Technical Communication

Engineering 100.250

Winter 2015

Visuals

Erik Hildinger

Visuals

Choosing, Finding and Using What You Need

Please describe a potato peeler

Here's one…

www.istockphoto.com/file_closeup/food/cooking/utensils/563651_potato_peeler.php?id=563651

When do you use visuals?

When you need to teach people about something that's difficult to put in words

When do you use visuals?

When you need to teach people about something that's difficult to put in words

- ***But always recall that visuals are an adjunct, not a replacement of text.***

What things might you use a visual to help you describe?

Why? Which sort of visual?

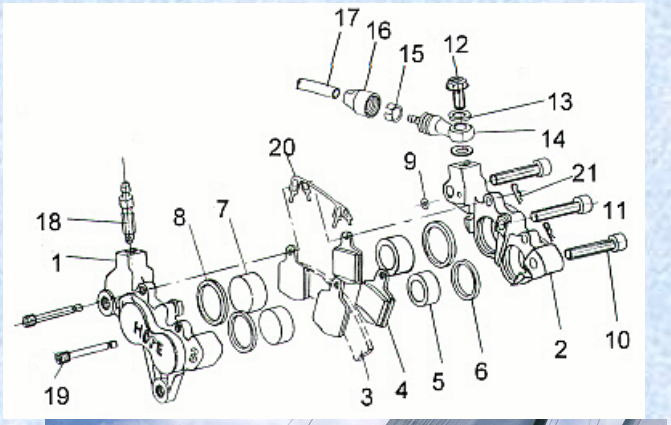
Visuals are used for two purposes

If you keep them in mind, you will know what to use

The two purposes

- Informative
- Dramatic

Visuals: Two Purposes



- Informative

www.ukbikestore.co.uk/acatalog/HOPE_M4_CALIPER.html

- Dramatic

www.swanyachts.co.uk/

Keep in mind your purpose

- Purpose determines what visual is used

The mere fact that you can make a visual does not mean you should use one.

Purpose determines what visual is used

And even whether you use one.

Examples of visuals

- Graphs
- Pictures
  - Photos
  - Drawings
- Maps
- Diagrams
  - Exploded diagrams
- Tables

Graphs (Charts)

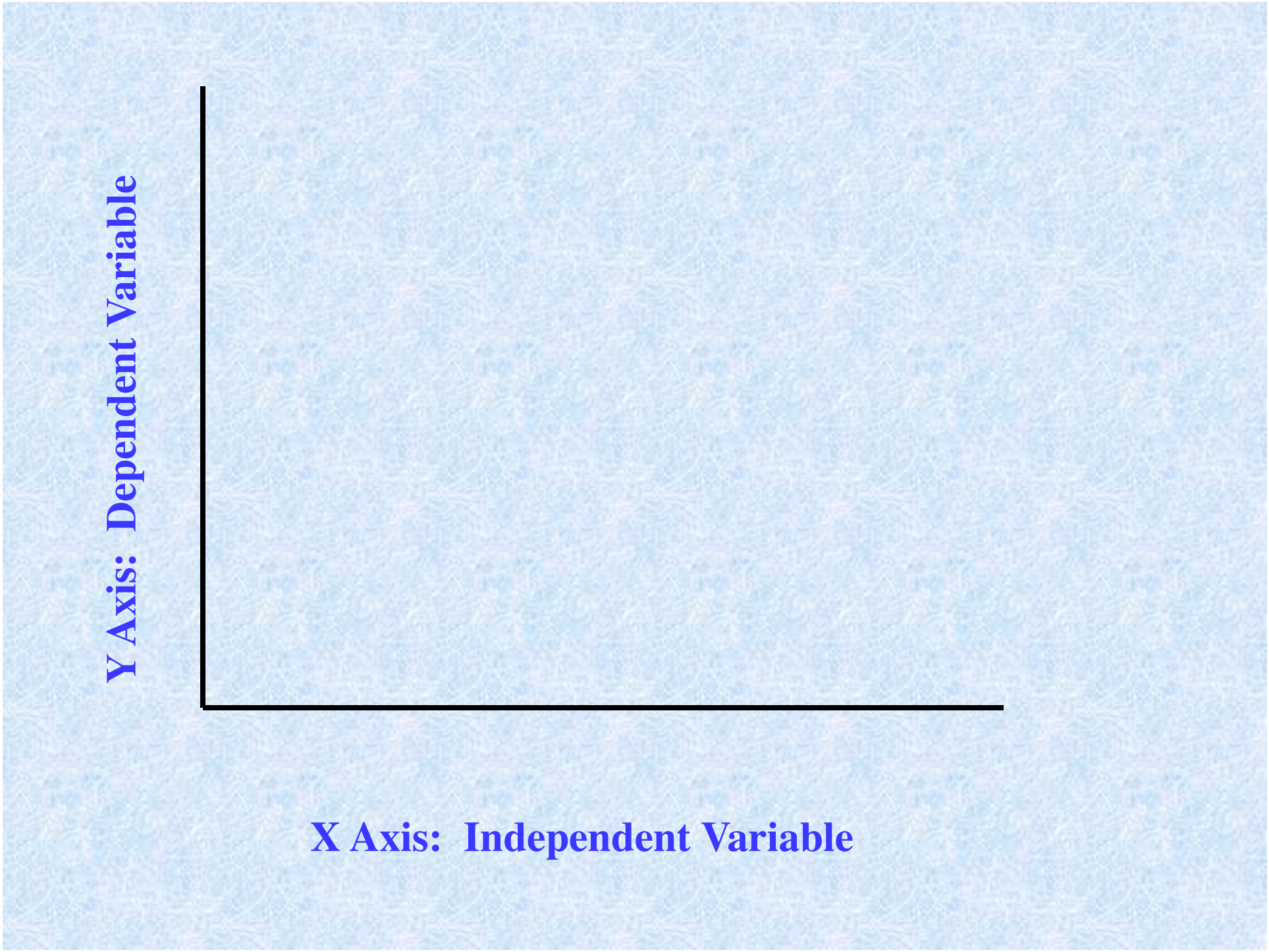
- Line graphs
- Bar graphs
- Pie charts
- Organizational charts
- Gantt charts

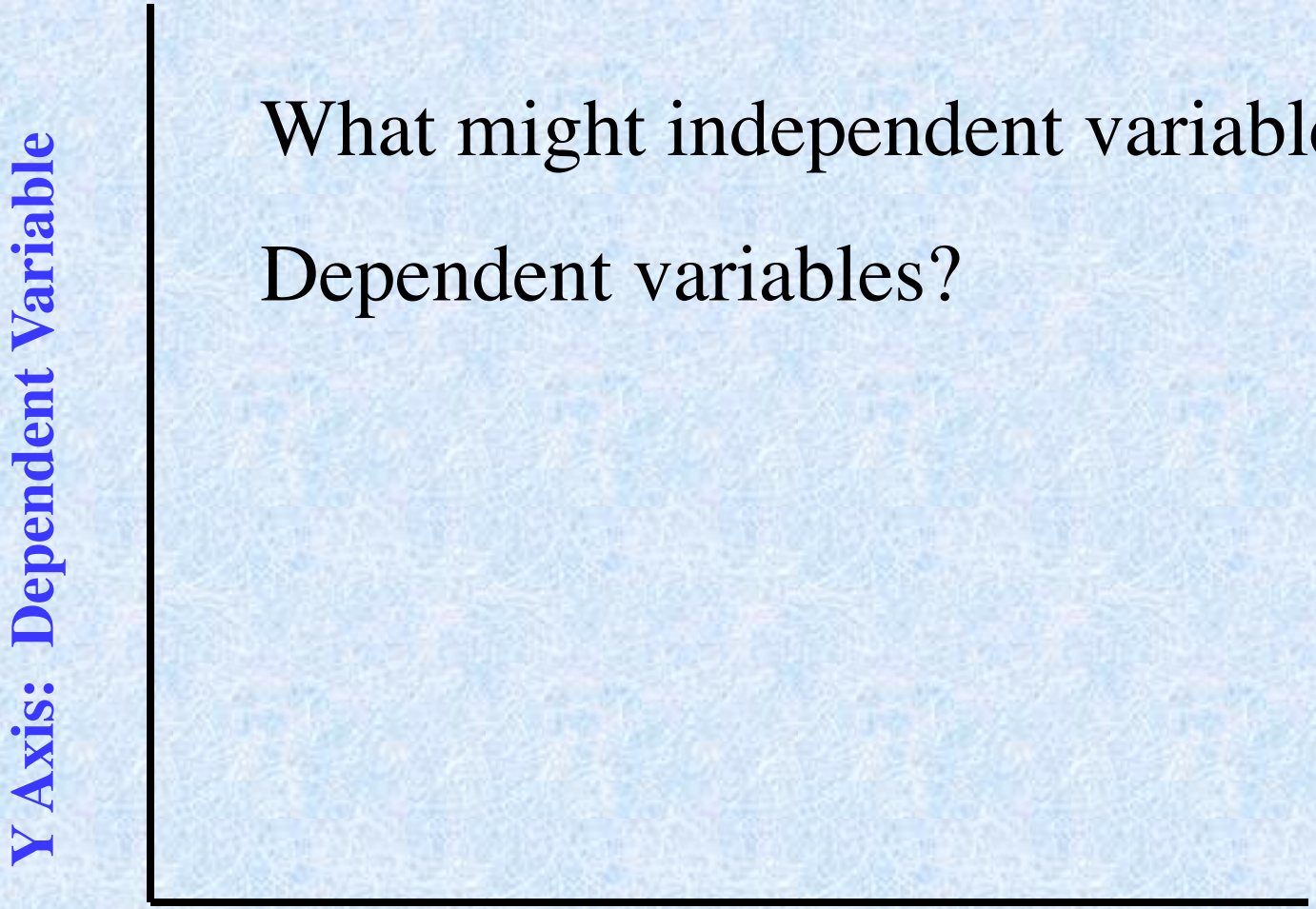
Line graph

- Shows continuing data
- Show the relationship between a dependent and independent variable

Line graph

- X axis shows the independent variable
- Y axis shows the dependent variable


Y Axis: Dependent Variable
X Axis: Independent Variable



What might independent variables be?

Dependent variables?

X Axis: Independent Variable

Bar graphs are useful for showing relative amounts of different things at the same time.

