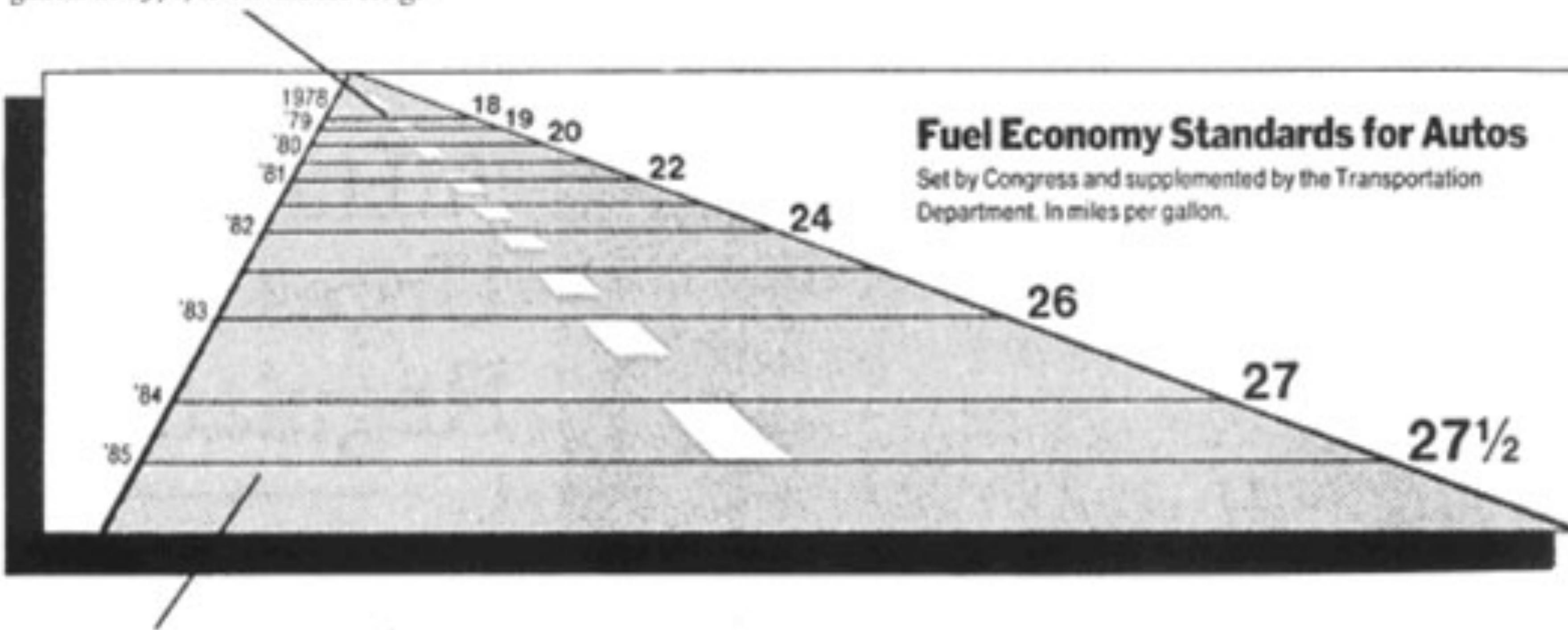


# Show all the data, start at 0



# Avoid distortion

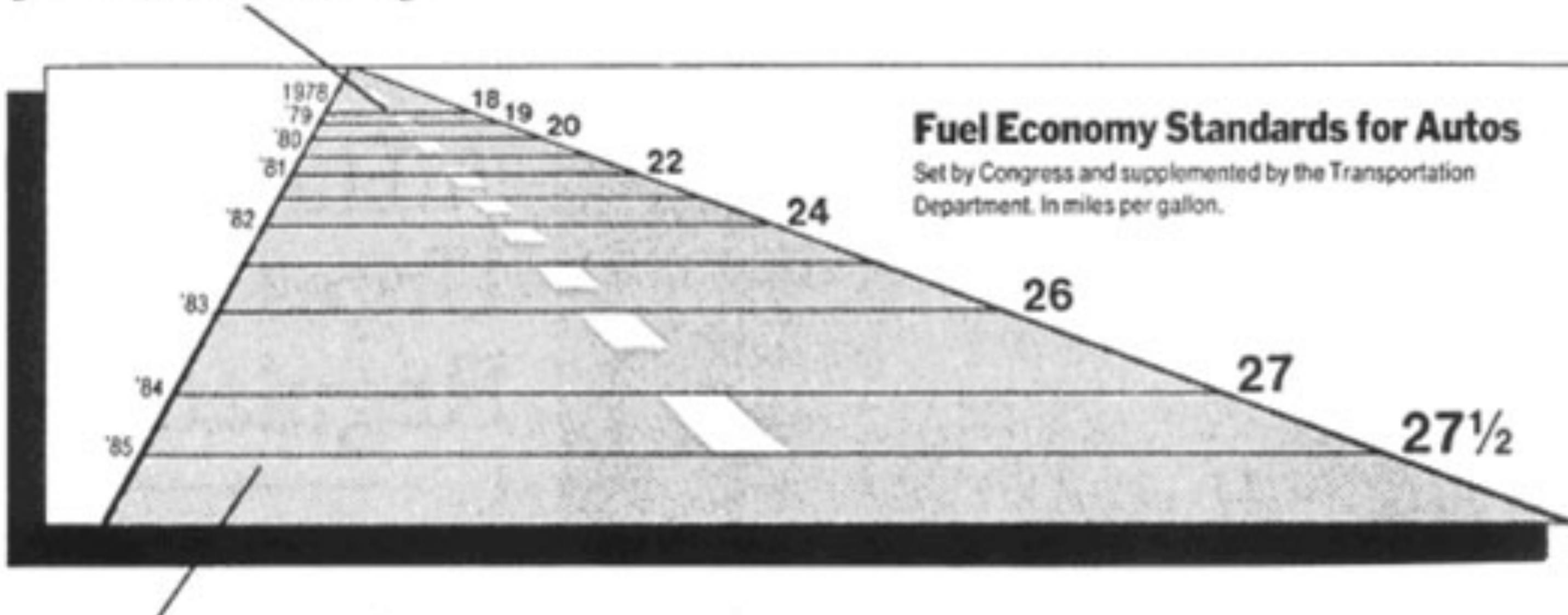
This line, representing 18 miles per gallon in 1978, is 0.6 inches long.



This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long.

# The Lie factor

This line, representing 18 miles per gallon in 1978, is 0.6 inches long.



This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long.

$$\frac{(5.3 - 0.6) / 0.6}{(27.5 - 18) / 18} = 14.8$$

Size of effect shown in graphic

Size of effect in data

# Tufte's integrity principles

Show data variation, not design variation

Channel should be directly proportional to data attribute value to minimize the “lie factor”.

