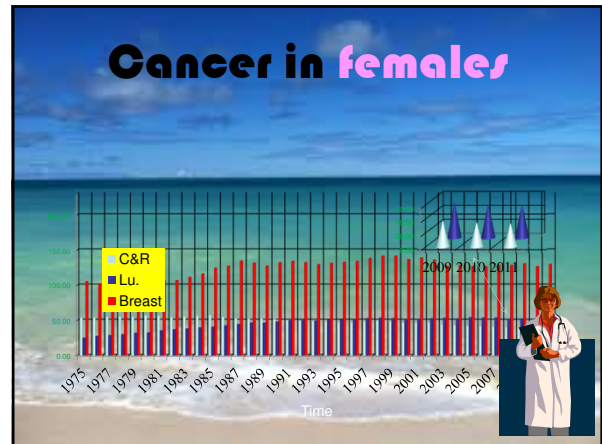
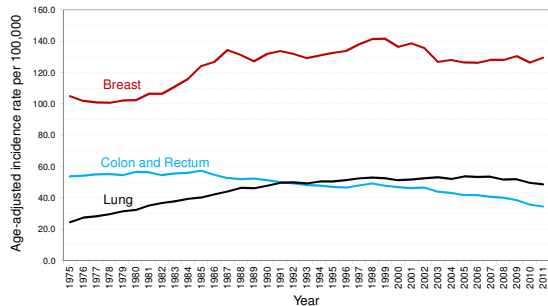


Visual Display of Public Health Data

Michael C. Samuel, Dr. P.H.
CA DHS STD Control Branch



Cancer Rates by Site, Females, United States 1975-2011



* Cancer sites include invasive cases only unless otherwise noted.
† Rates are per 100,000 and are age-adjusted to the 2000 US Std Population (19 Age groups). Cancer PDS-11/00. The modified rates are the point estimates for the regression lines calculated by the General Regression Program, Version 4.1.0, April 2014, National Cancer Institute.
Reference source: SEER 9 sites (all races), Compendex, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, and Hawaii; <http://seer.cancer.gov/seermain.html>; 4-15/2014

Outline

- Key Issues
 - The Big picture
 - Tufte
 - Sponge Bob
 - History (ies...)
 - Software
 - R, PowerPoint, Excel, et. al. (more R...)
 - Big data
 - Type of Displays
 - Technical Issues
 - Scale
 - "Nut and Bolts"
 - color, fonts, lines/grids, labels/legends, 3D
 - Production and reproduction (less...)
 - Chart junk, Human touch
 - Infographics, query systems
 - Interactive Displays and R-Shiny
 - "Great Graphs"
 - Conclusion
- Note: The example figures in this talk are to discuss form, not the actual substance of these data.

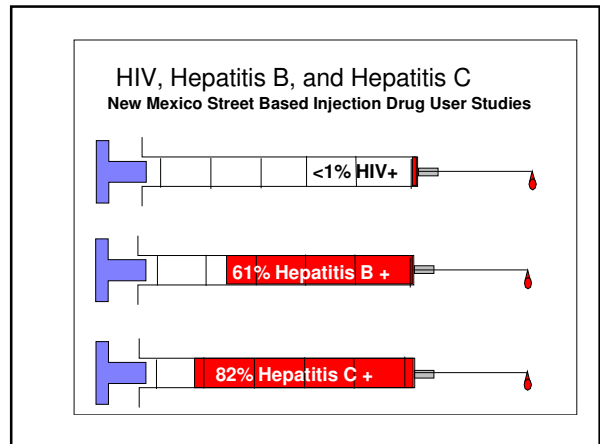
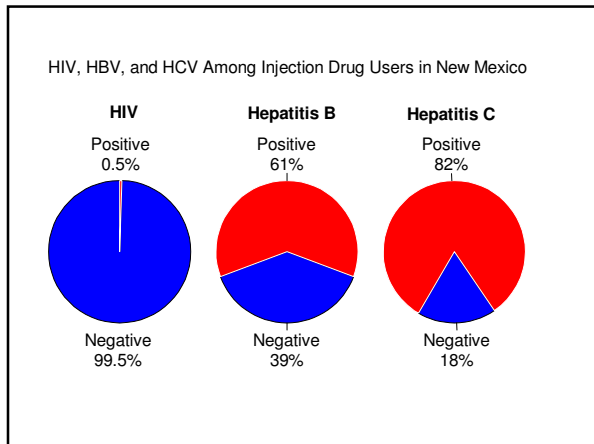
Data

Action

- Program
 - New program
 - Revised program priorities
- New guidelines
- New policy
- New hypothesis (may lead to new action)
- More (or less) money!

HIV and Hepatitis among Injection Drug Users New Mexico, 1997

	N tested	% Positive	95% C.I.
HIV	1002	0.5	.16-1.6
Hep A	696	66.1	62.4-69.6
Hep B	950	61.1	57.9-64.2
Hep C	945	82.2	79.6-84.6

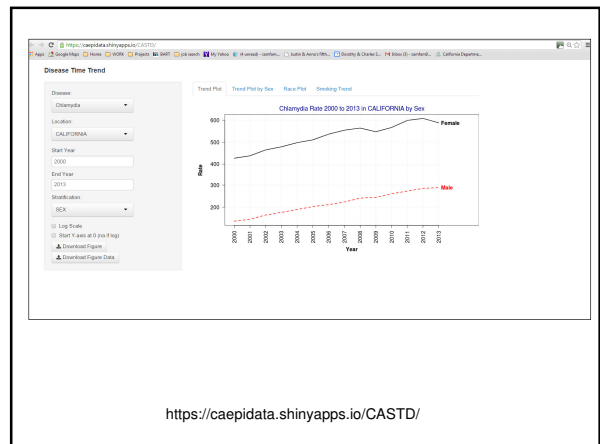
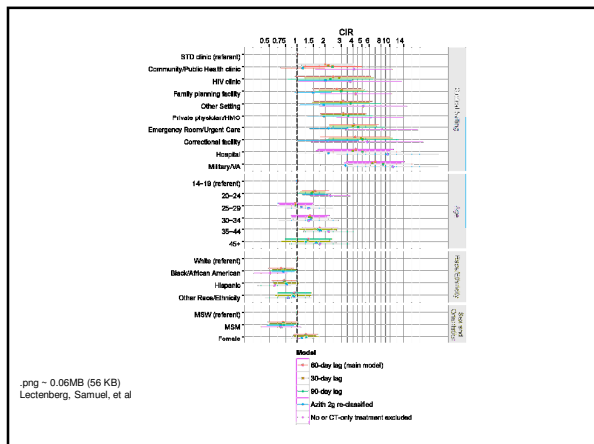