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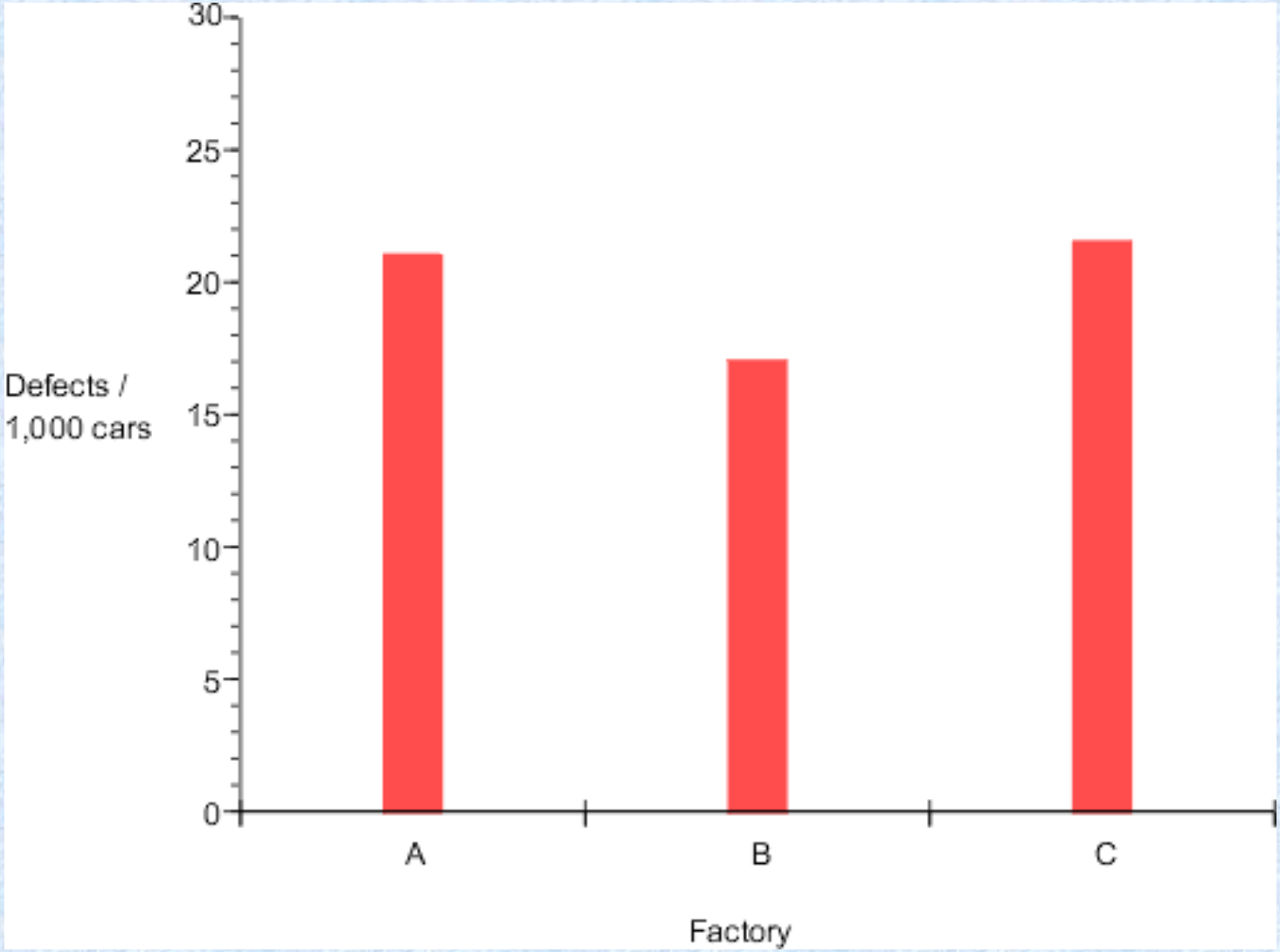
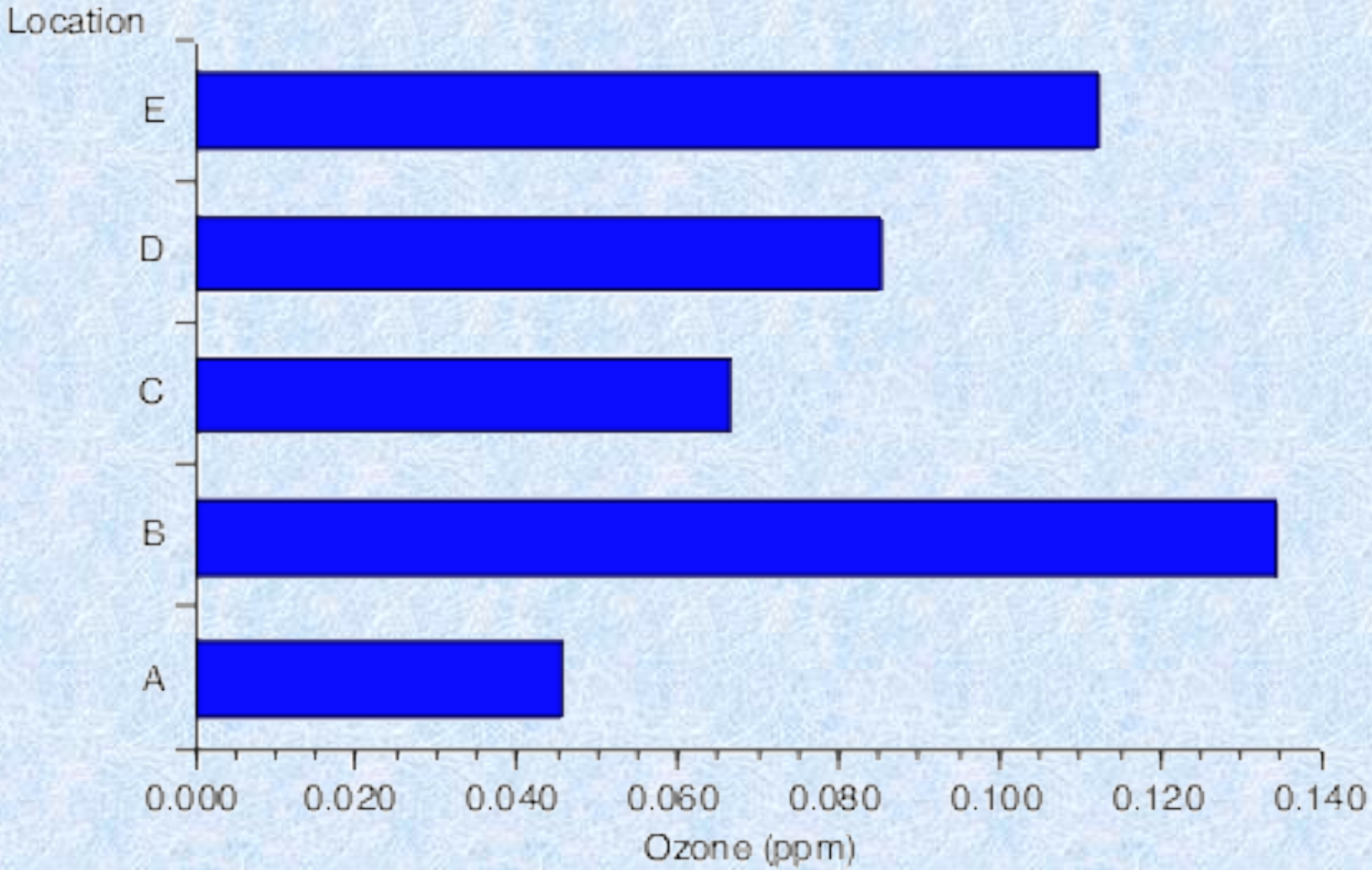
The are good for showing big differences.

Vertical Bar Chart



http://www.ncsu.edu/labwrite/res/gh/gh-bargraph.html, 17 March 2004

Horizontal Bar Chart



http://www.ncsu.edu/labwrite/res/gh/gh-bargraph.html, 17 March 2004

Pie charts

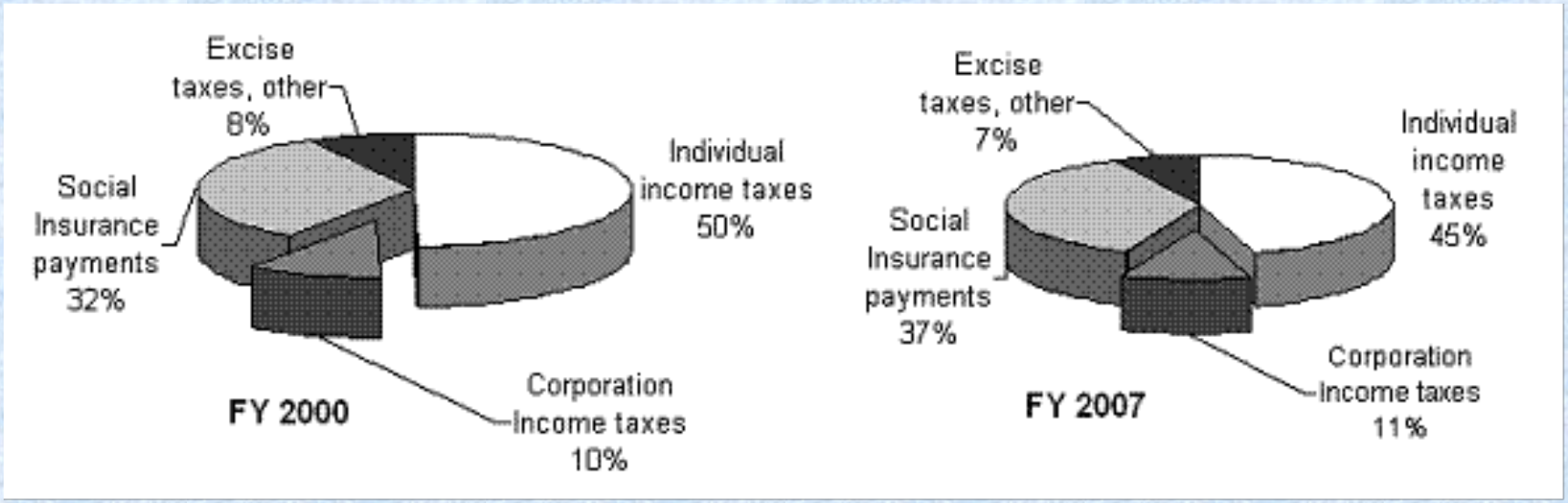
Are useful to show a series of parts that add up to 100%

But they must not have too many slices.

The world's most accurate pie chart?

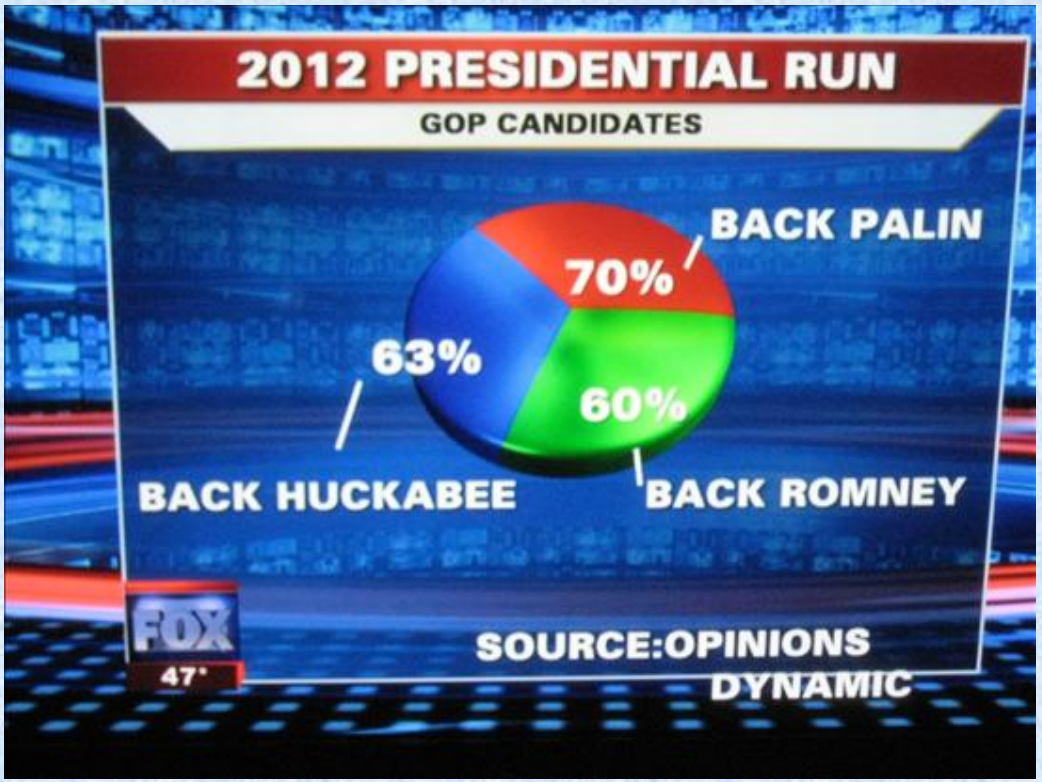
http://www.makefive.com/categories/entertainment/other/pie-charts-that-explain-simple-material/pie-i-have-not-eaten

As a rule, avoid 3-D pie charts



http://lilt.ilstu.edu/gmklass/pos138/datadisplay/

Can you see a problem?