Strive for clear, detailed and accurate labels and scales

every time you make a powerpoint

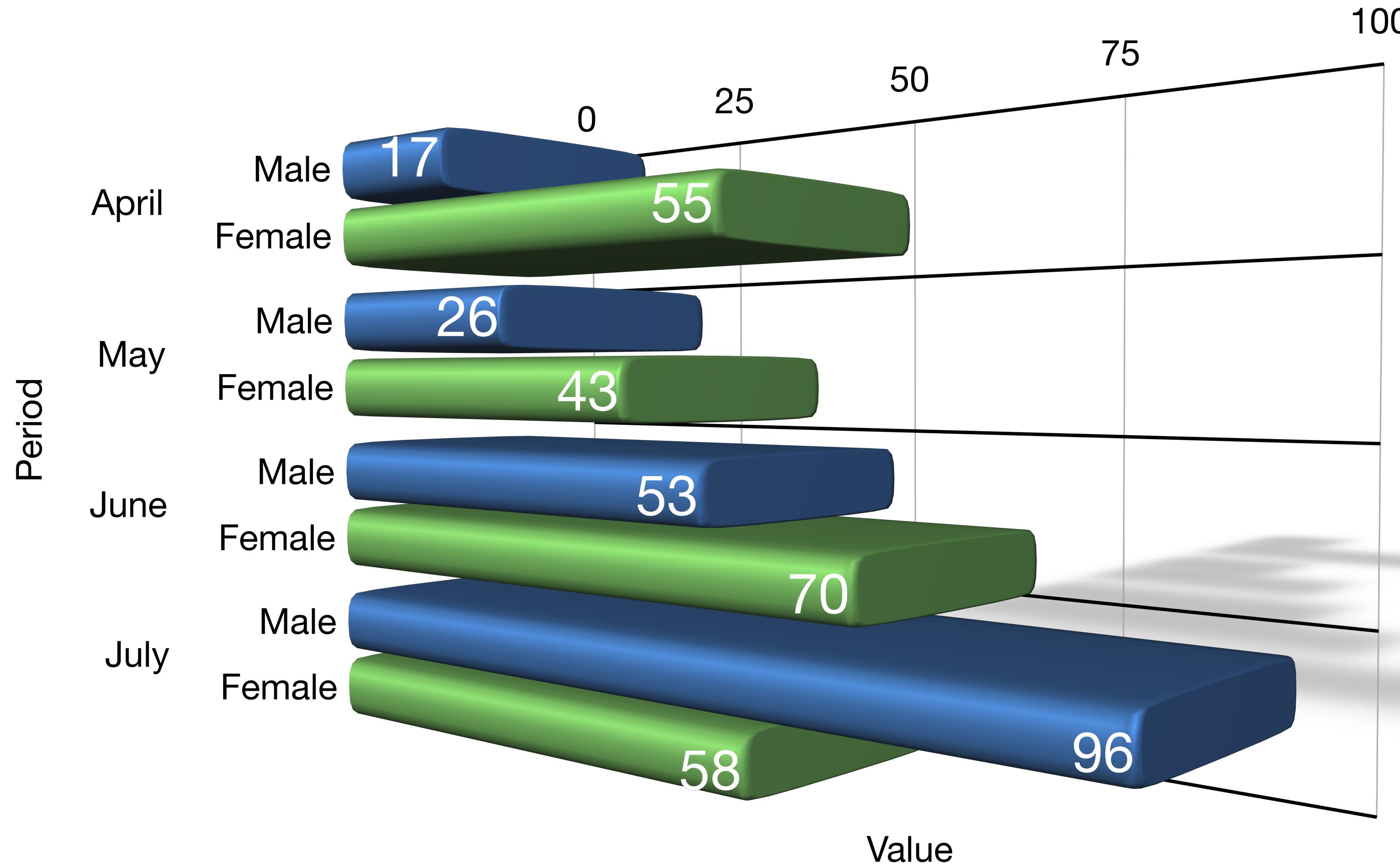


edward tufte kills a kitten

mark goetz

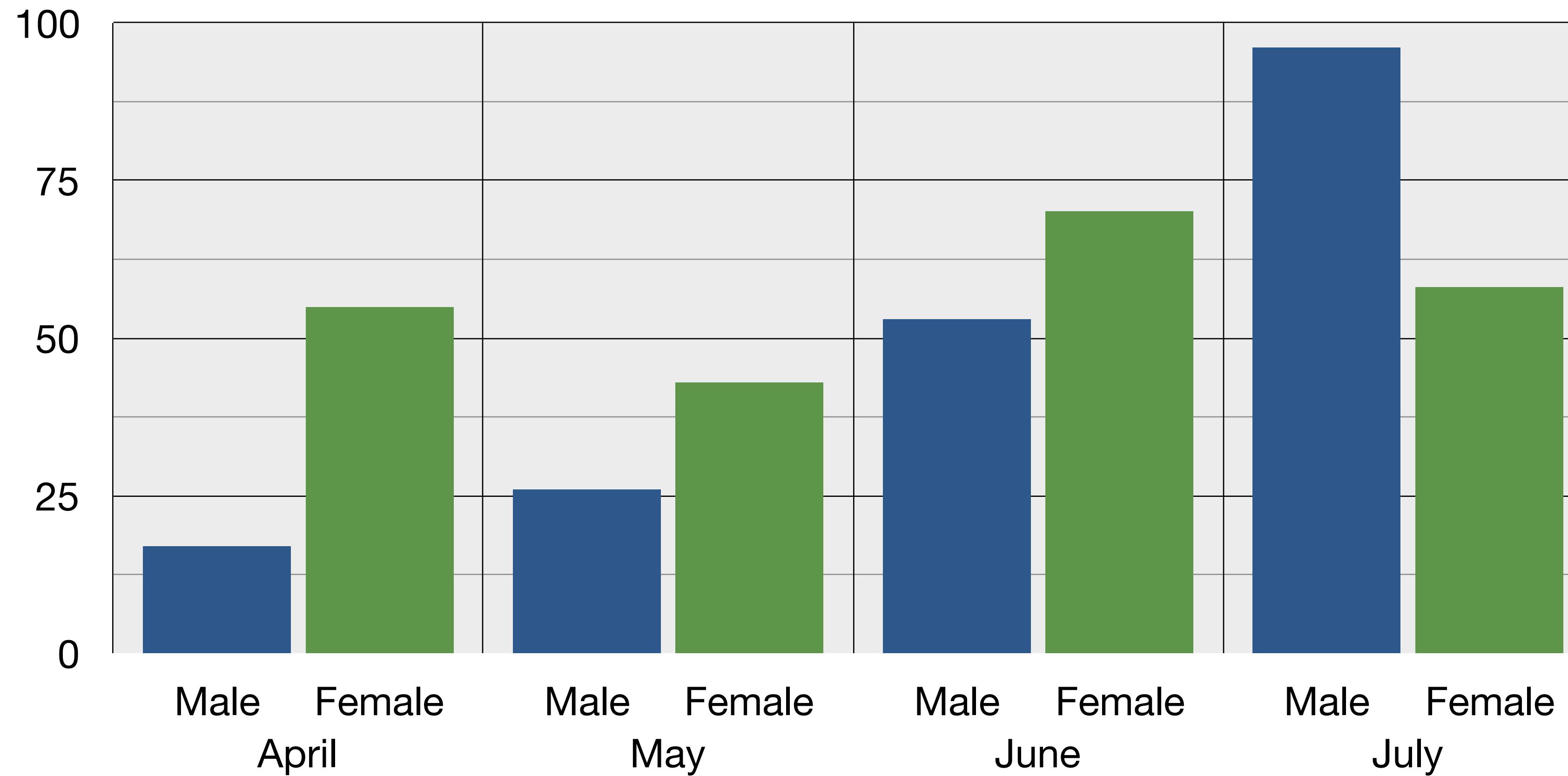
Design principles

# No unjustified 3D and clutter



# A better chart

**Still extraneous visual elements that detract from message**



# Bar chart guidelines

Use horizontal labels,  
easier to read

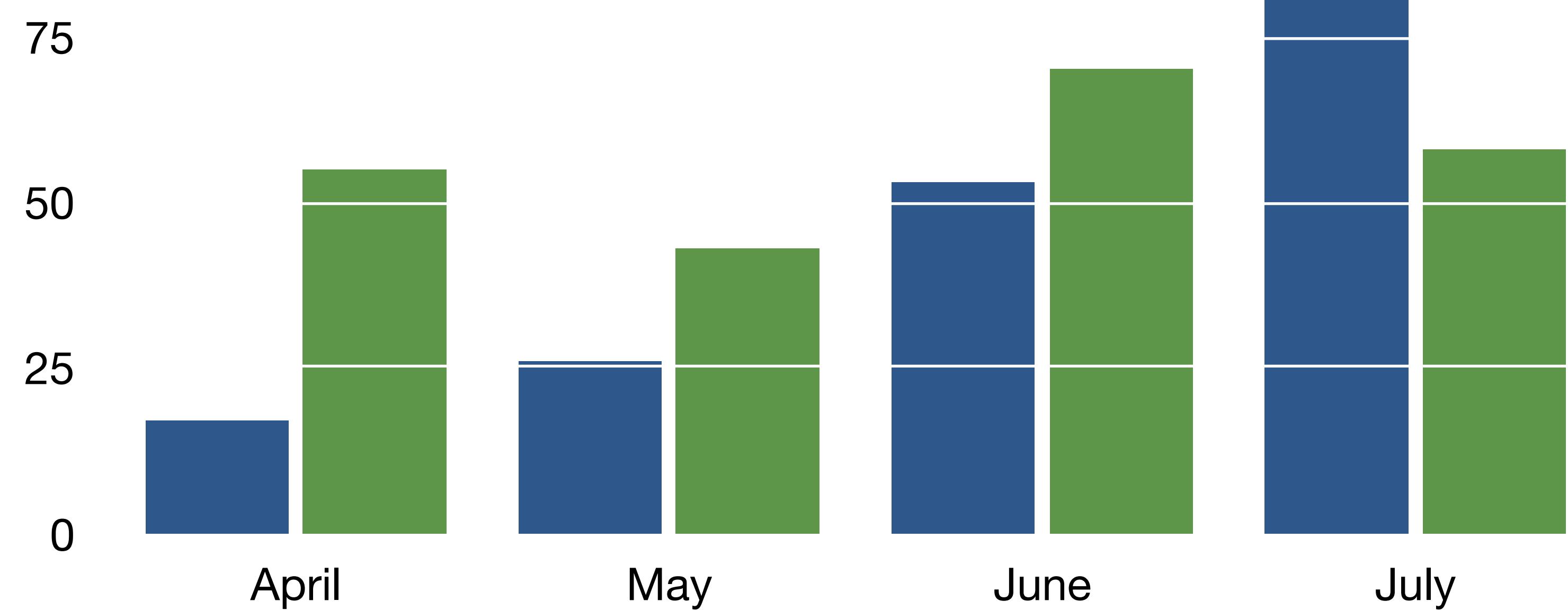
Male      Female

Space bars between  
40-50% of the bar width

Start the Y axis at 0 and  
don't truncate the bars

Use consistent colors

For categorical data,  
order alphabetically



# Useful Junk? The Effects of Visual Embellishment on Comprehension and Memorability of Charts

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## ABSTRACT

Guidelines for designing information charts often state that the presentation should reduce ‘chart junk’ – visual embellishments that are not essential to understanding the data. In contrast, some popular chart designers wrap the presented data in detailed and elaborate imagery, raising the questions of whether this imagery is really as detrimental to understanding as has been proposed, and whether the visual embellishment may have other benefits. To investigate these issues, we conducted an experiment that compared embellished charts with plain ones, and measured both interpretation accuracy and long-term recall. We found that people’s accuracy in describing the embellished charts was no worse than for plain charts, and that their recall after a two-to-three-week gap was significantly better. Although we are cautious about recommending that all charts be produced in this style, our results question some of the premises of the minimalist approach to chart design.