Data → **Action**

KEEPING IT CLEAN

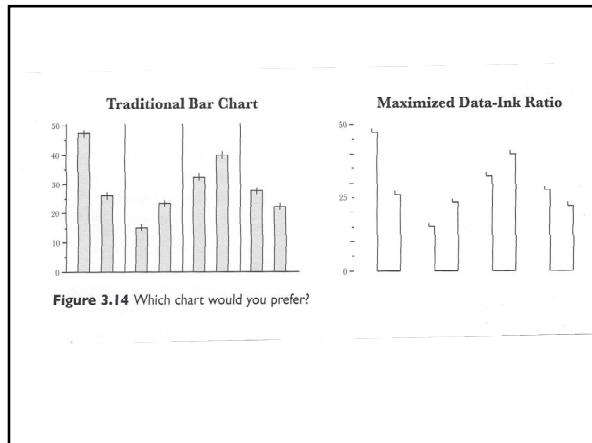
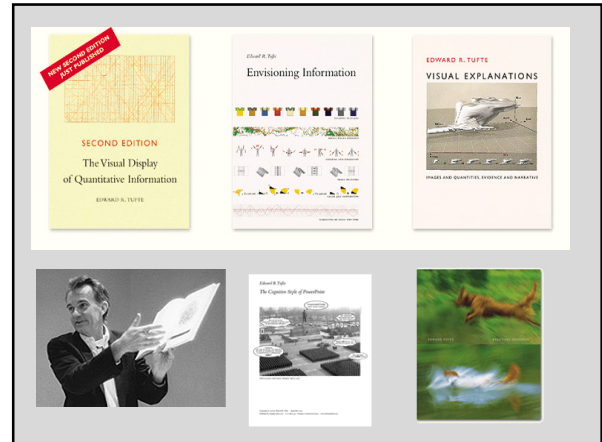
New Mexico is leading the way when it comes to its drug addicts.

- ### Guidelines for Effective Visual Display
- Communicate important information
 - Complexity is good, and...
 - Keep it simple, stupid
 - Know your audience
 - Oral presentation vs. written material
 - Data integrity
 - Clear labels and annotations
 - Use appropriate scale(s)
 - Use appropriate type of chart
 - Pay attention to details
 - Avoid extraneous "Chart Junk"



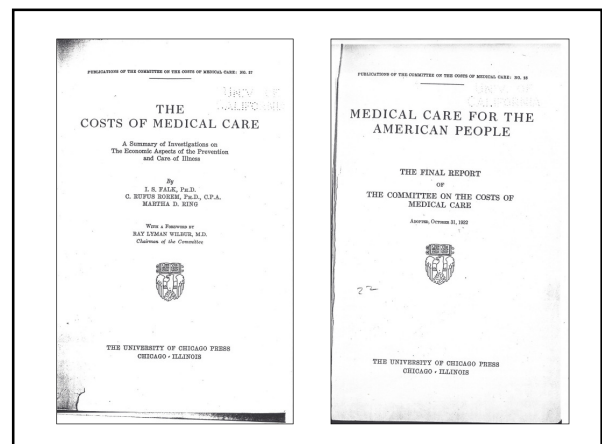
Edward Tufte

- Look at his books!
- Graphical Excellence
- The Lie Factor
- Data Density
- Less is more
- Small Multiples / Parallelism



History

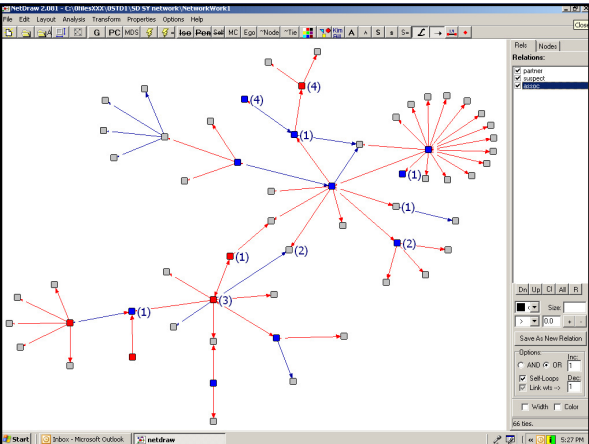
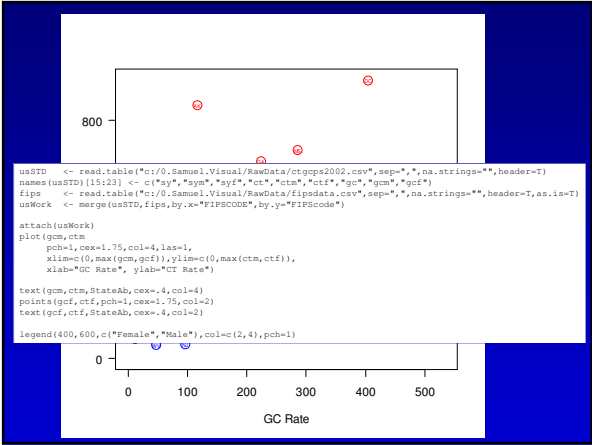
<http://datavis.ca/milestones/>