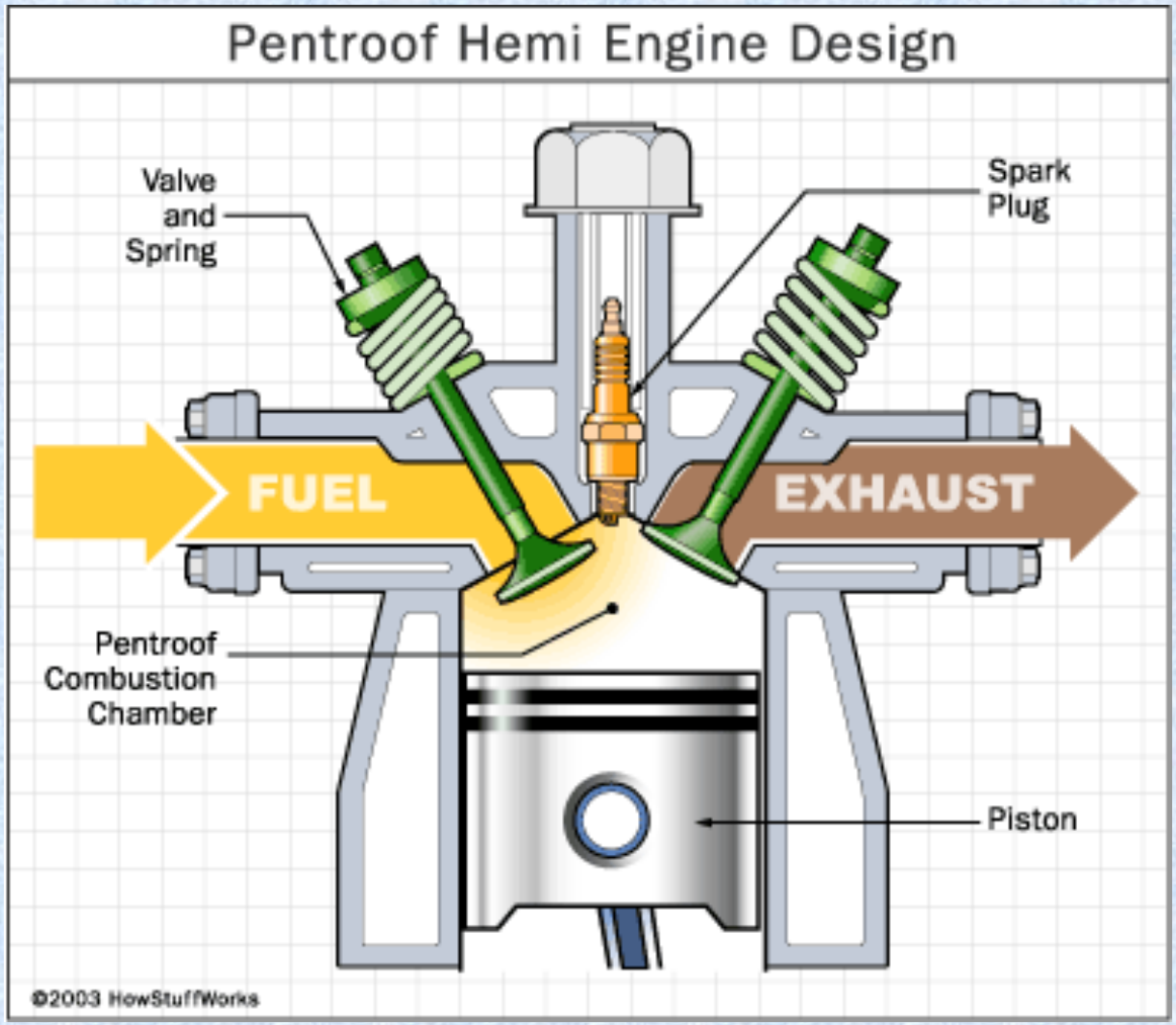


http://www.math.yorku.ca/SCS/Gallery/

Pictures: vivid but not always informative.

http://www.cartype.com/pages/3282/chrysler_hemi_hurricane

http://www.cartype.com/pages/3282/chrysler_hemi_heritage



http://auto.howstuffworks.com/engine1.html, 17 March 2004

But be sure that the data presented are meaningful

Make sure that data presented are meaningful

1a: Murders* in Ten Largest US Cities, 1998

Chicago	703
New York	633
Detroit	430
Los Angeles	426
Philadelphia	338
Houston	254
Dallas	252
Phoenix	185
San Antonio	89
San Diego	42

*Murder and non-negligent manslaughter

http://lilt.ilstu.edu/gmklass/pos138/datadisplay/sections/goodtables.htm

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*Murder and non-negligent manslaughter

NOTE:

1b: Murder Rates* in Ten Largest US Cities, 1998

Detroit	43.0
Chicago	25.6
Philadelphia	23.3
Dallas	23.1
Phoenix	15.1
Houston	14.1
Los Angeles	11.8
New York	8.6
San Antonio	8.1
San Diego	3.5