## Author Keywords

Charts, information visualization, imagery, memorability.

## ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI):  
Miscellaneous.

## General Terms

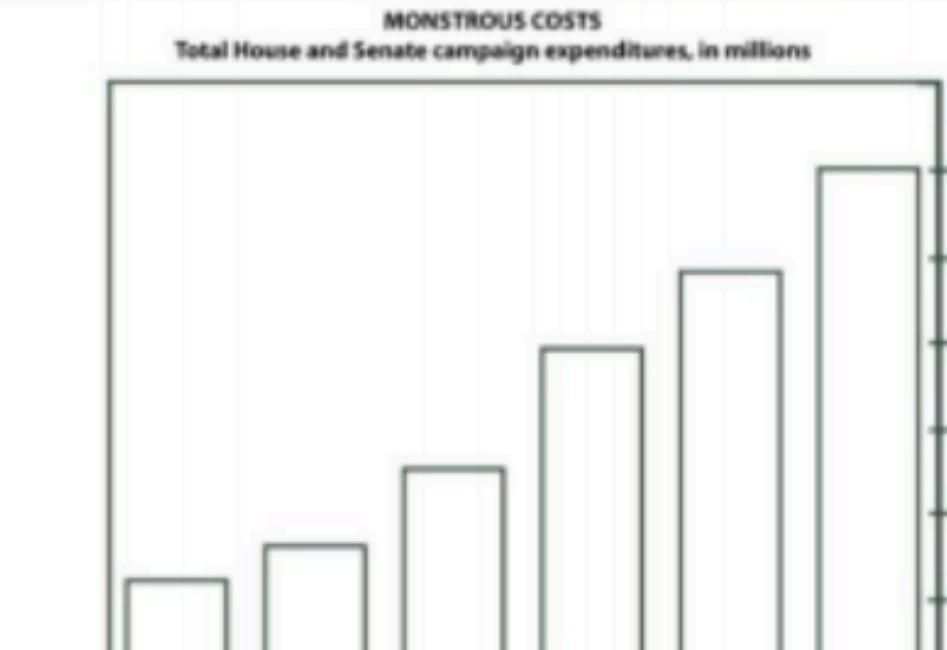
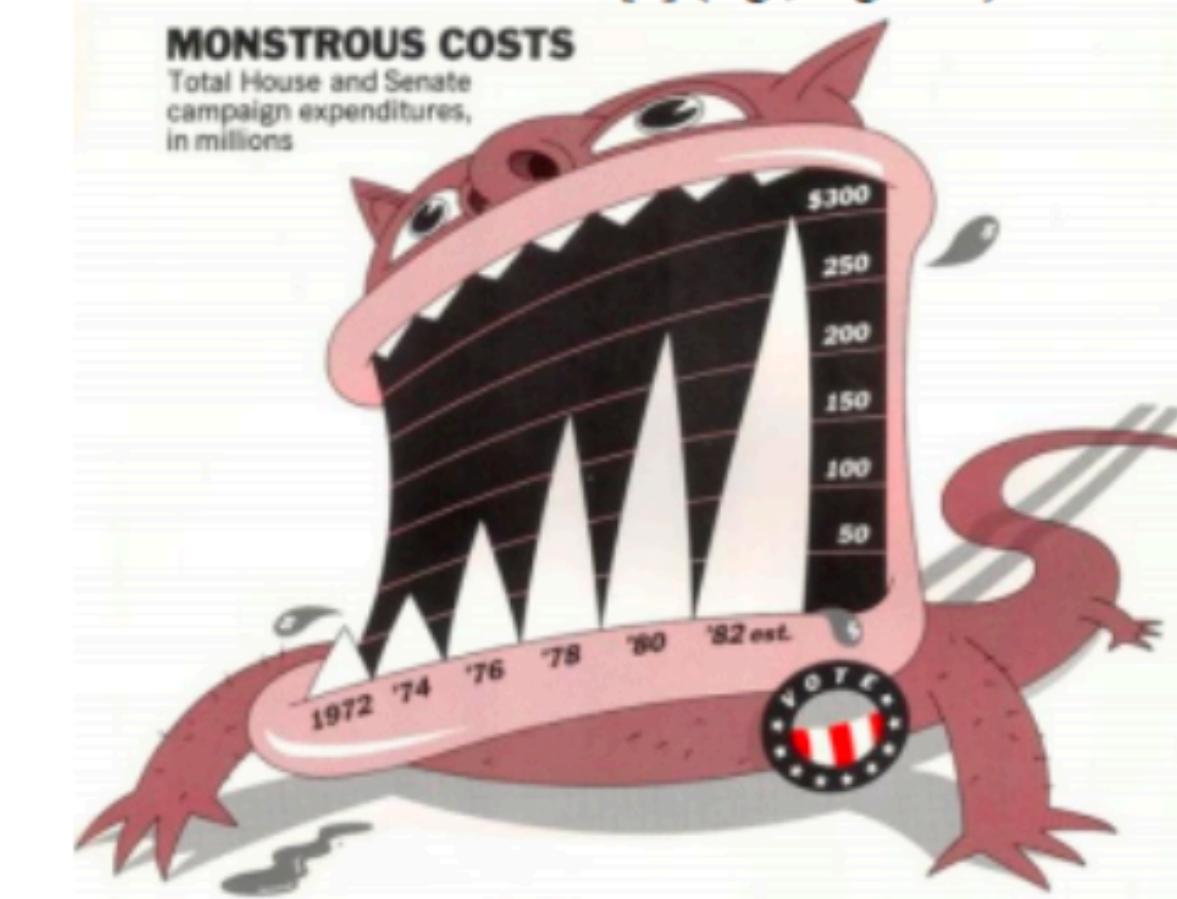
Design, Human Factors

## INTRODUCTION

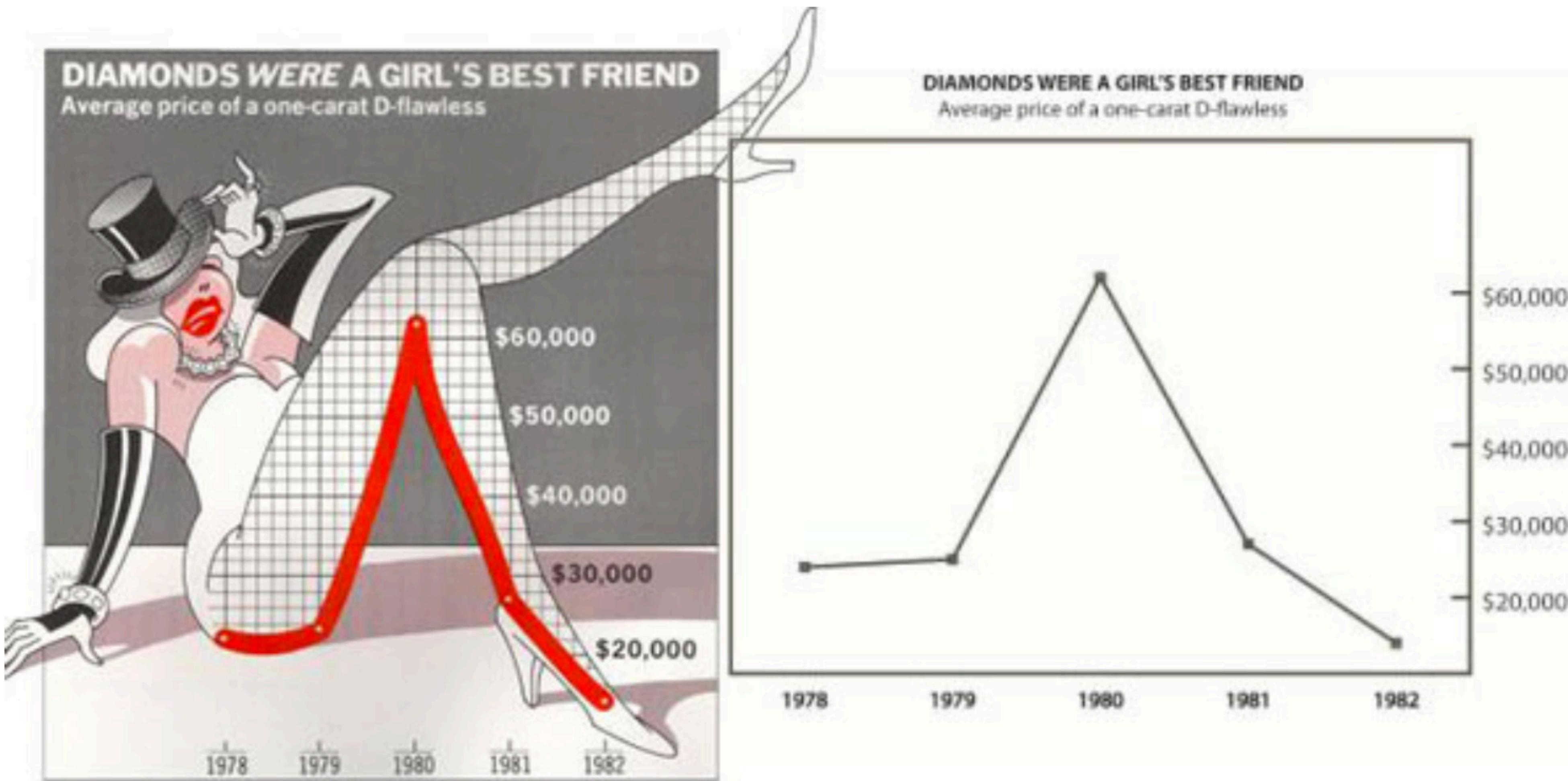
Many experts in the area of chart design, such as Edward Tufte, criticize the inclusion of visual embellishment in charts and graphs; their guidelines for good chart design often suggest that the addition of *chart junk*, decorations and other kinds of non-essential imagery, to a chart can make interpretation more difficult and can distract readers from the data [22]. This *minimalist* perspective advocates

*data-ink* – or the ink in the chart used to represent data.