Software



- ## Software
- Stand alone graphics packages**
 - PowerPoint; Harvard Graphics
 - Great for presentations; easy to use
 - Spreadsheets**
 - Excel
 - Easy to use
 - Can be difficult to modify or share
 - Direct integration of data and figures
 - Stat packages with graphics**
 - SAS; SPSS; Stata; Epi Info
 - Integrate data and graphics
 - Some "point and click", some programming
 - Not as ideal for presentations
 - R (S-plus)**
 - Free
 - Complete integration of data and graphics
 - Completely flexible graphics
 - Harder to learn/use
 - Specialized Software**
 - Eg. "NetDraw" Network analysis



Big data

Display Types

- Tables
- Line Charts
- Bar Charts
- Pie Charts
- Scattergrams
- Statistical Charts
 - Box Plots
- Maps
- Others
- Hybrid

Tables

**Been in a jail or prison in the past 12 months
CA Gonorrhea Cases - 2004**

Jurisdiction	Yes
	%
Alameda	18.8%
Fresno	20.9%
Kern	20.5%
Long Beach	8.5%
Orange	22.2%
San Bernardino	9.0%
Total	100.0%



STD Control Branch

**Been in a jail or prison in the past 12 months
CA Gonorrhea Cases - 2004**

Jurisdiction	N	%
Alameda	207	21.3%
Fresno	203	24.1%
Kern	199	24.1%
Long Beach	201	10.0%
Orange	432	12.0%
San Bernardino	84	25.0%
Total	1326	17.6%

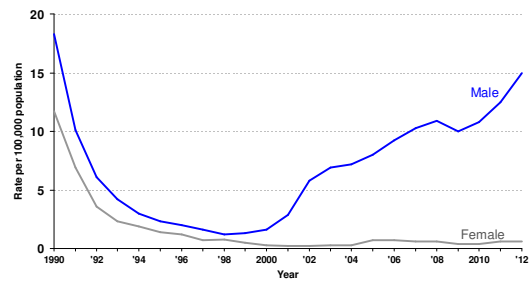


STD Control Branch

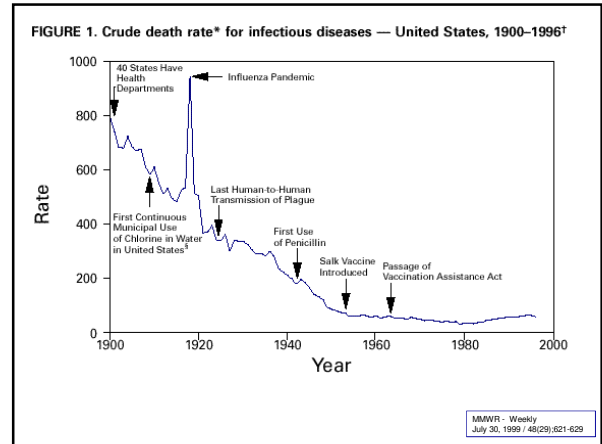
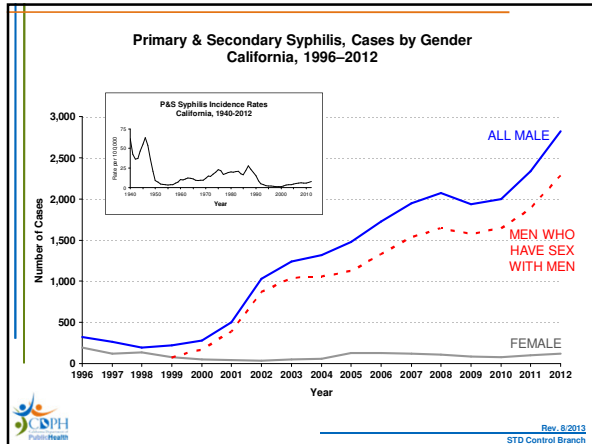
Line Graph

- X-axis truly or close to continuous
- Simple
- Complex: multi-line, 2-axis, logarithmic

**Primary & Secondary Syphilis, Incidence Rates by Gender
California, 1990-2012**

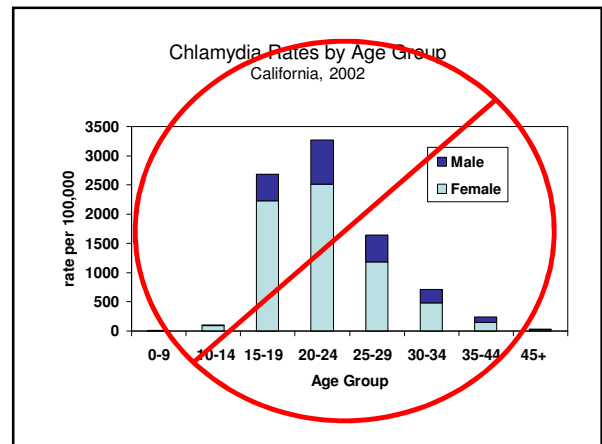
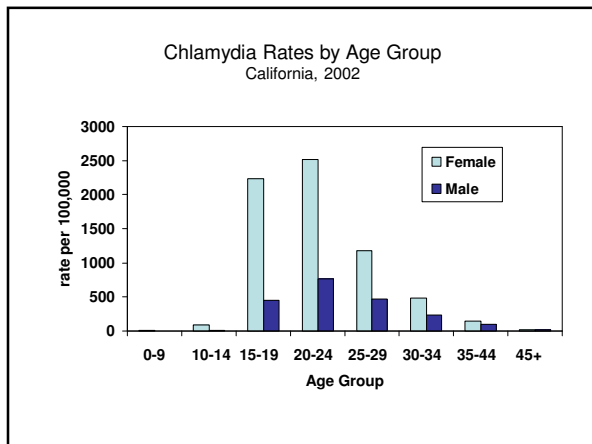
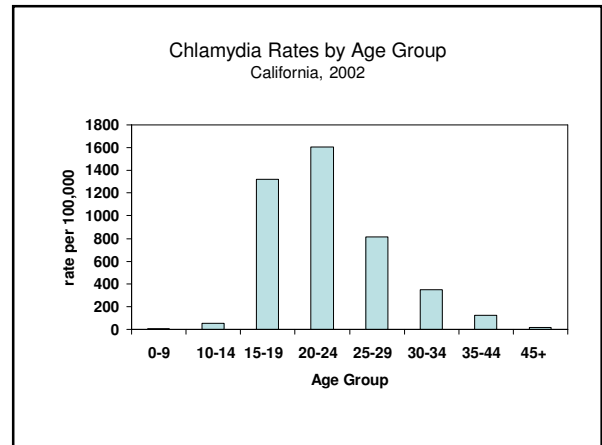