*Murder and non-negligent manslaughter per 100,000 population

http://lilt.ilstu.edu/gmklass/pos138/datadisplay/sections/goodtables.htm

Numbering conventions for tables and visuals

Tables are numbered this way

- Table 1
- Table 2
- Table 3

All other visuals are numbered this way

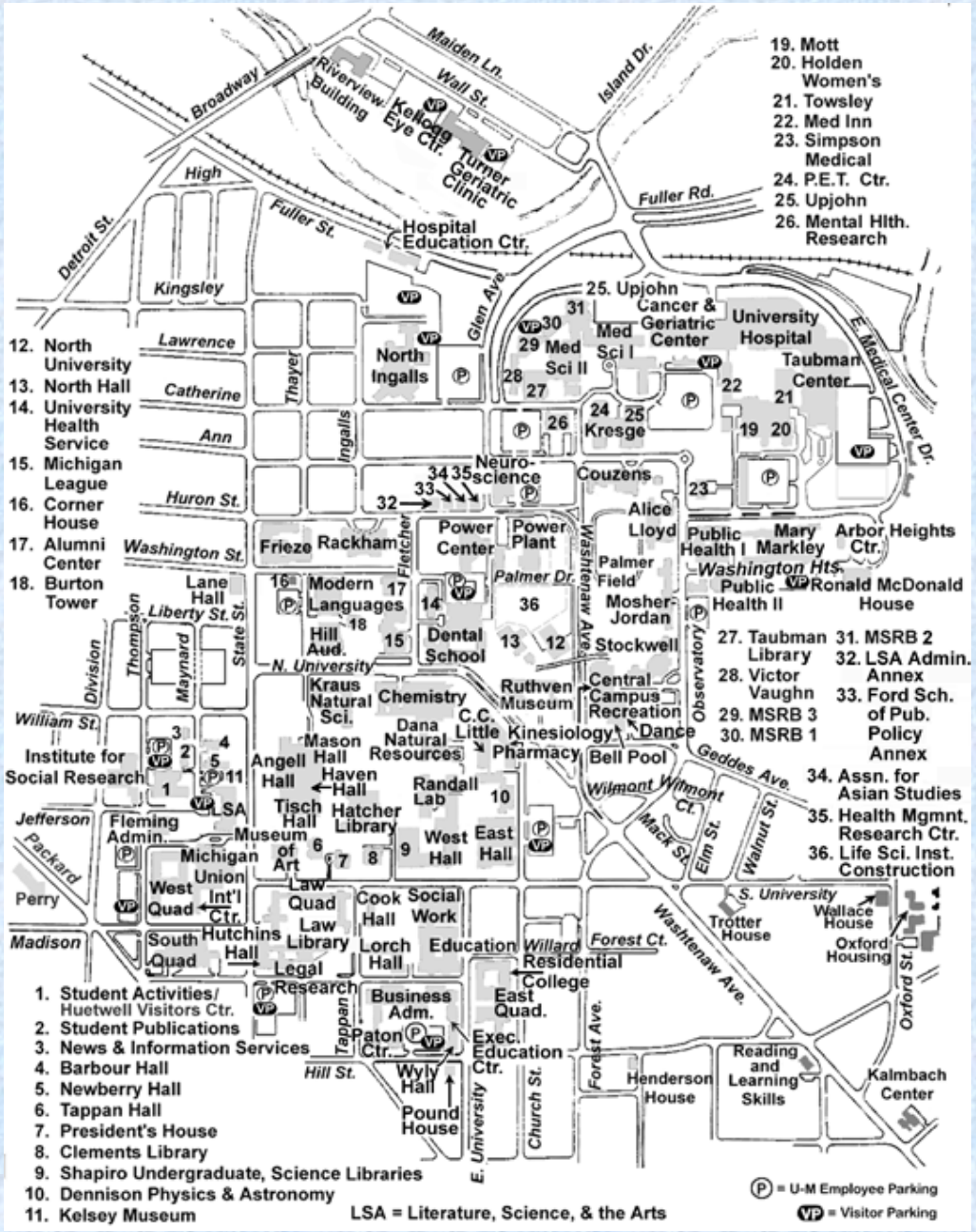
- Figure 1
- Figure 2
- Figure 3

Tables and figures are numbered independently of each other

- Figure 1
- Figure 2
- Table 1
- Figure 3
- Table 2

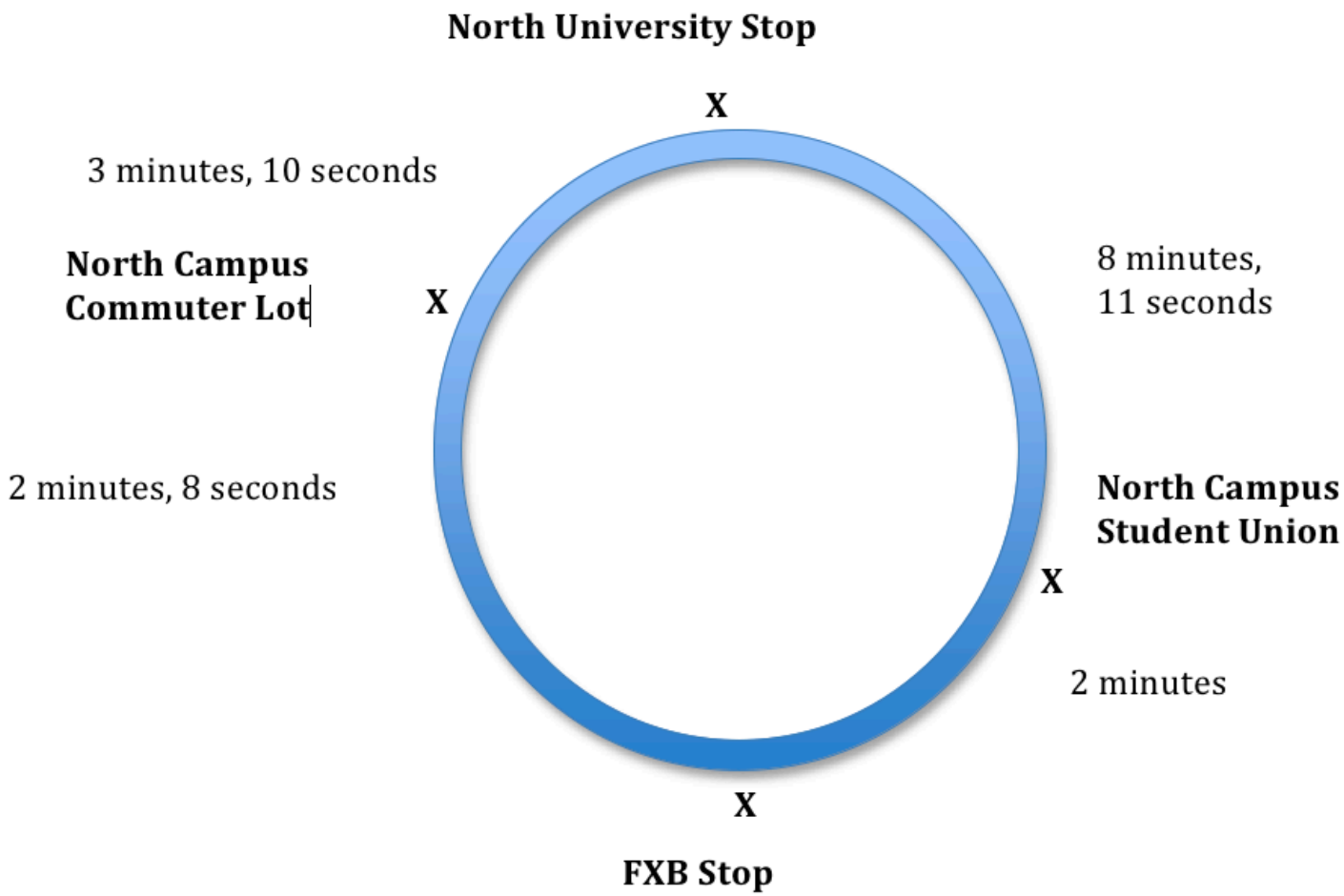
So, then what are the advantages of drawings over photographs?

Maps: You should already have some idea of what they are.

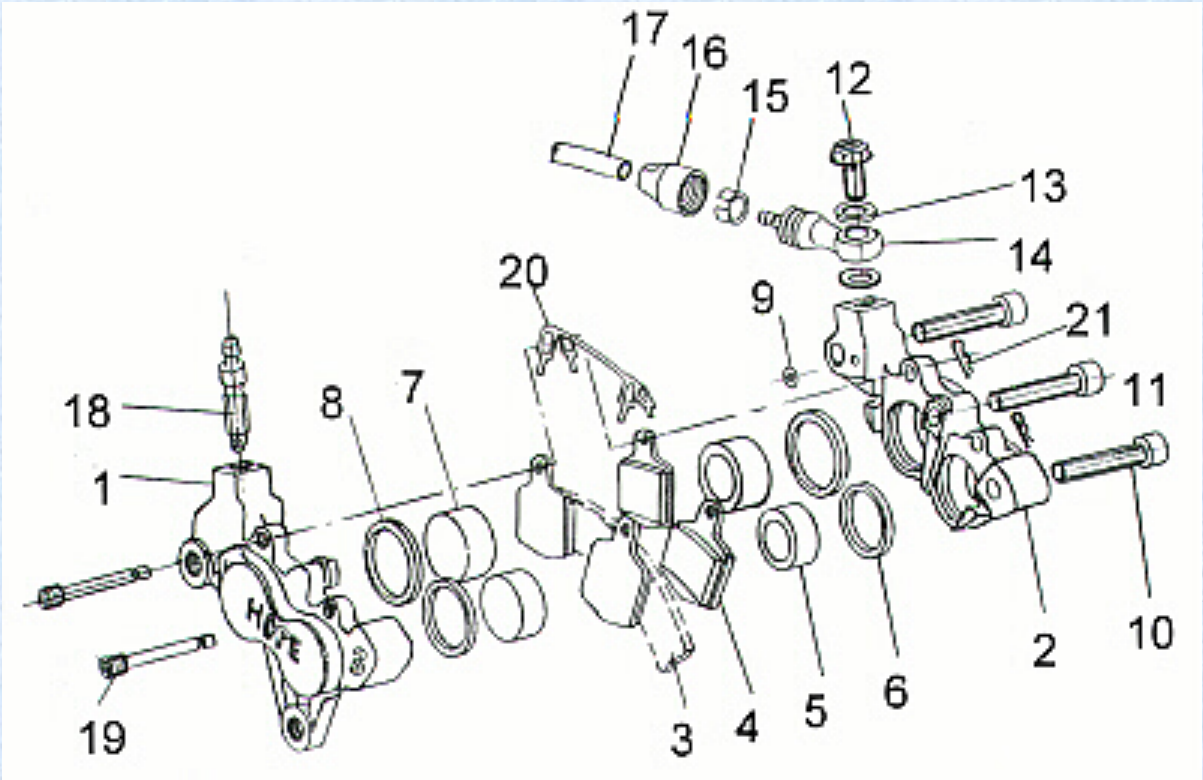


http://www.umich.edu/~newsinfo/ccamp.html 17 March 2004

Order and Relationship in Time of Bus Stops



Diagrams



http://www.ukbikestore.co.uk/acatalog/HOPE_M4_CALIPER.html

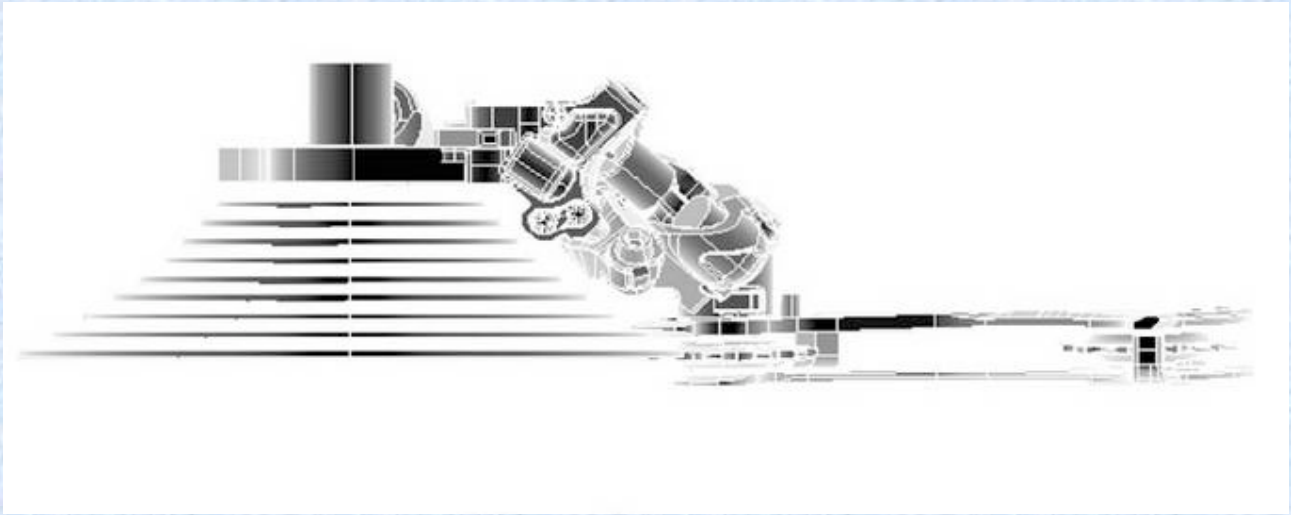
Tables

Good for setting out figures.

Not good for showing trends.

Visuals do not speak for themselves: you must title them and label them adequately.

For example, what's this?



Citation omitted

Shimano bike
derailleur

http://www.light-bikes.de/website/new/
wp-content/uploads/2007/06/
shimanoshadowtechnology.jpg

Beware of Excel

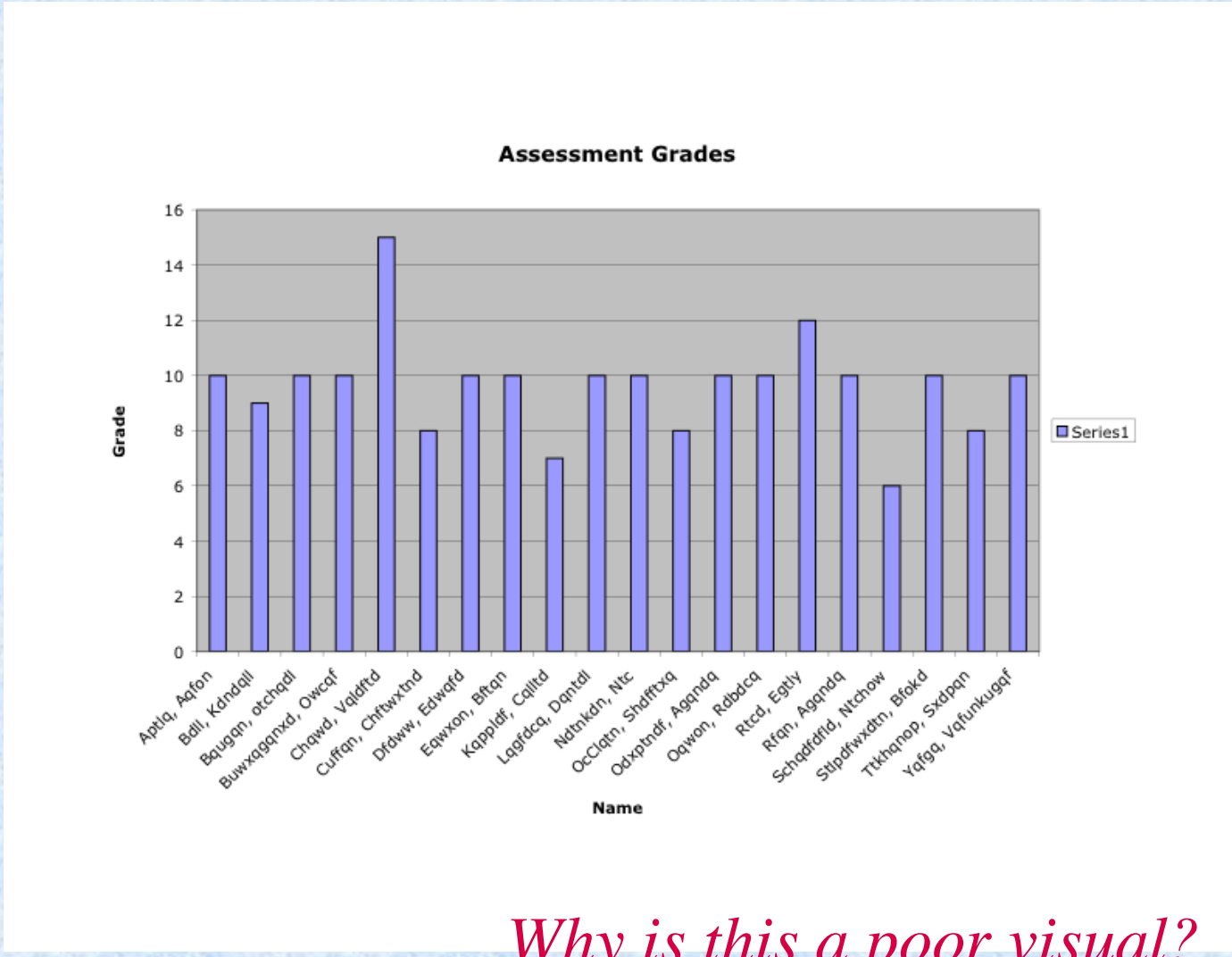
It will make graphs for you very easily

Beware of Excel

It will make graphs for you very easily.