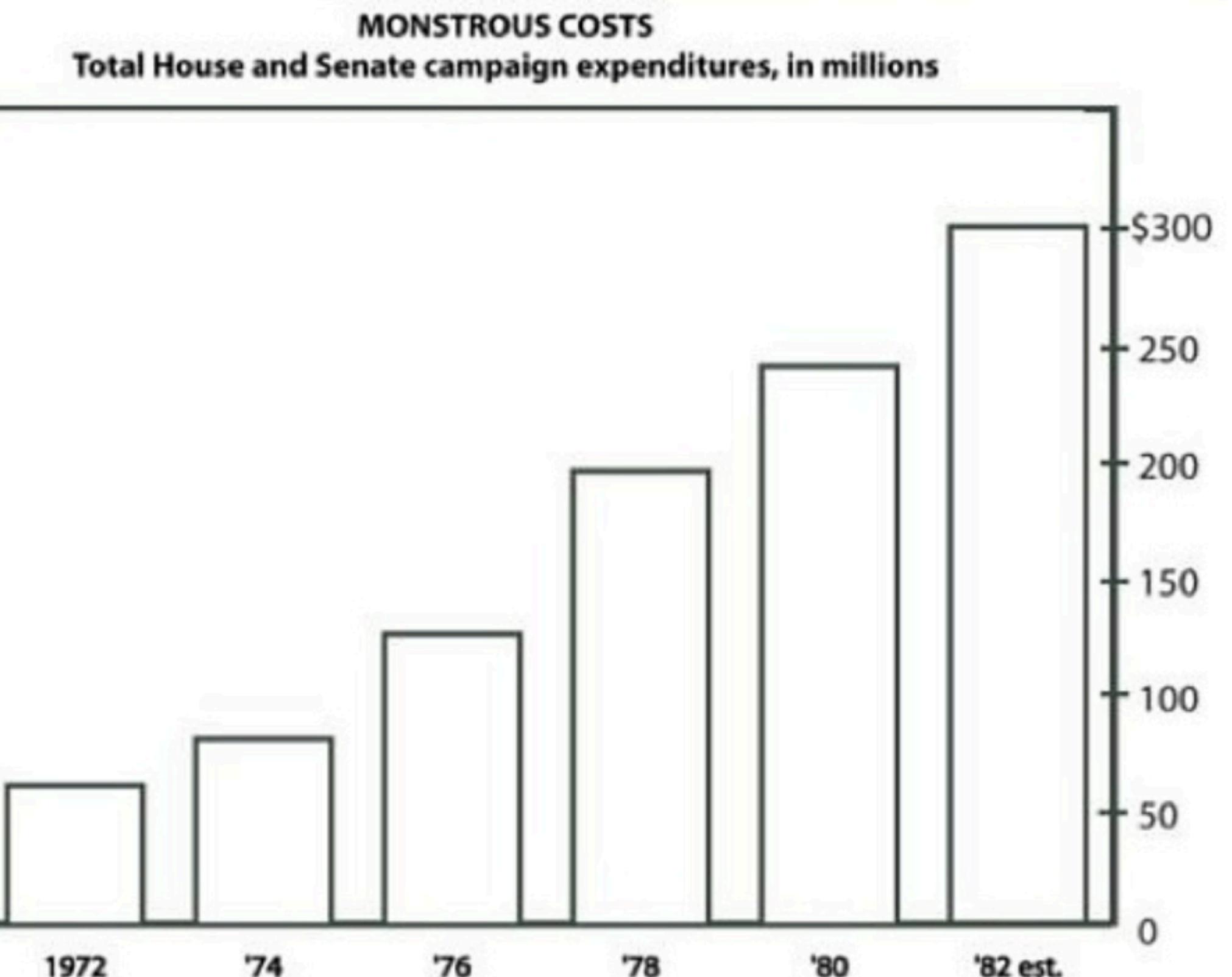
Despite these minimalist guidelines, many designers include a wide variety of visual embellishments in their charts, from small decorations to large images and visual backgrounds. One well-known proponent of visual embellishment in charts is the graphic artist Nigel Holmes, whose work regularly incorporates strong visual imagery into the fabric of the chart [7] (e.g., Figure 1).



# Chartjunk useful?



# Chartjunk useful?



# Experimental results

Interpretation accuracy is the same

No difference in remembering the results after a five-minute gap

Yet, a **significantly better recall for Holmes charts** (topic and details) after 2-3 weeks

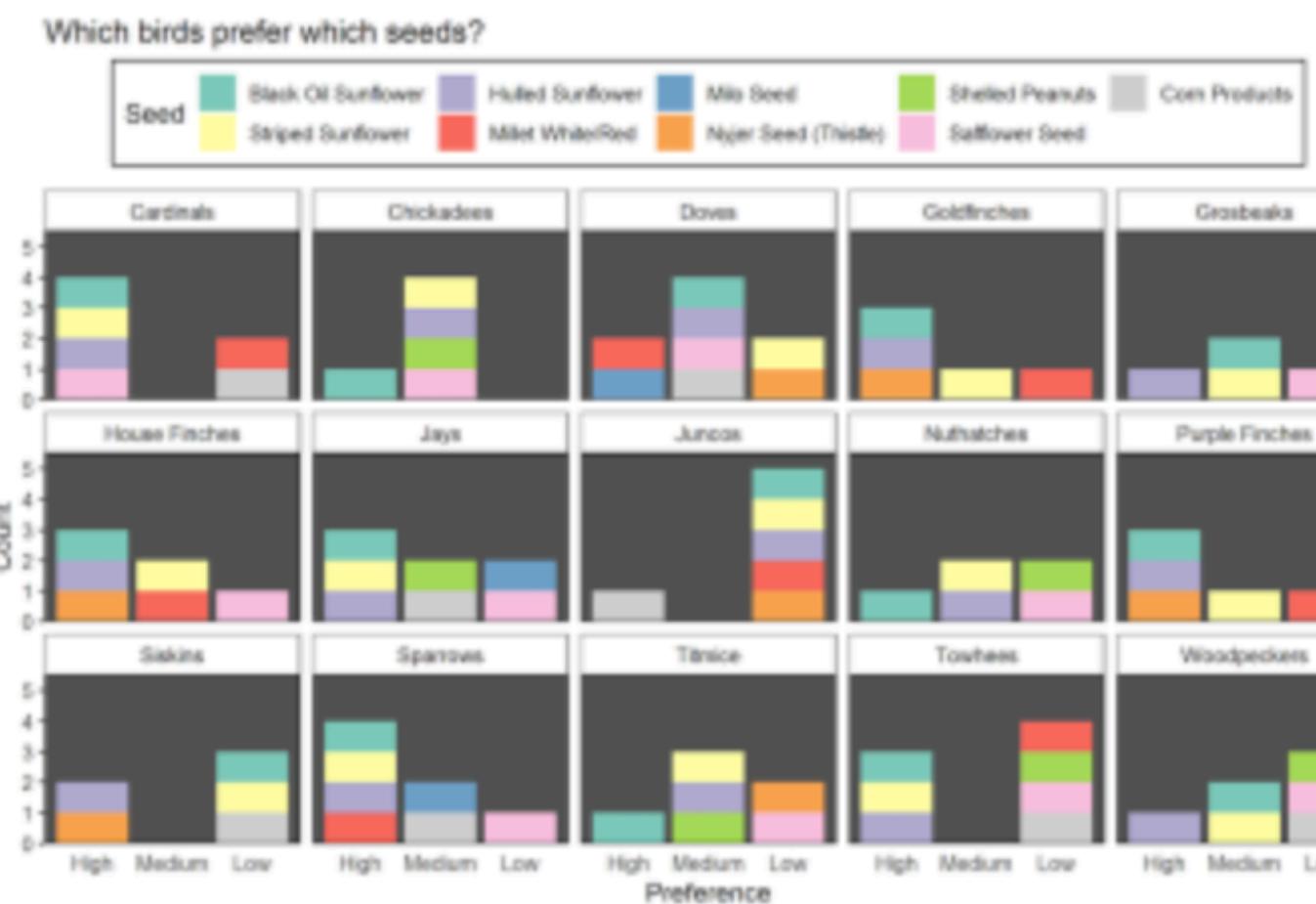
More enjoyable, more attractive and more expressive