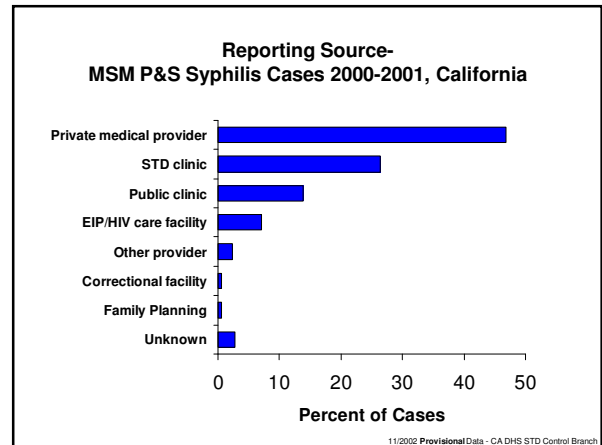
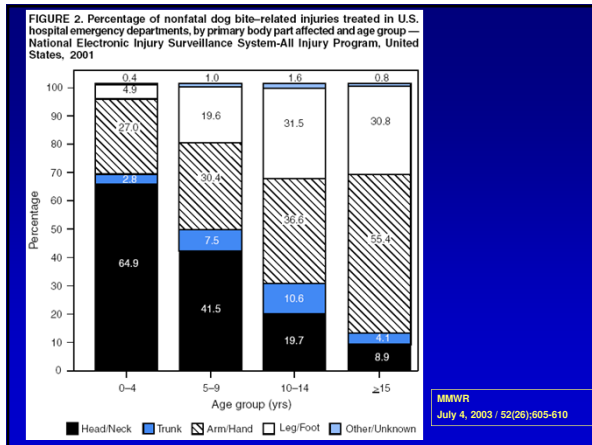
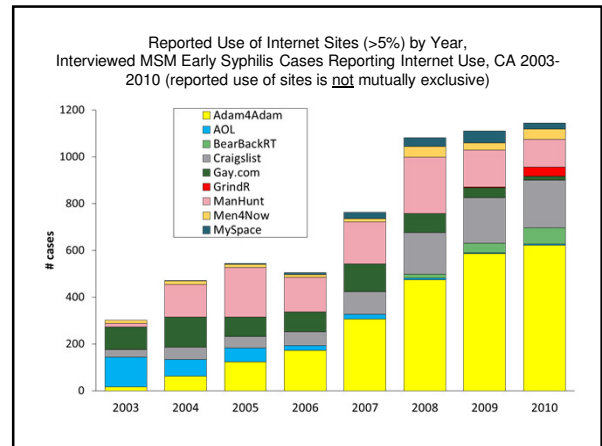
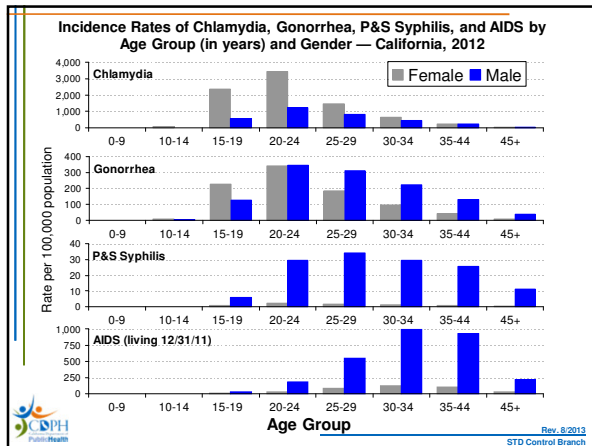
Rev. 8/2013
STD Control Branch



Bar Chart

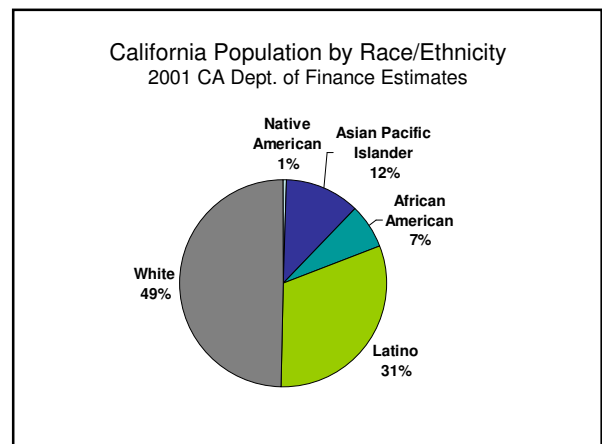
- Very common chart type
- Y-axis: count, rate or percent of something
- X-axis: qualitative variable, or ordered categorical variable
- Vertical bars or horizontal bars
- Simple
- Clustered/Grouped
- Stacked
- 100%
- Histogram=special case