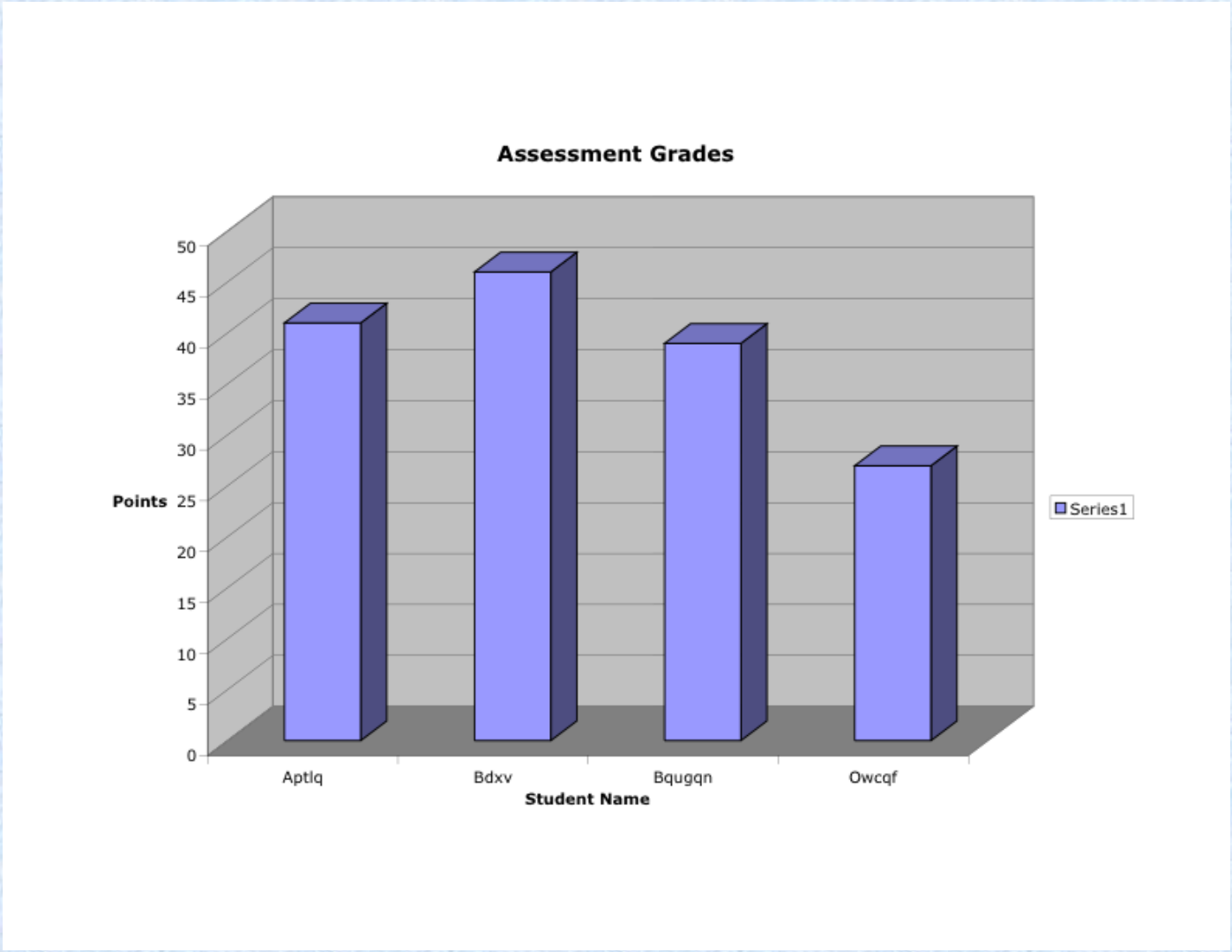
It will make bad graphs for you very easily.

Excel will make bar charts like this



Why is this a poor visual?

Or like this…


Assessment Grades
Points
50
45
40
35
30
25
20
15
10
5
0
Aptlq
Bdxv
Bqugqn
Owcqf
Student Name
Series1

Why not use a table instead?

Selected new car prices for 2012

Mercedes-Benz C Class Coupe	$37,220
Chevrolet Volt	$39,145
Cadillac CDS Coupe	$40,615
Maserati Gran Tourismo	$137,300
BMW 1 Series 128i	$36,900

http://www.nadaguides.com/Cars

Honesty and Clarity

Wrong

SPAD S.XIII

Right

SPAD S.XIII

en.wikipedia.org/wiki/Image:SPAD_XIII_040510-F-1234P-019.jpg

Honesty: you must credit the creator or owner of any visual that you use

Honesty and clarity

Obviously, you must be honest in presenting your data.

If you are not careful you may produce a deceptive visual

The text at the bottom of the following graph reads: "Fig. 2 | Comparison of peak emitted sound levels (dB) between thicker faced stainless steel (yellow) and thin faced titanium (red) golf drivers when hit three times by a professional golfer."

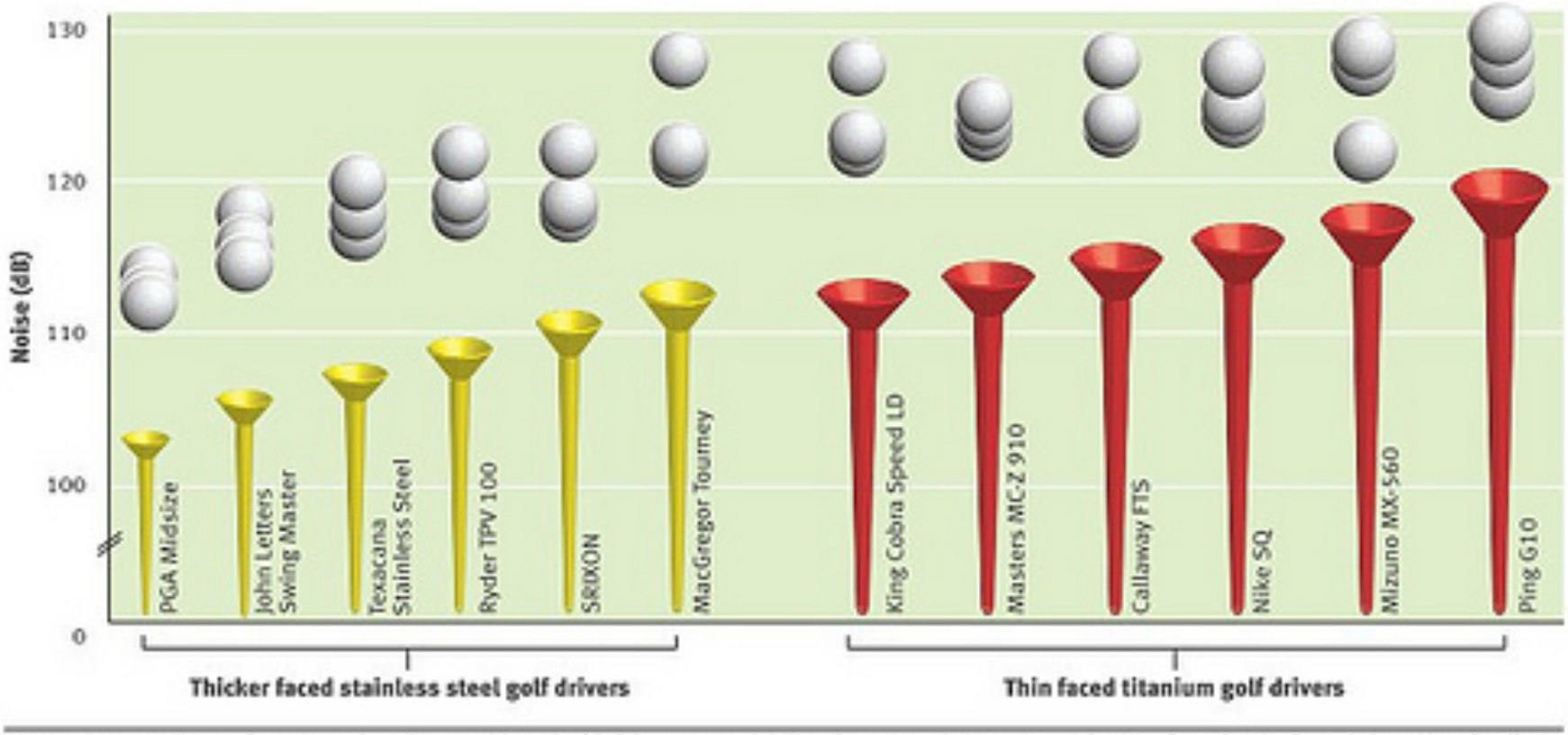


Fig 2 | Comparison of peak emitted sound levels (dB) between thicker faced stainless steel (yellow) and thin faced titanium (red) golf drivers when hit three times by a professional golfer