Pro: engagement, impact

Con: trustworthiness, interpretability

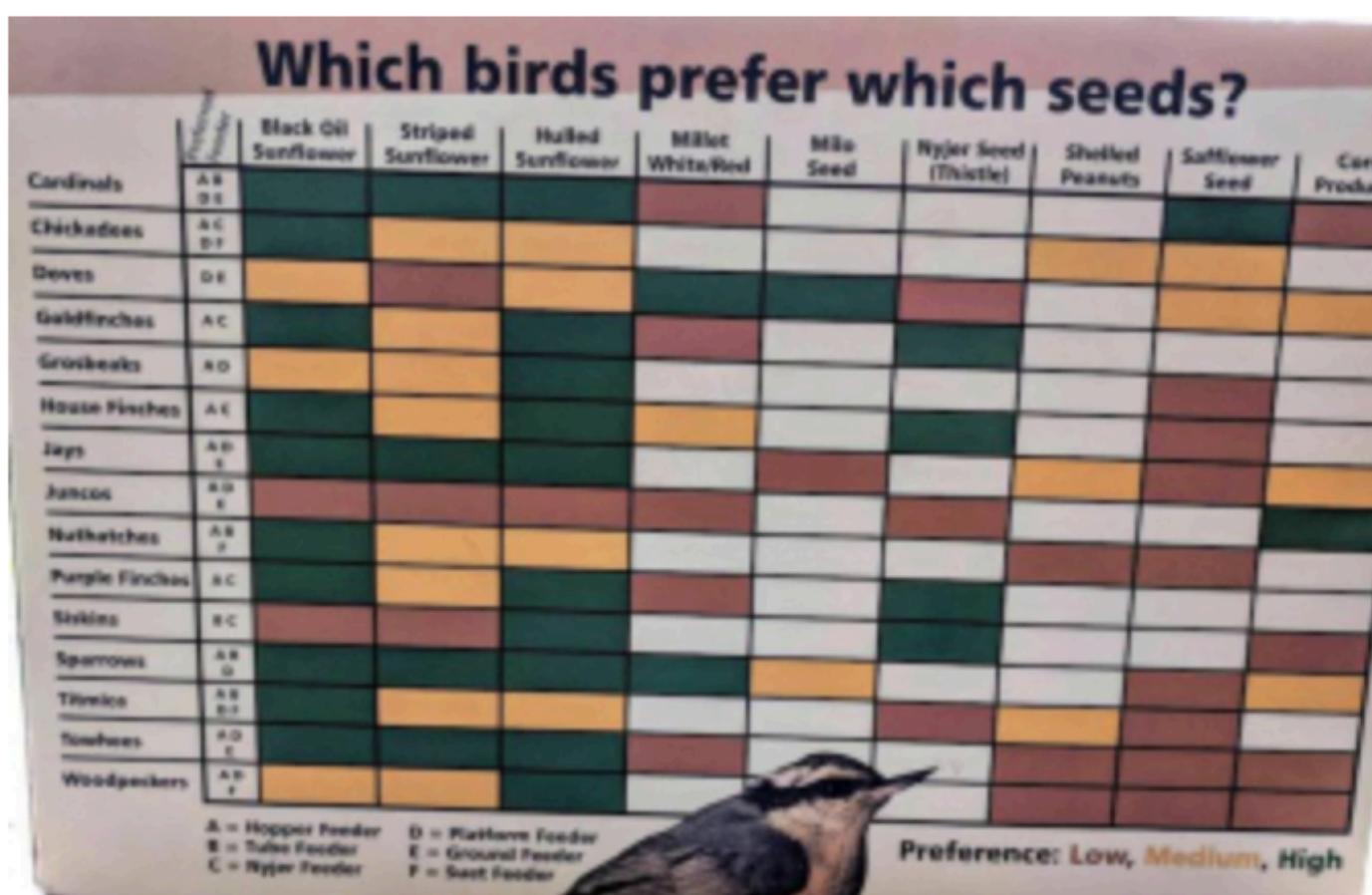
## Some Tufte basics brought to you by your favorite birds

Someone sent me this via Twitter, found on the Data is Beautiful [reddit](#):



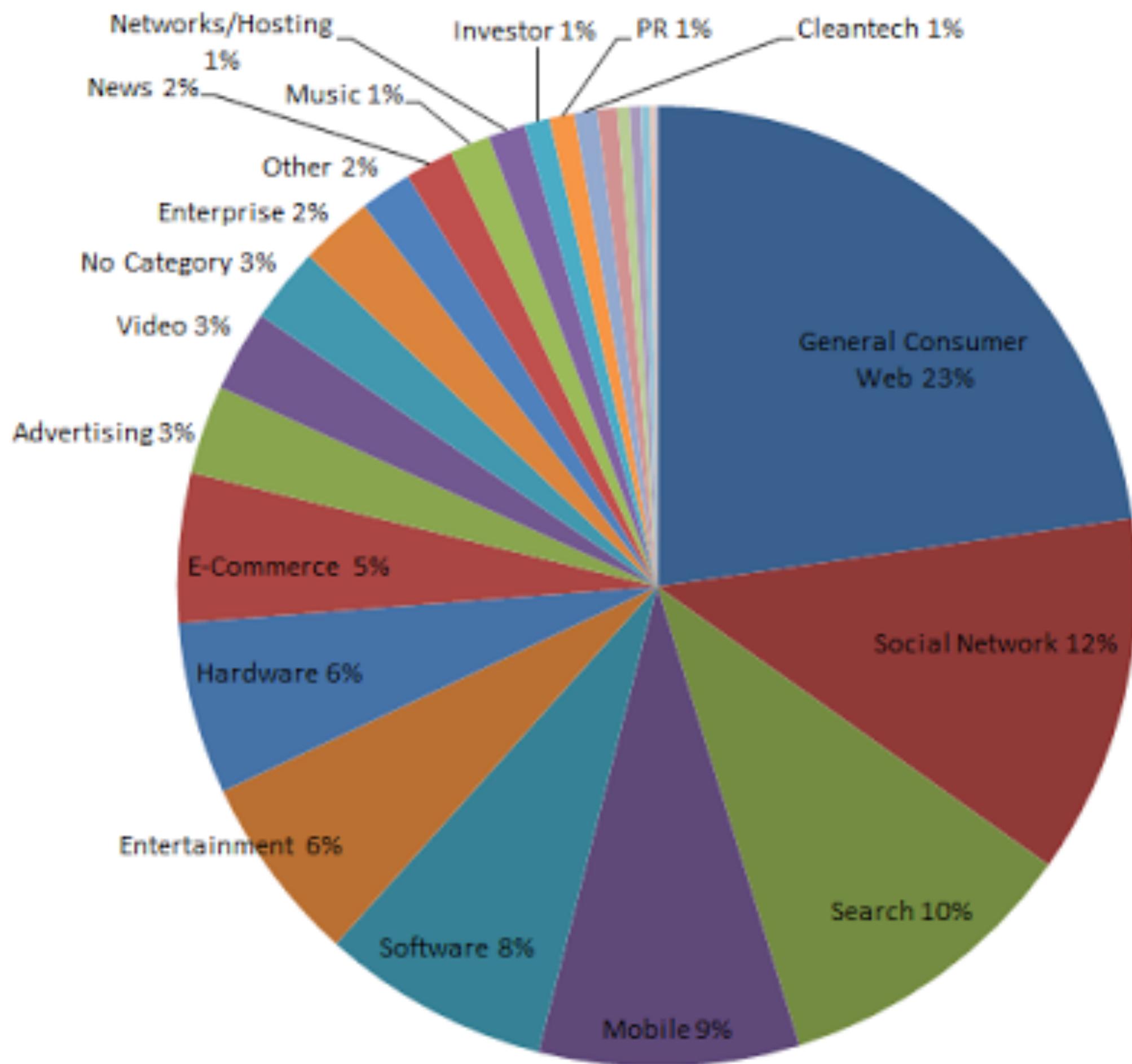
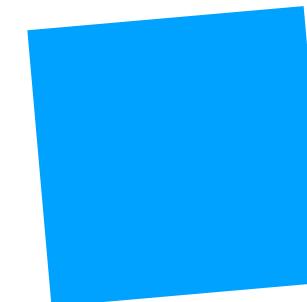
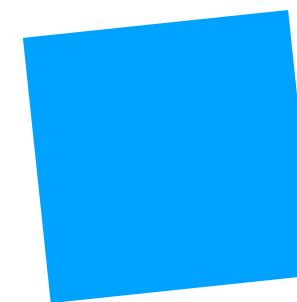
The chart does not deliver on its promise: It's tough to know which birds like which seeds.