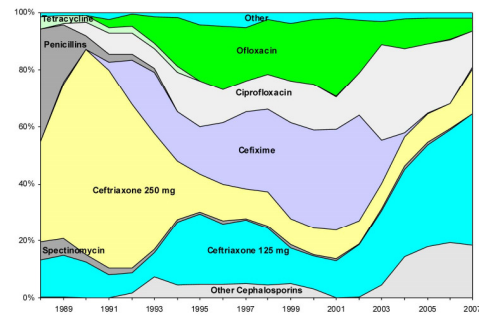
Pie Chart

- Tufte says they should never be used
- But
 - Very familiar to most people
 - Easy to understand
 - Effective if used carefully and sparingly



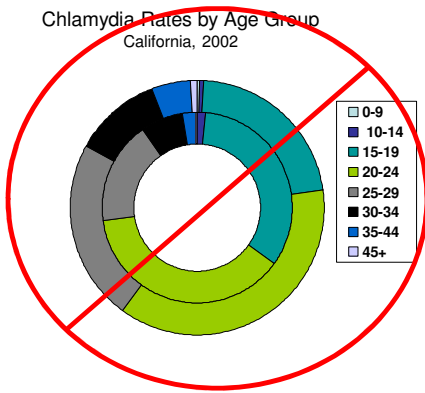
Many Other Types
and
Hybrids

Figure 11. Drugs used to treat gonorrhea in GISP participants, 1988–2007

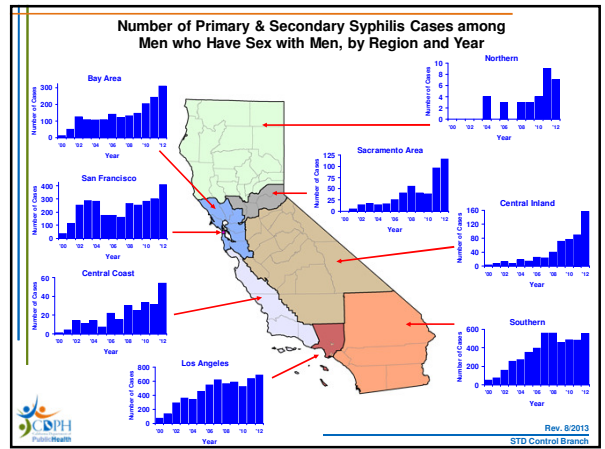


Note: For 2007, "Other" includes no therapy (0.8%), azithromycin 2 g (0.8%), levofloxacin (0.2%), and other less frequently used drugs.

Chlamydia Rates by Age Group
California, 2002



Number of Primary & Secondary Syphilis Cases among
Men who Have Sex with Men, by Region and Year



“Nut and Bolts”

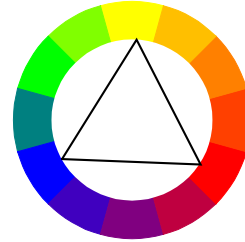
- Scale and Proportion
- Labels and Legends
- Grid Lines
- Color
- Animation/“PowerPoint”
- Font
- 3D
- Production/Reproduction
- Chart Junk
- Software

Color

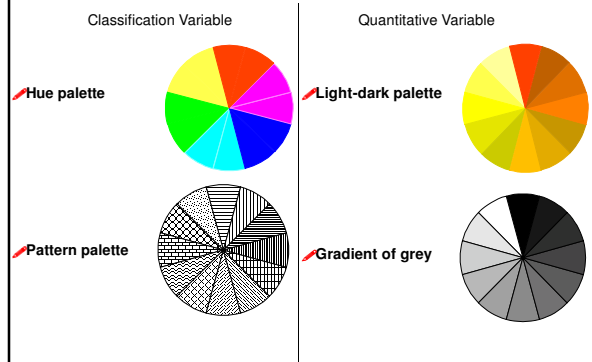
Color

- Use for a reason
- Use nice colors
 - Shades of Blue
 - Shade of Yellow
 - Colors of Nature
- Use color sparingly
- RED can be good for **Main Point**, if used sparingly
- Red often does not project well with slides and LCDs
- Use consistent colors (and fonts, etc.)