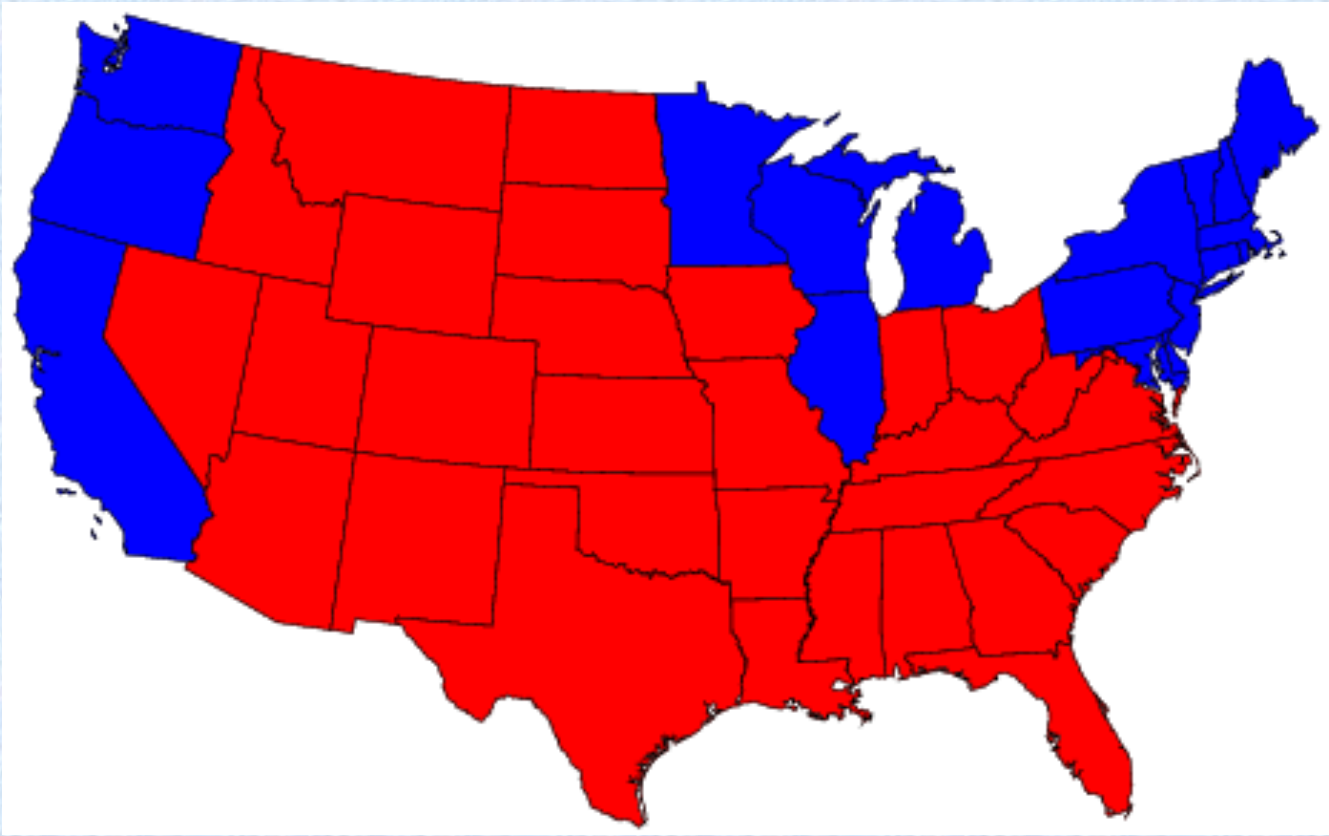
http://chilternfixie.wordpress.com/2010/07/17/good-data-bad-visuals/

“There are lots of things wrong with this graph, but let’s look at the golf tees. The ratio of the area of the tees distorts the visual impression, giving an illusion of a much greater difference between the minimum and maximum values (compounded by the break in the Y-axis). This effect is much worse because the golf tees do not represent any data at all. The data is represented by the golf balls. Delete the golf tees and you lose no data at all. Lose all the ink except the pixels at the centre of each of the golf balls and you don’t lose any information.”

https://chilternfixie.wordpress.com/2010/07/17/good-data-bad-visuals/

Los Angeles Times, August 5, 1979, p. 3.

Tufte, 1983, p. 69



A majority of residents of the red states voted for George Bush in the 2004 election, while a majority of the residents in the blue states voted for John Kerry.

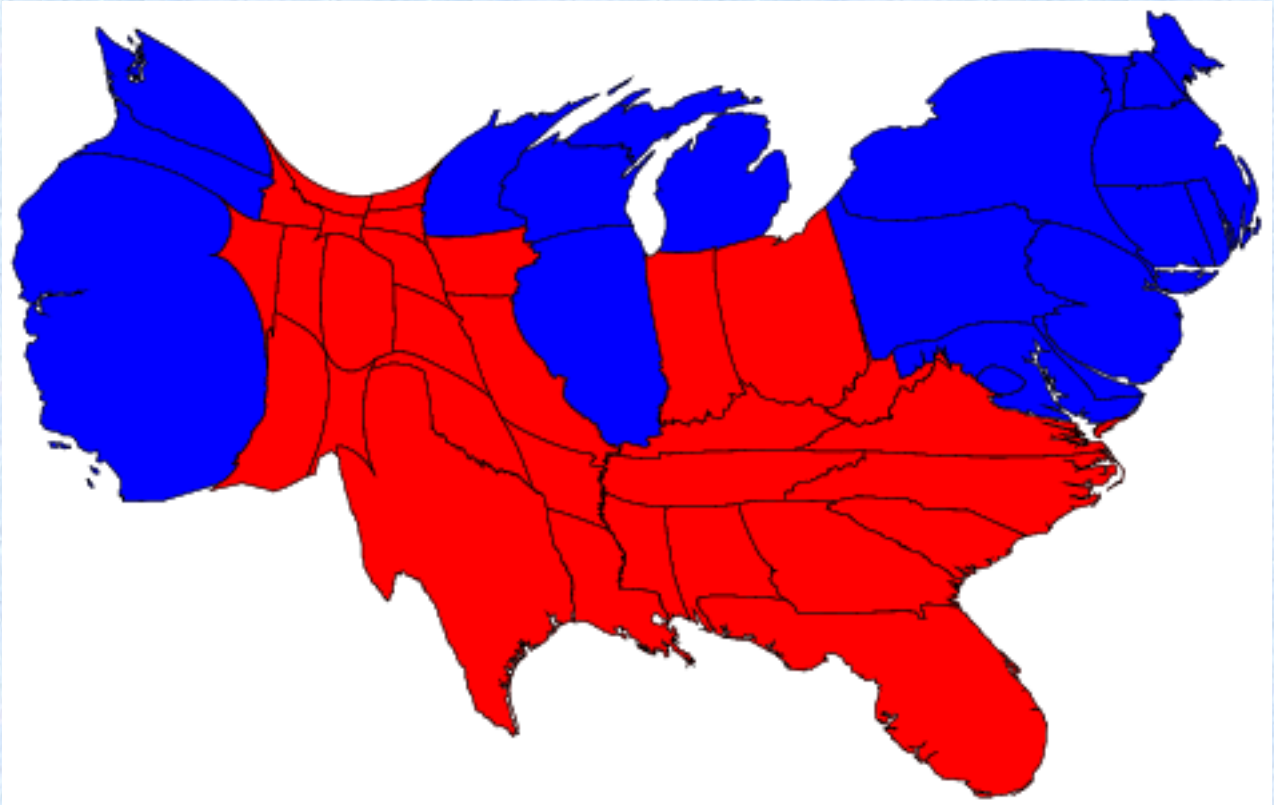
www.cscs.umich.edu/~crshalizi/election/

Politics!

Consider the previous visual in light of these facts:

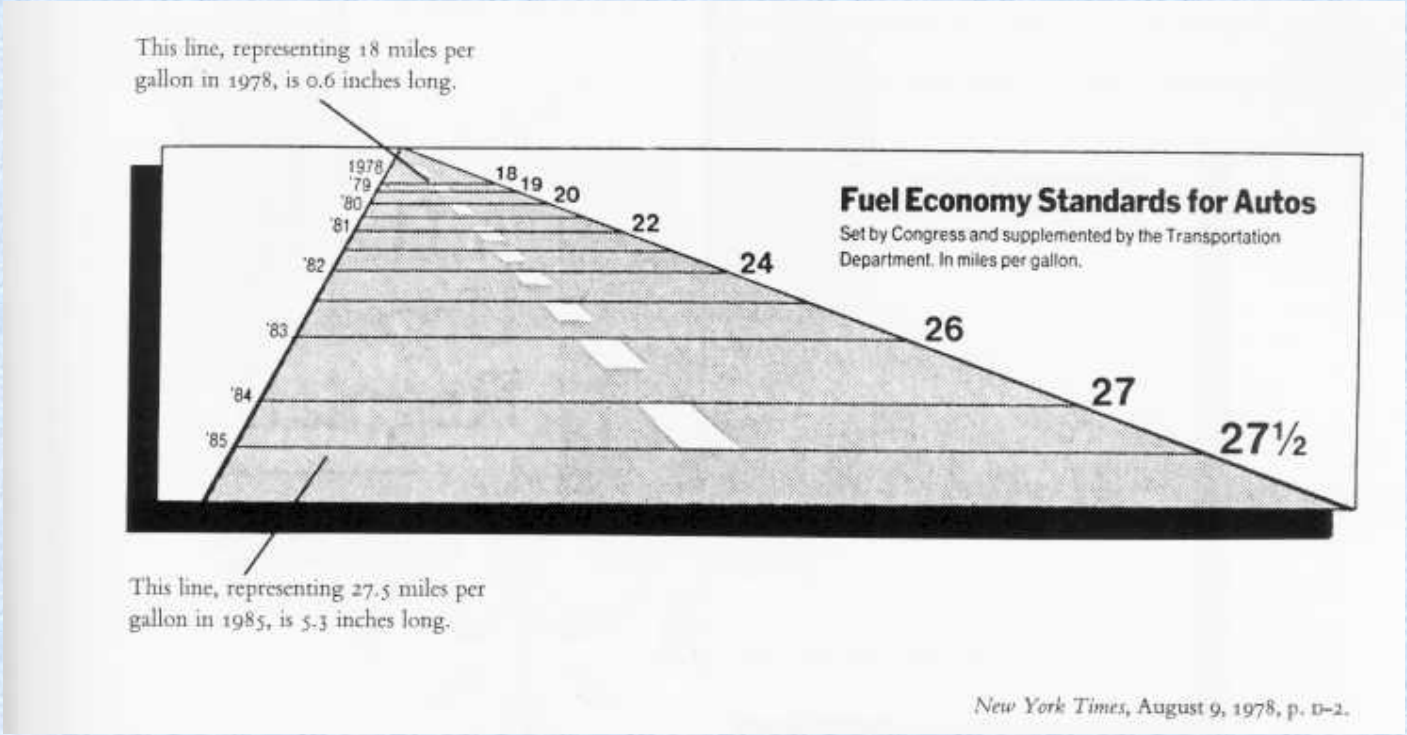
Of those who voted in the 2004 election, 50.7% voted for George Bush and 48.3% voted for John Kerry, a difference of 2.4%.

Previous map redrawn to reflect the size of states by population instead of land area



www.cscs.umich.edu/~crshalizi/election/

Texts reads: "This line, representing 18 miles per gallon in 1978, is 0.6 inches long."



from Tufte, 1983, p. 57

Text reads: "This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long."

"Standard deviation of batting averages for all full-time players by year for the first 100 years of professional baseball. Note the regular decline."