The original chart was also provided in the reddit:



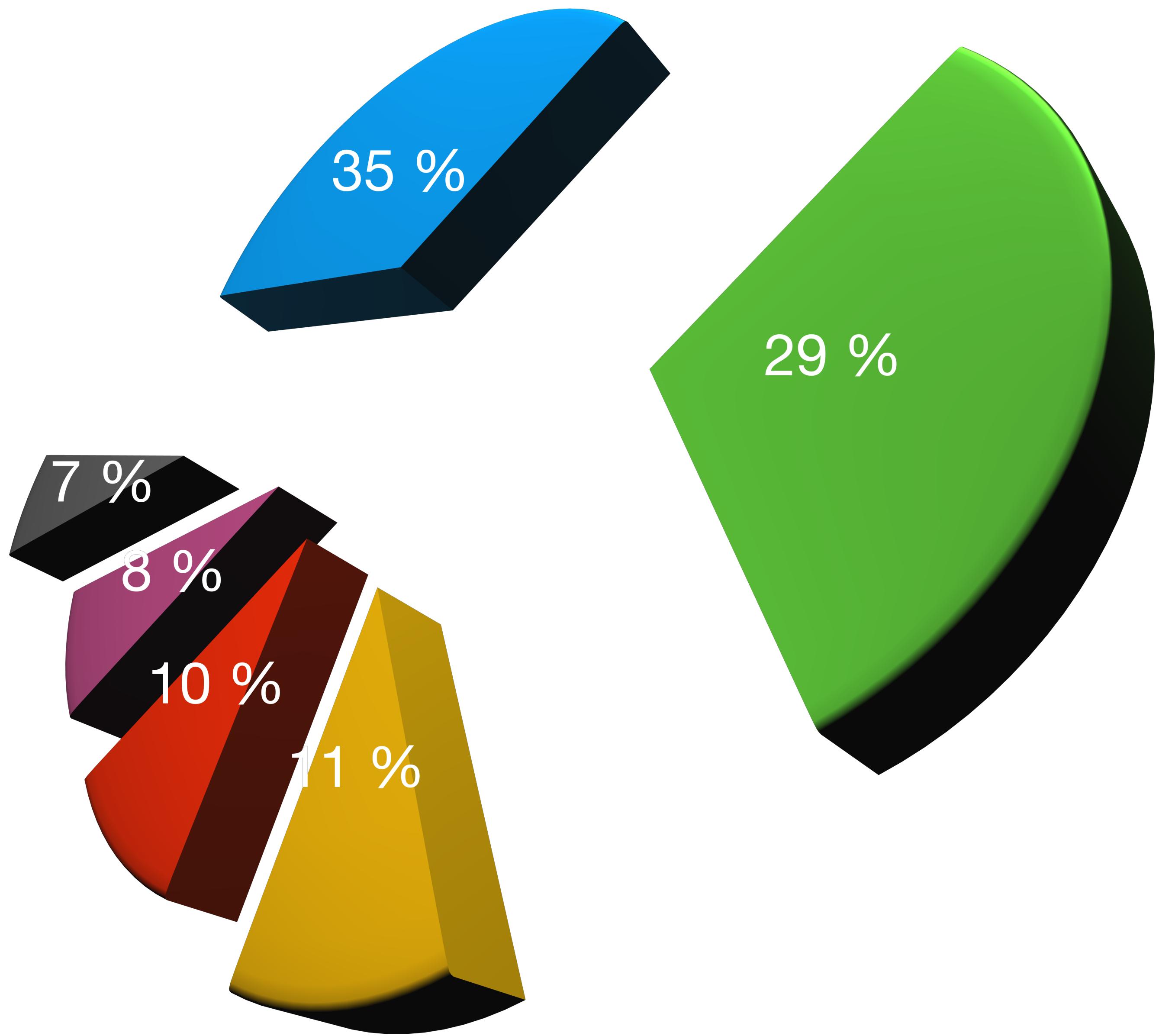
# Death to pie charts

Angles and areas are difficult to perceive accurately when small



Techcrunch news articles categories

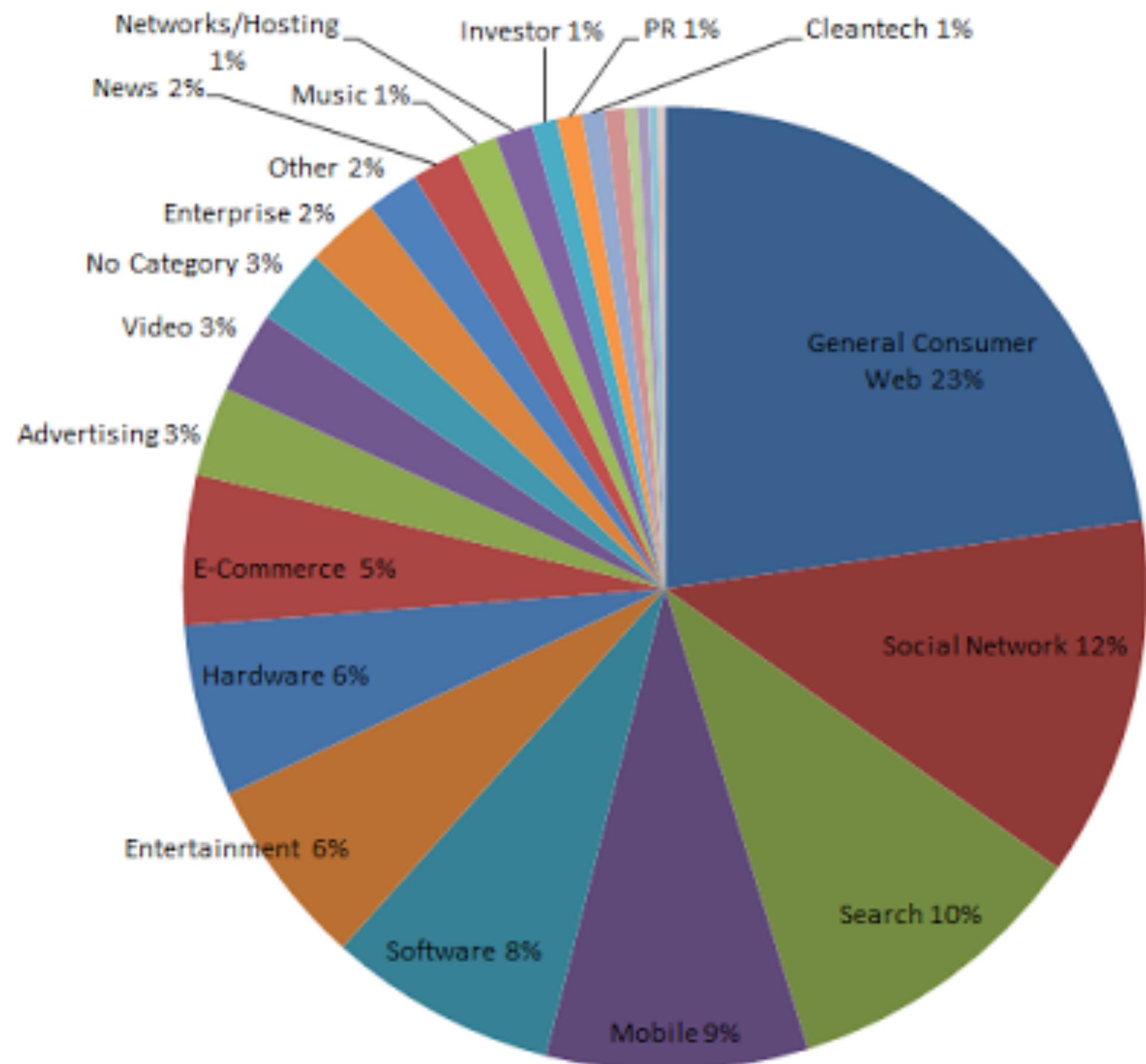
Cole Nussbaumer



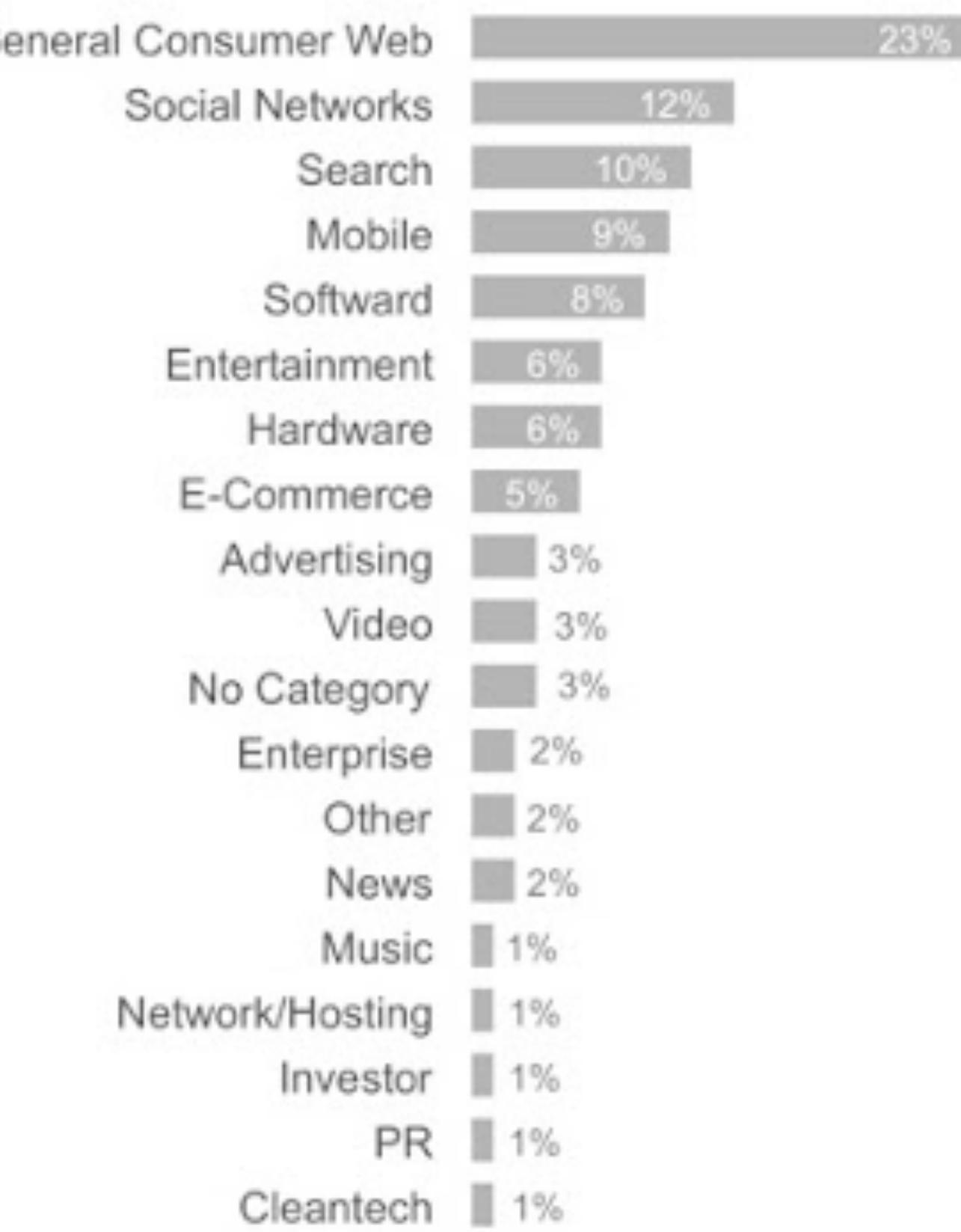
# From pie to bar



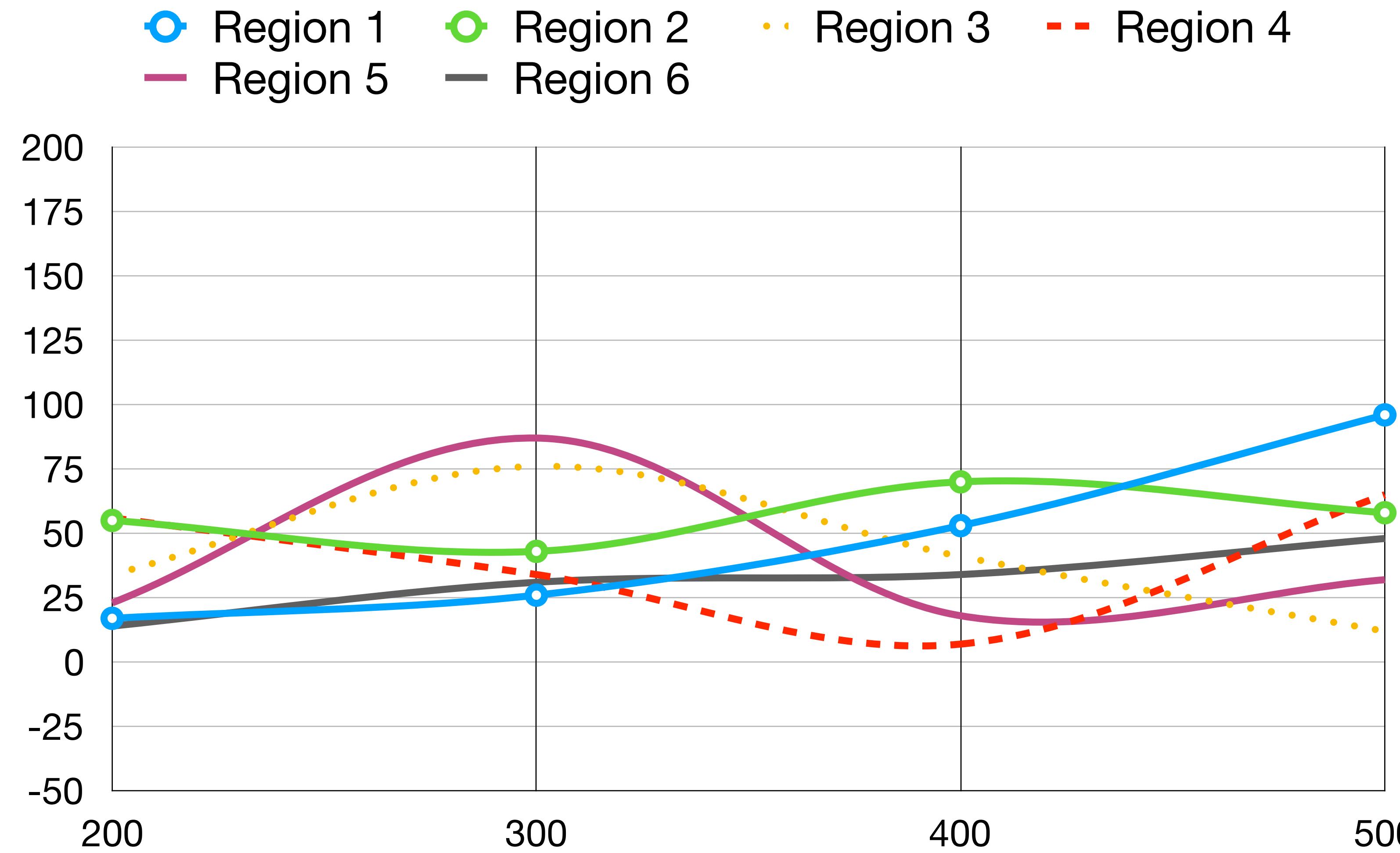
# From pie to bar



**TechCrunch Coverage: 2005 - 2011**  
*Bars are best!*



# What's wrong?



# Line chart tips

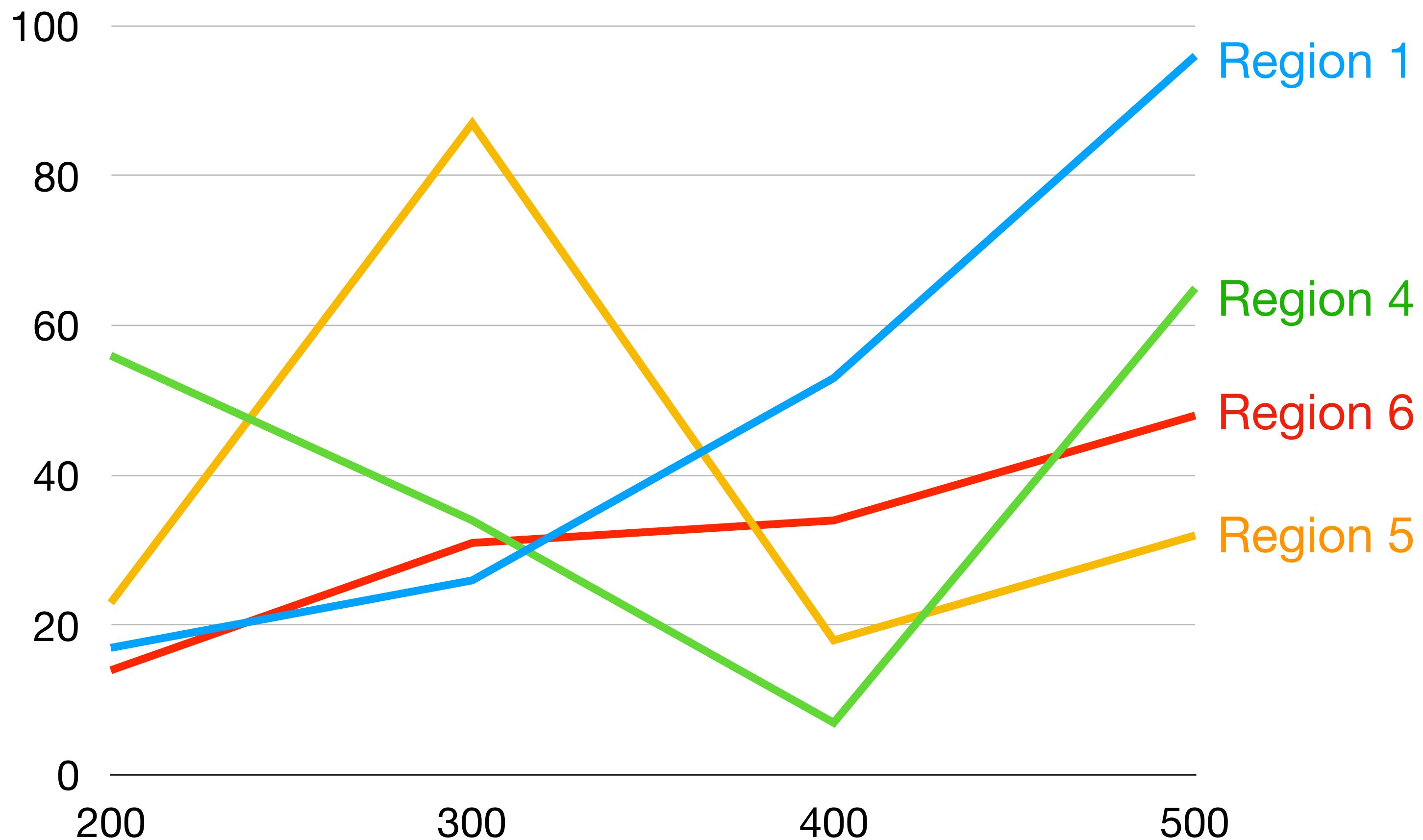
Use a 0-based axes if possible

Don't plot more than 4 lines

Use solid lines only

Label the lines directly

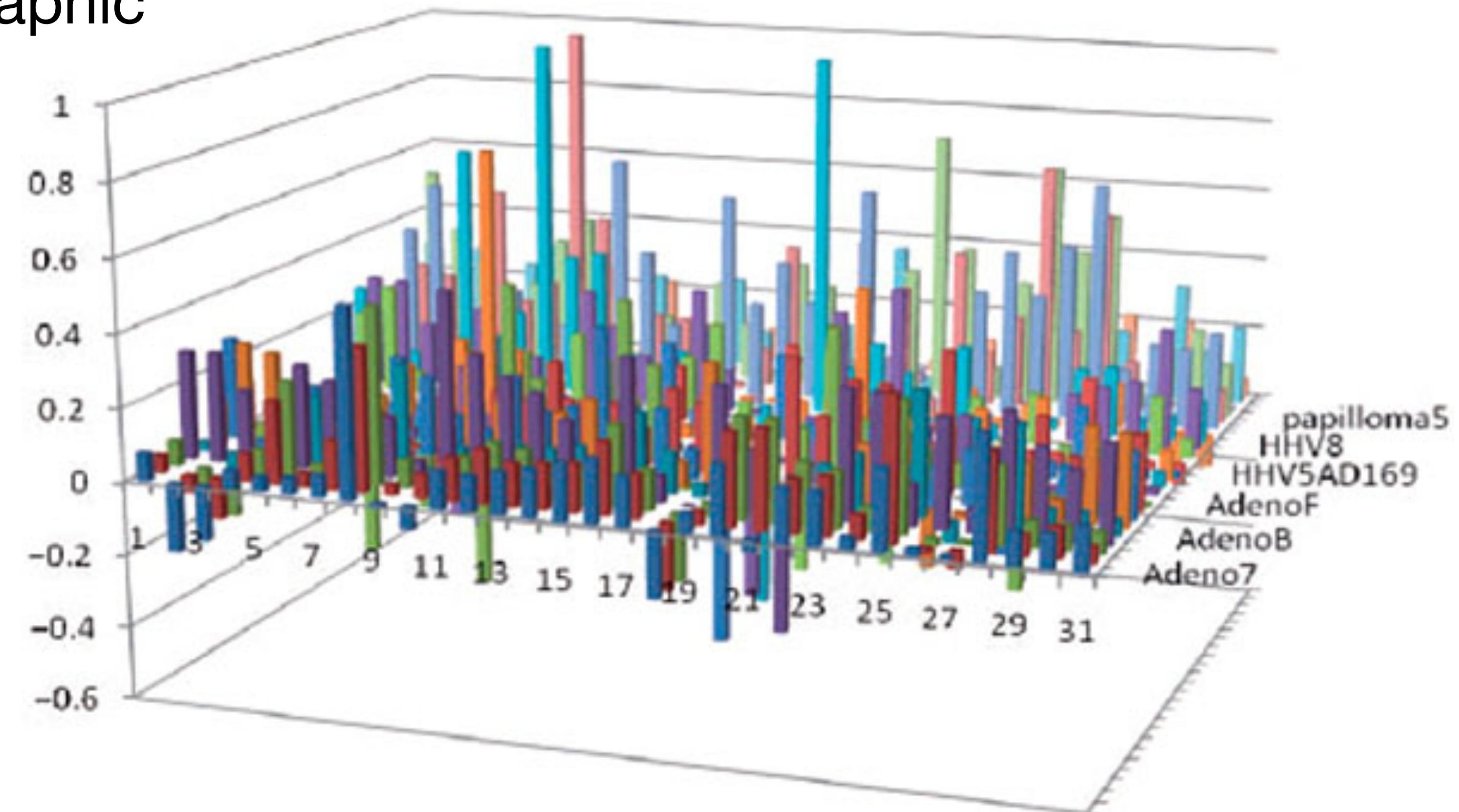
Use the right height



# Maximize data density

$$\text{Data density} = \frac{\# \text{ data points}}{\text{area of data graphic}}$$