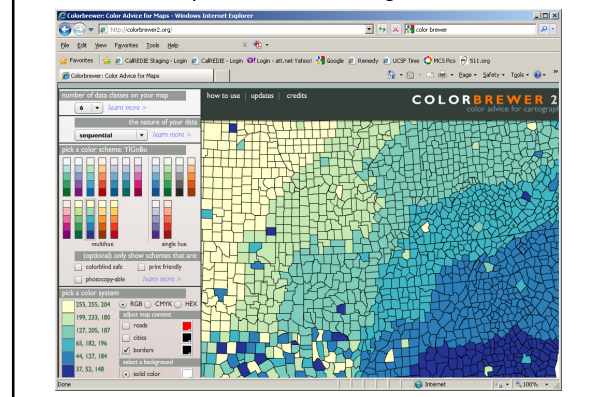
How to Select a Color



Color/Pattern Choice



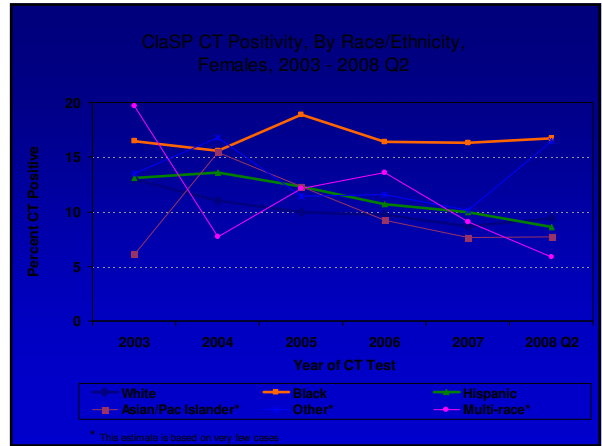
<http://colorbrewer2.org/>



Leading causes of death in Los Angeles County, 2005.¹

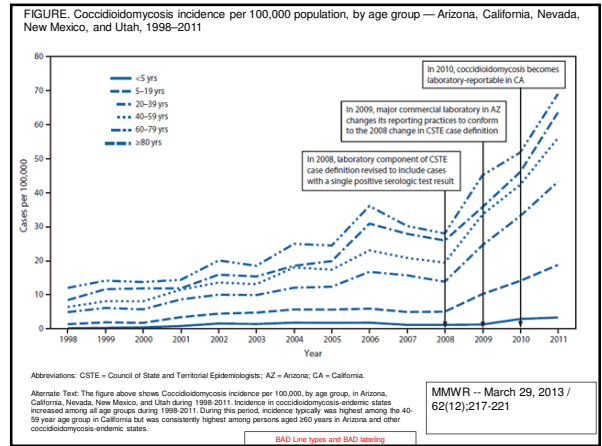
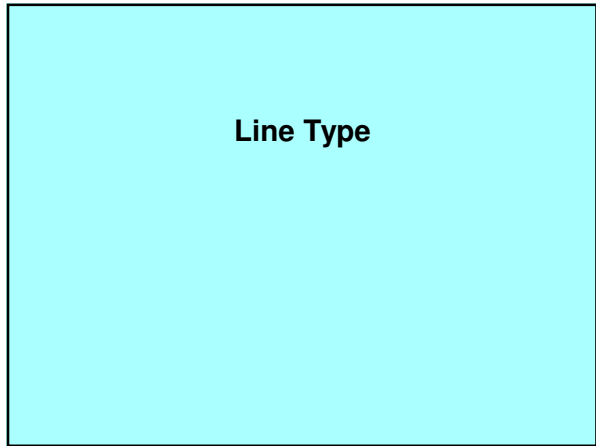
Rank	Cause of death	No. of deaths	Premature death rank	Rank	Cause of death	Years of life lost	Death rank
1.	Coronary heart disease	15,154	1.	1.	Coronary heart disease	64,231	1.
2.	Stroke	3,775	8.	2.	Homicide	48,067	10.
3.	Lung cancer	3,036	5.	3.	Motor vehicle crash	32,394	12.
4.	Emphysema/COPD	2,770	13.	4.	Suicide	19,375	17.
5.	Pneumonia/influenza	2,333	19.	5.	Lung cancer	18,490	3.
6.	Diabetes	2,305	7.	6.	Liver disease	17,897	11.
7.	Alzheimer's disease	1,546	50.	7.	Diabetes	16,971	6.
8.	Colorectal cancer	1,409	12.	8.	Stroke	16,442	2.
9.	Breast cancer	1,174	10.	9.	Drug overdose	16,138	21.
10.	Homicide	1,066	2.	10.	Breast cancer	13,610	9.

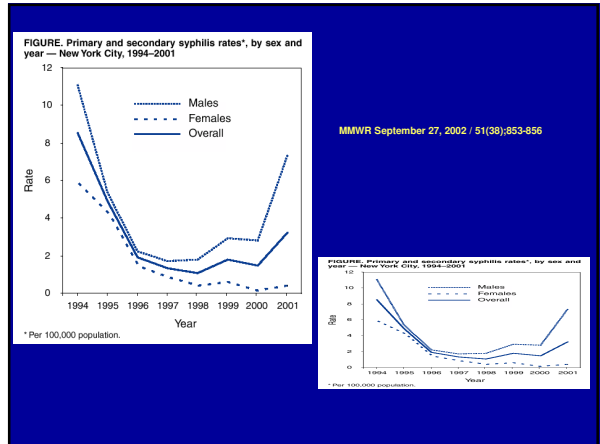
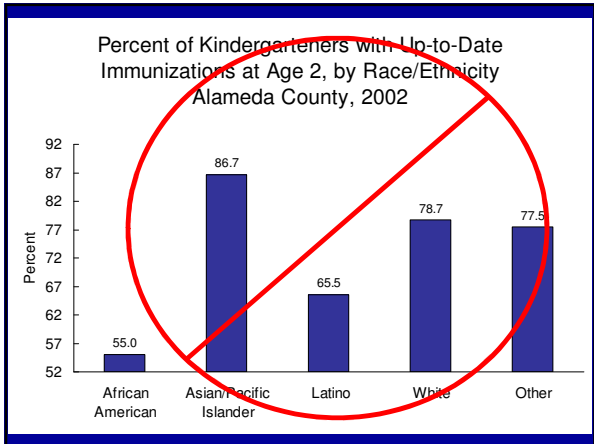
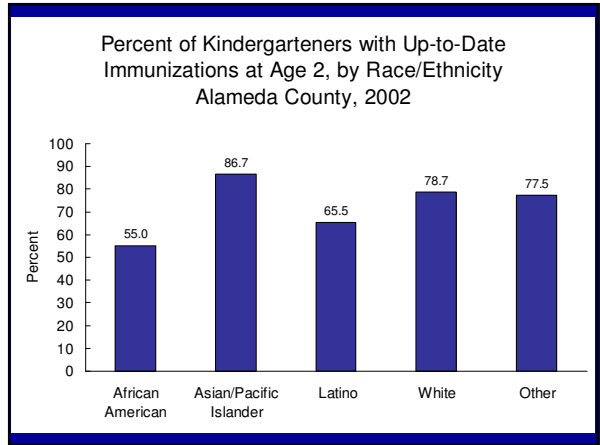
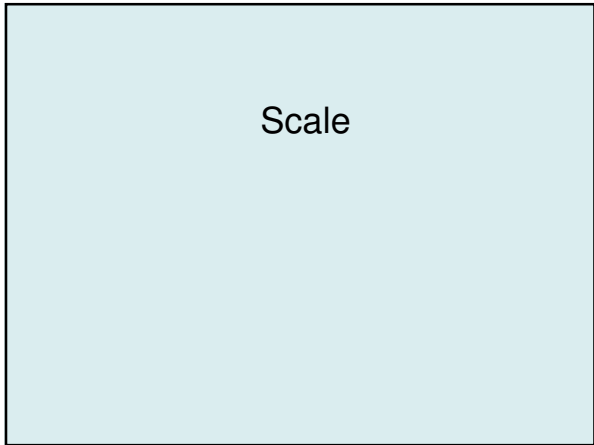
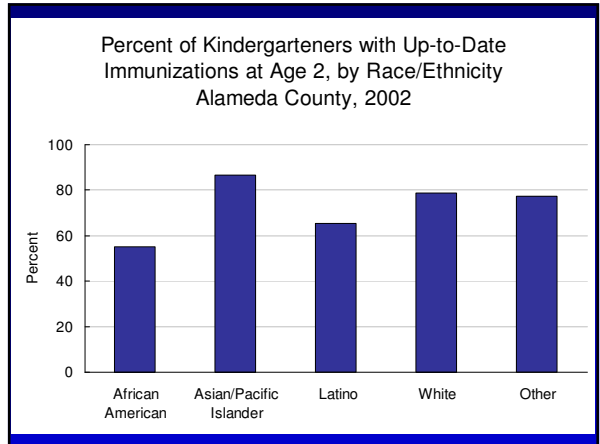
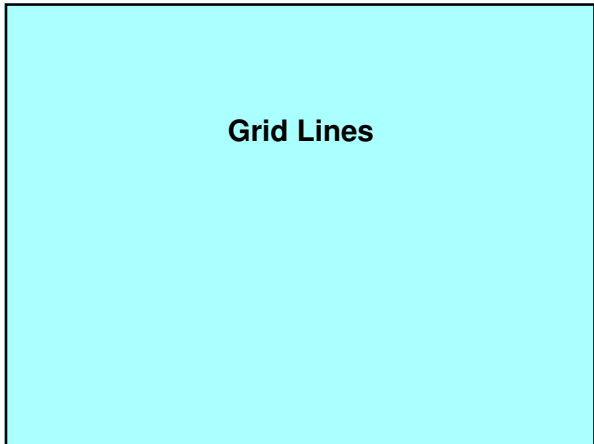
Background Colors and oral presentations