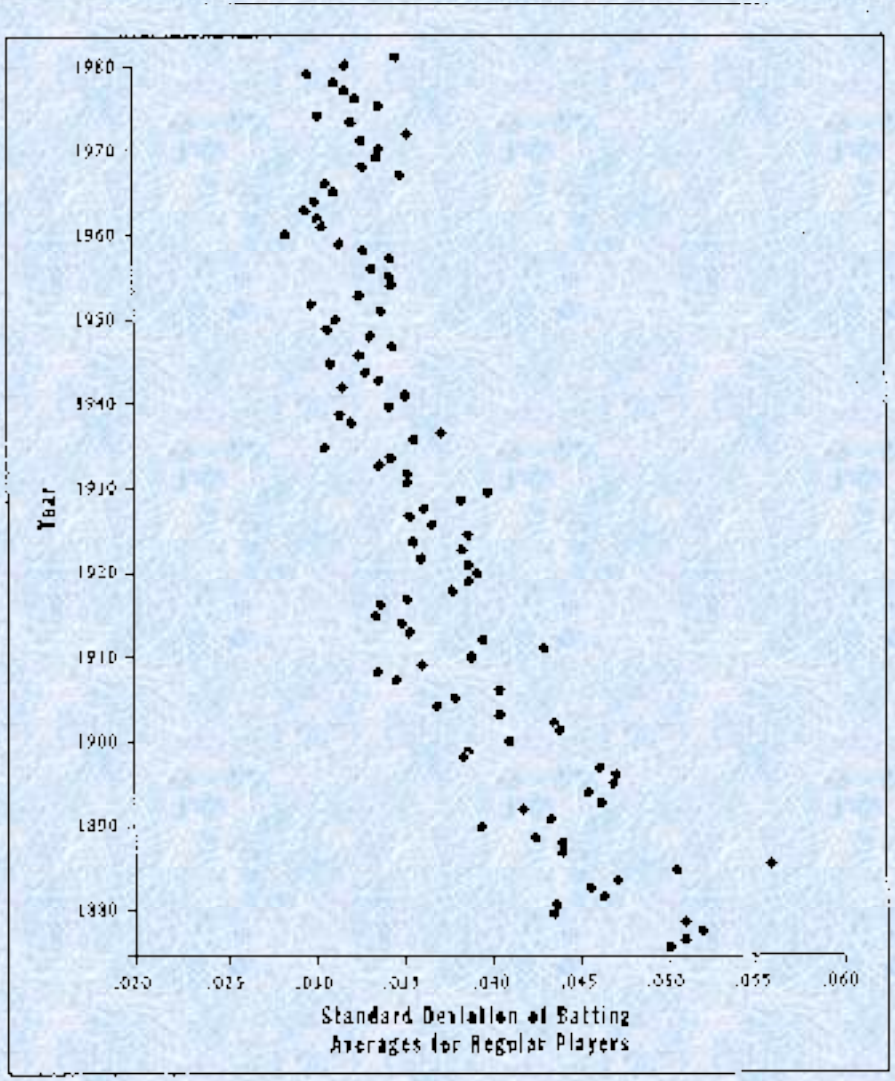
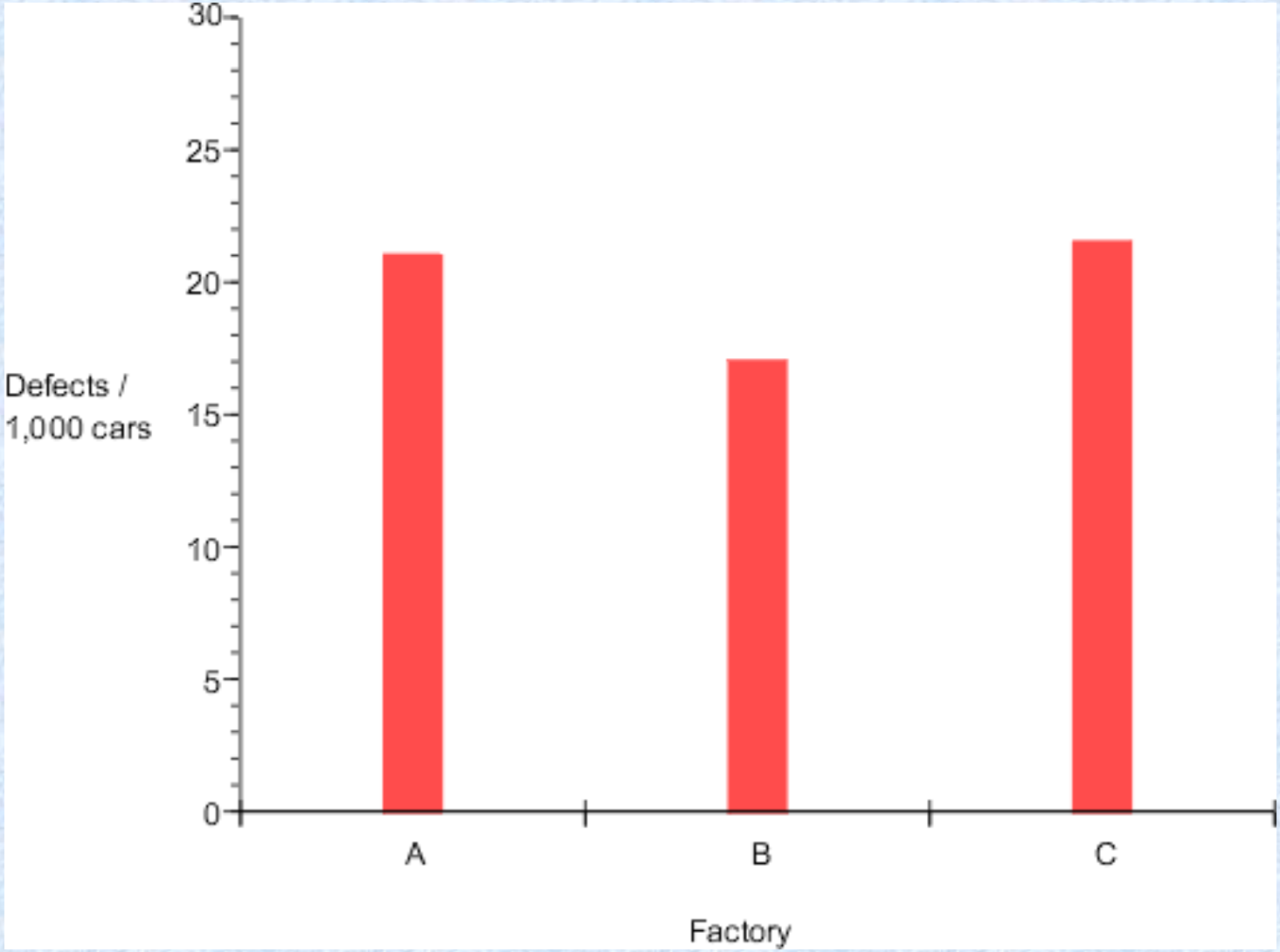


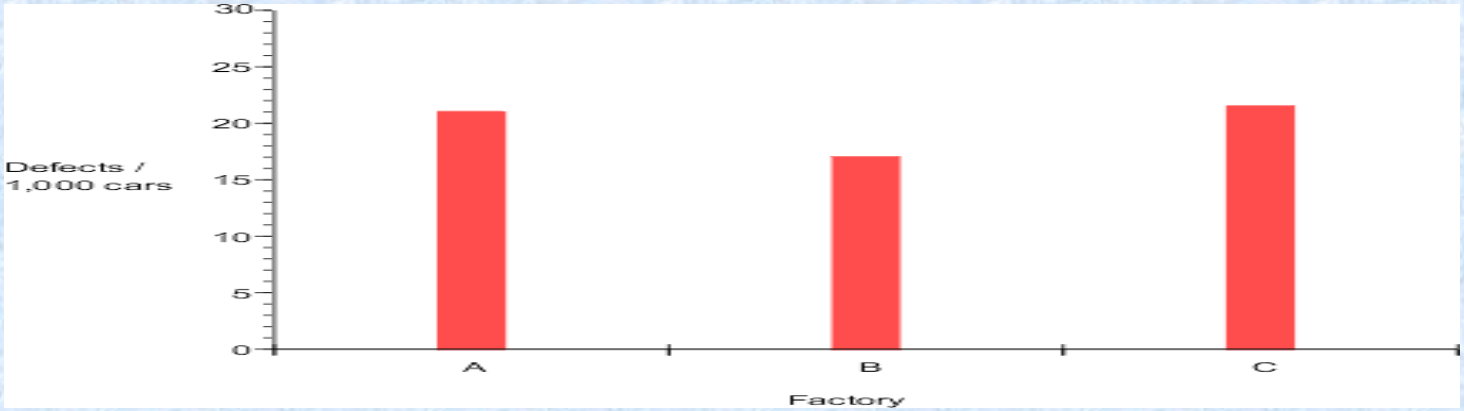
FIGURE 16
Standard deviation of batting averages for all full-time players by year for the first 100 years of professional baseball. Note the regular decline.

www.math.yorku.ca/SCS/Gallery/images/gould.gif

www.math.yorku.ca/SCS/Gallery/images/gould2.gif



http://www.ncsu.edu/labwrite/res/gh/gh-bargraph.html, 17 March 2004



http://www.ncsu.edu/labwrite/res/gh/gh-bargraph.html, 17 March 2004

adapted

Beware of Excel

- It will make pie graphs from data that do not add up to 100%
- It will make 3-D graphs
- It will make bar graphs with too many bars

Visuals can be dangerous

Visuals can be dangerous if you rely on them without considering a certain fact: many people cannot understand graphs.

This means they can be not only useless to the reader, but dangerous you.

Remember: Many people have difficulty with graphs

"Another psychologist tested grownups. . . . The vast majority were unable to see what the charts and graphs were supposed to show: they couldn't even grasp general facts or spot basic trends."

Flesch, R. (1949). *The Art of Readable Writing.* New York: Macmillan

Don’t assume your reader will understand your visual.

“Try to teach people with a picture and you may find that you need a thousand words to tell them exactly what to look at and why.”

Flesch, R. 1949. The Art of Readable Writing. New York: Macmillan.

Visuals are distracting during presentations (though often necessary)

- People naturally look at bright colored screens
- People often prefer the visual to the speaker
- People will try to read the text of a slide rather than listen to what you say

Therefore?

When using visuals during presentations

- Them simple
- Consider (and try to observe) the “Seven by Seven Rule”:
  - “Use no more than seven words per line of text and no more than seven lines per slide”

Our vocal distortion device will

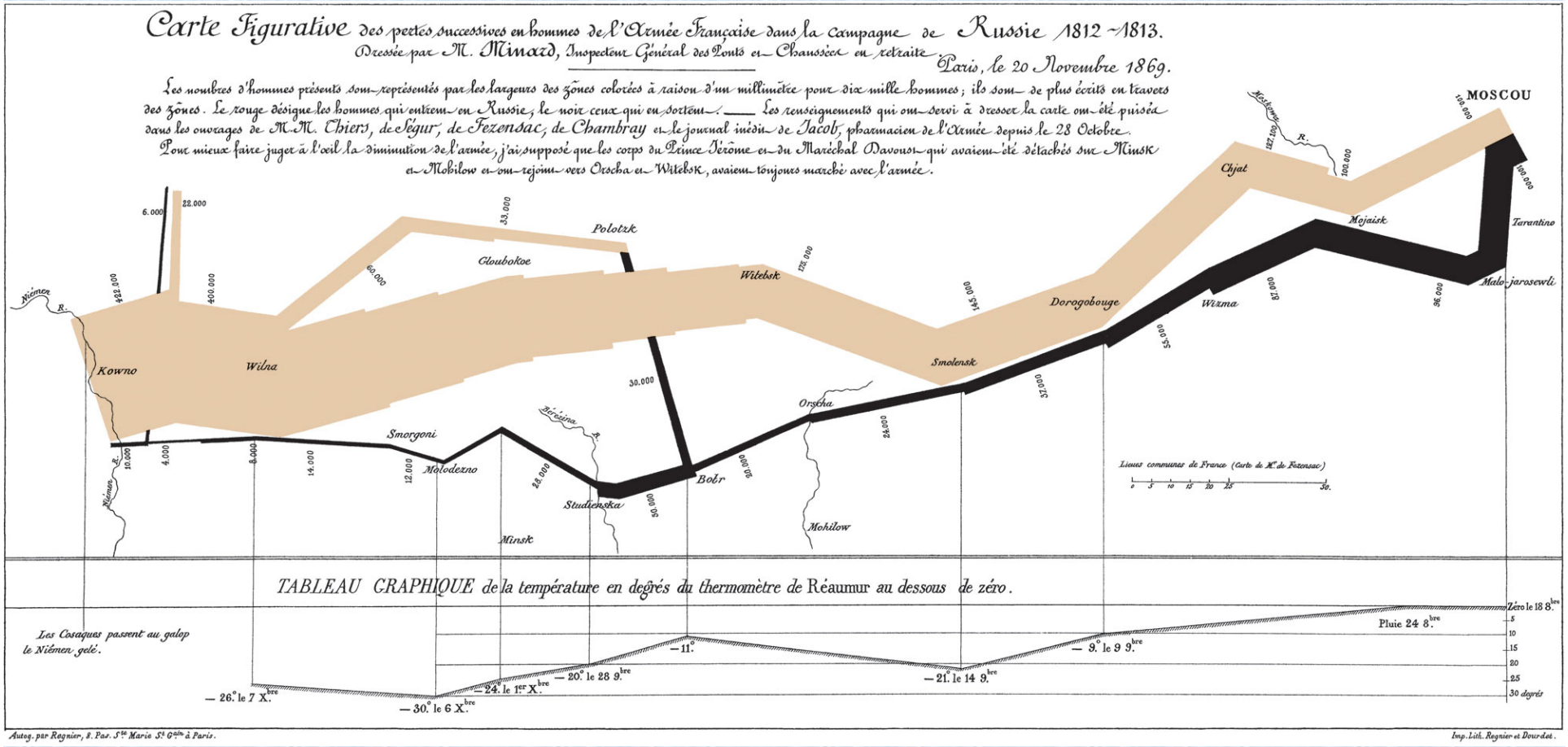
- Amuse people who don't have satisfying hobbies
- Be cheap enough to produce in huge quantities
- Bring in a great deal of so that we can expand this division widely
- Help advertise a popular film

Some interesting historic visuals

The text at the top of the following graph reads:

Visual map of the successive losses of men in the French army during the campaign in Russia, 1812-1813.