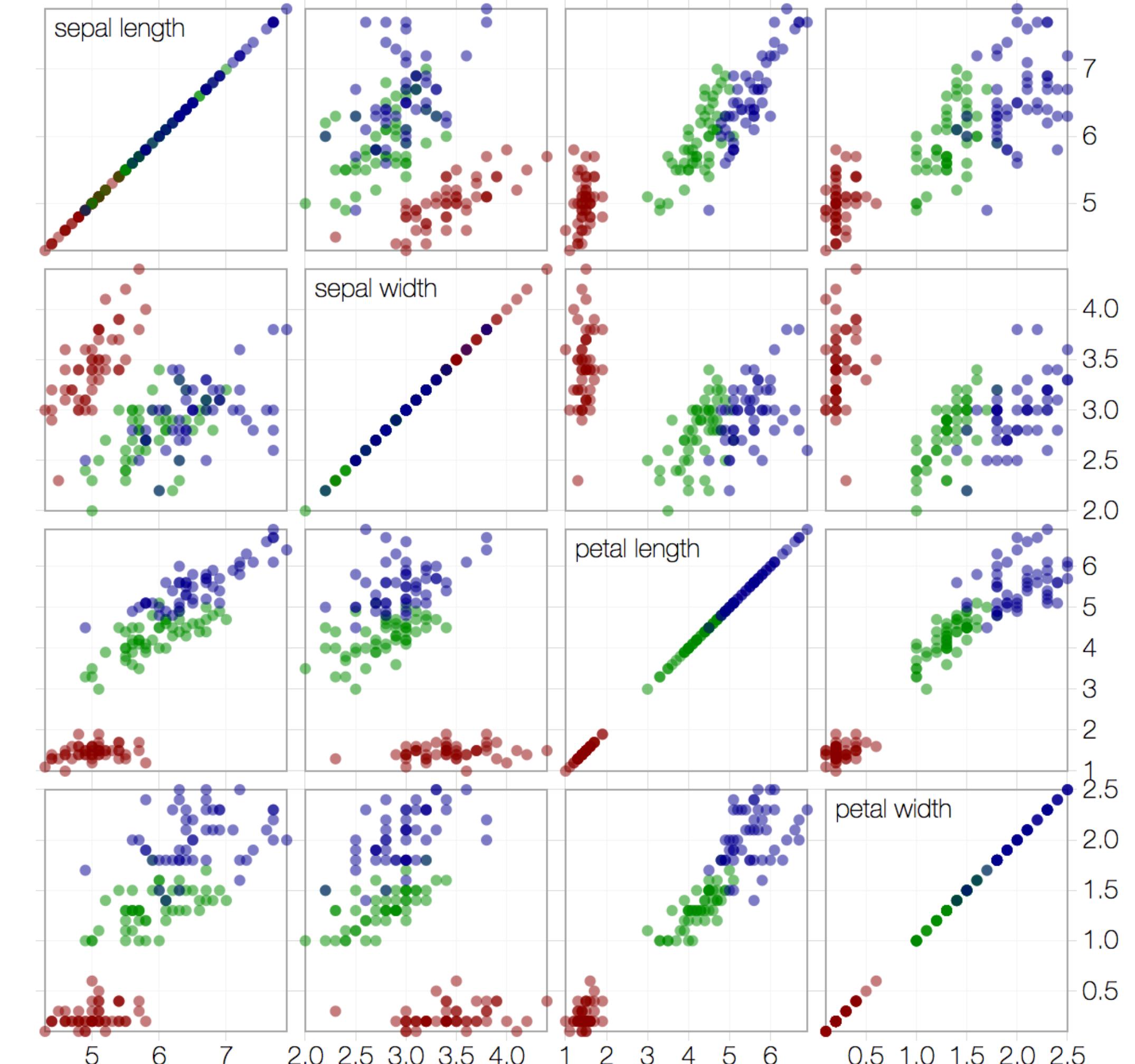
**Within reason!**



# Small multiples

Real-world data tend to be multivariate with more than 2 dimensions.

We can espace the 2D space by plotting several views of the dataset altogether



# Best design practices for reports and visuals

06/22/2018 • 47 minutes to read • Contributors  [all](#)

We've released a new and improved navigation and content experience for Power BI, and we're in the process of updating all of our documentation. The information and screenshots on this page may not match what you see on your screen. For more information see [Navigating Power BI service](#).

## Introduction

This paper provides best practices for designing reports in Power BI. Starting with planning, it discusses principles of design that you can apply to your reports and to the pages and individual visuals that make up that report. Many of these best practices apply to dashboard design as well.

We hope this paper will be a jumping-off point for you and that you'll apply what you learn to your own reports and visualizations and that you'll continue the conversation on [community.powerbi.com](#). BI report design and visualization usage is a hot topic right now and there are many thought leaders, bloggers, and websites that look at this topic in breadth and depth (we've listed a few at the end).

### Note

The recommendations made in this white paper are guidelines for you to apply when and where it makes sense. For every principle we describe below, there are usually valid reasons to "break the rule."

# Homework

Read Visualization Analysis and Design  
Chapter 3, 4, 6