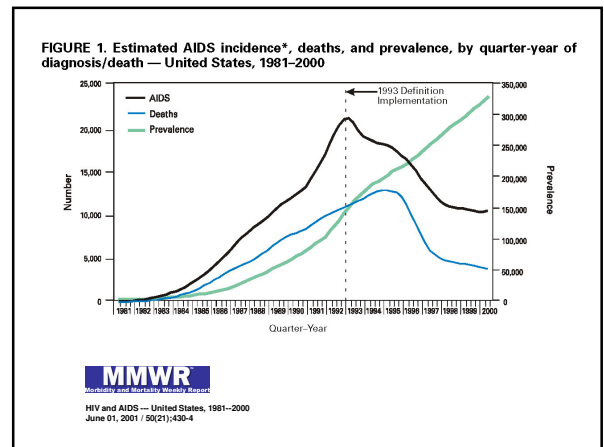
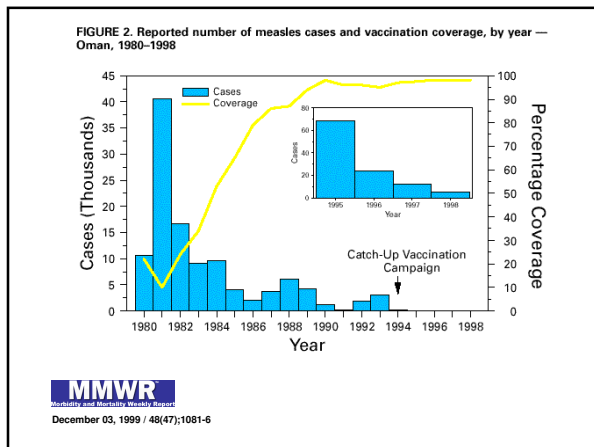
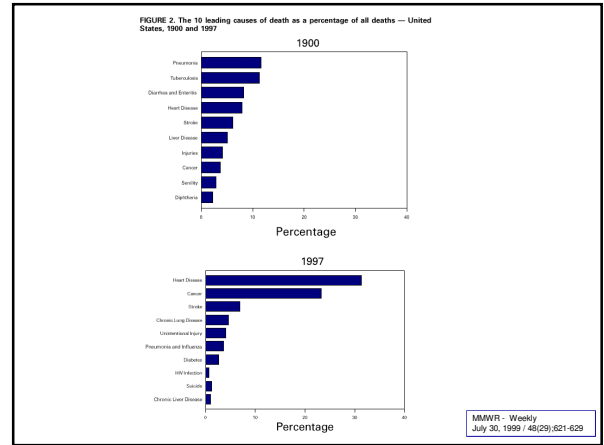
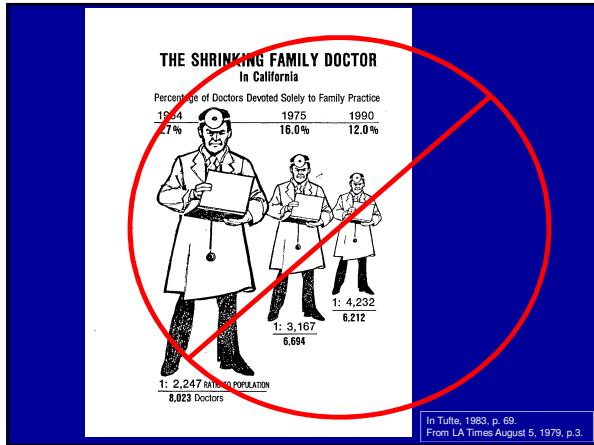
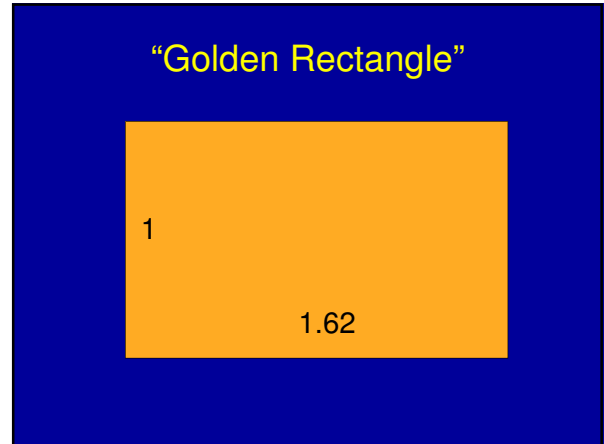
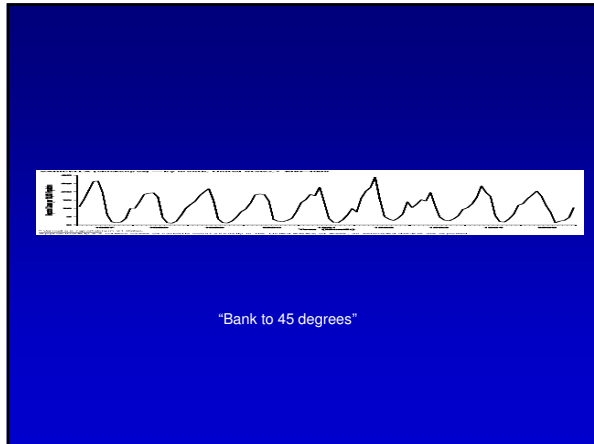