The numbers of the men are represented below by the widths of the colored zones at the scale of one millimeter for ten thousand men; they are also written in the area. The red designates the men who enter Russia, the black those who leave…

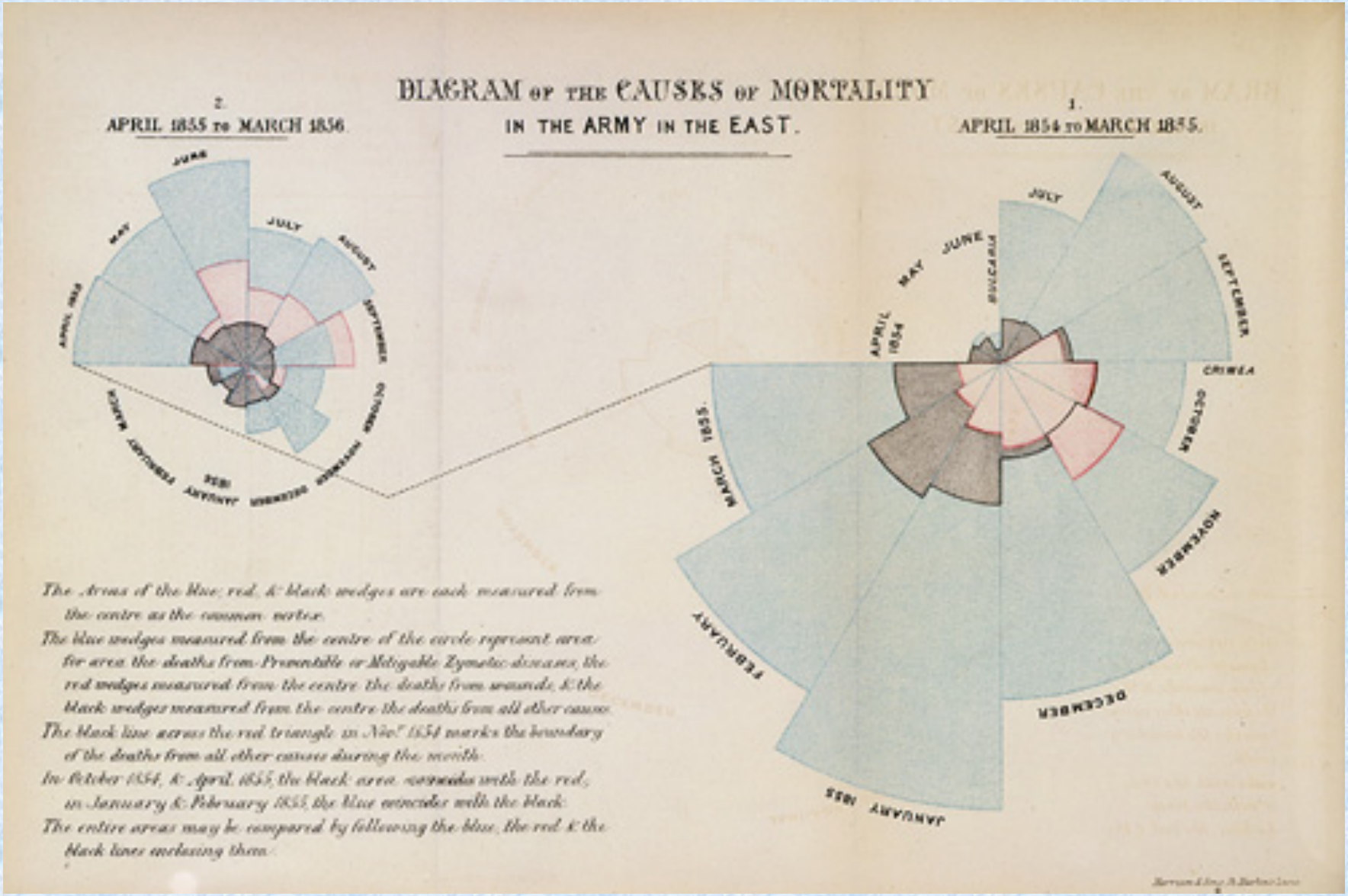


commons.wikimedia.org/ wiki/Image:Minard.png

Florence Nightingale

1820-1910

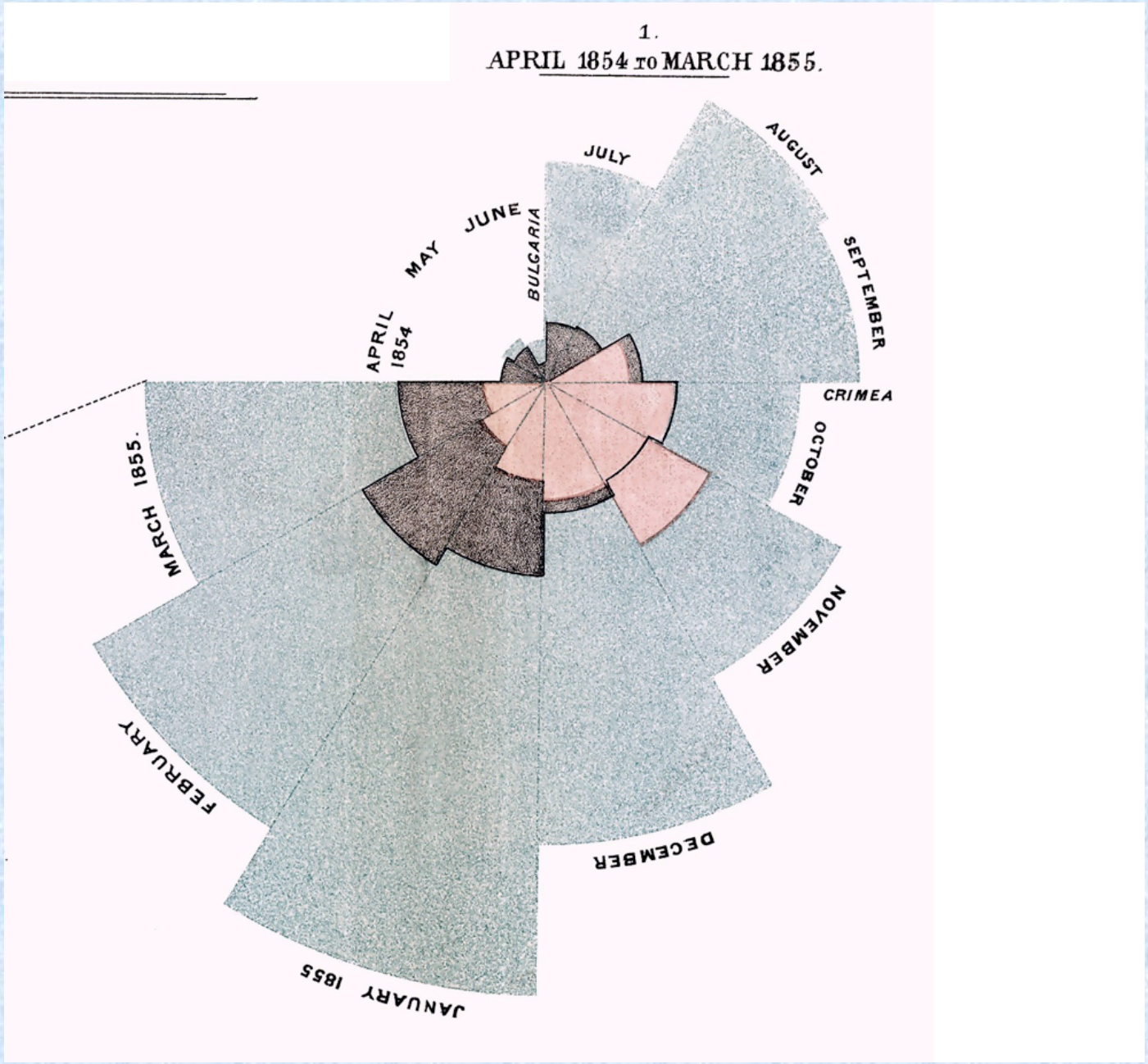
upload.wikimedia.org/wikipedia/commons/thumb/3/3f/
Florence_Nightingale.png/300px-Florence_Nightingale.png



en.wikipedia.org/wiki/Image:Nightingale-mortality.jpg

In this diagram, Nightingale resolved the problem of the "bat's wing" by using *areas* to represent the variation in the death rate, instead of the length of radial lines. The blue wedges, representing death by sickness, are far bigger than those representing wounds. The message of this graphic is twofold: first, most of the fatalities during the war were from sickness and second, improvements in hygiene dramatically reduced the death rate.

From Hugh Small. Paper from *Stats & Lamps* Research Conference organised by the Florence Nightingale Museum at St. Thomas' Hospital, 18th March 1998.



http://upload.wikimedia.org/wikipedia/commons/1/17/Nightingale-mortality.jpg

“The greatest number of ideas in the shortest time with the least ink in the smallest space.”

Edwin R. Tufte on what makes an excellent visual.

Visual pointers

- Visuals, by themselves, are not clear

Visual pointers

- Visuals, by themselves, are not clear
- Visuals never take the place of text; they are an adjunct to it

Visual pointers

- Visuals, by themselves, are not clear: you must explain what you want the viewer to understand
- Visuals never take the place of text; they are an adjunct to it
- Visuals need to be introduced and explained

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Visual pointers

- Visuals, by themselves, are not clear
- Visuals never take the place of text; they are an adjunct to it
- Visuals need to be introduced and explained
- Visuals need to be labelled properly
- If a visual is not yours, you must attribute it, or you are plagiarizing

Summary

- Decide what you are trying to convey before choosing a visual
  - Information
  - Dramatic effect
- If you wish to convey information, decide which visual is the most efficient means
- Introduce the visual
- Explain to the audience what they are to understand from the visual