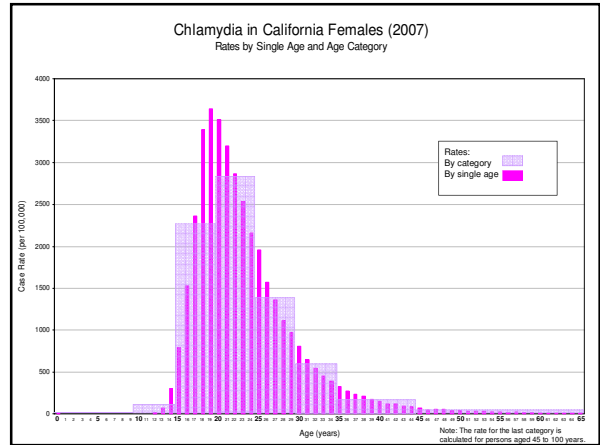
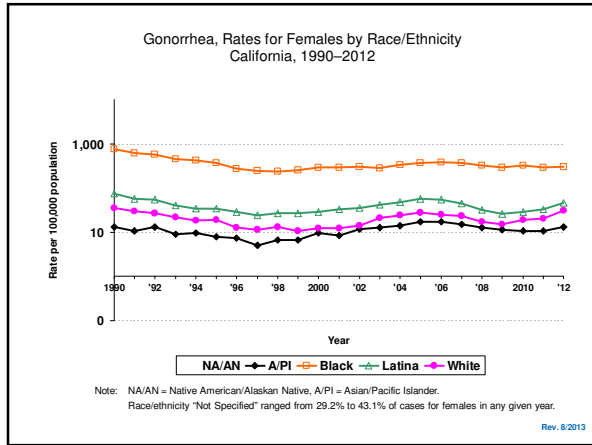
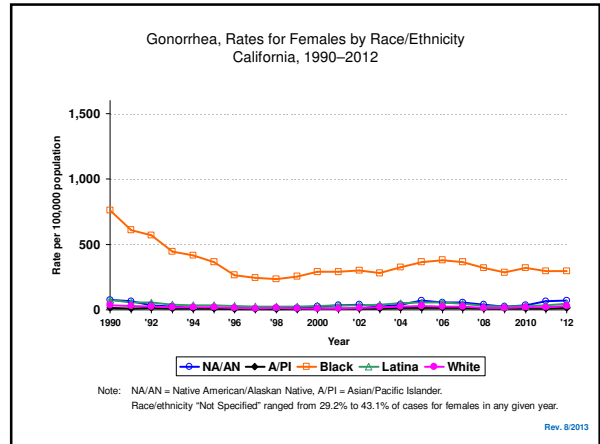
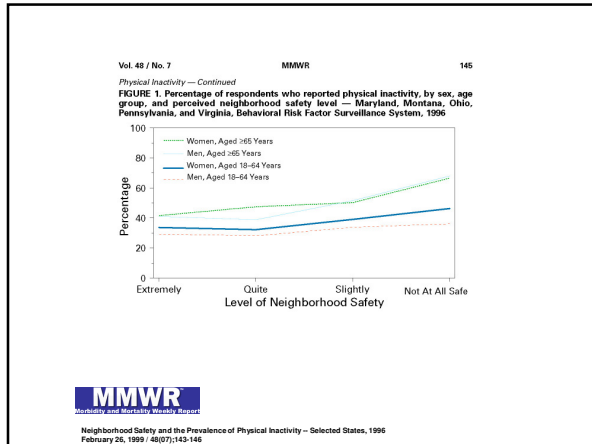
- ### Fonts / Fonts
- Use San Serif Fonts, Like Arial
 - Not Serif Fonts, Like Times Roman
 - They Are Harder to Read
 - Particularly in Oral Presentations
 - When the Font Is Small
 - See, Isn't This Better
 - ALSO, ALMOST NEVER USE ALL CAPS
 - IT'S HARD TO READ TOO
 - Big Enough to read

- ### Production / Reproduction
- Test printers, laptops, LCDs before full production is necessary
 - Often different colors and styles for:
 - PowerPoint oral presentation
 - Written report or manuscript
 - Color
 - May not photocopy (or print) well
 - Can be expensive to reproduce
 - Posters made on plotters require special consideration

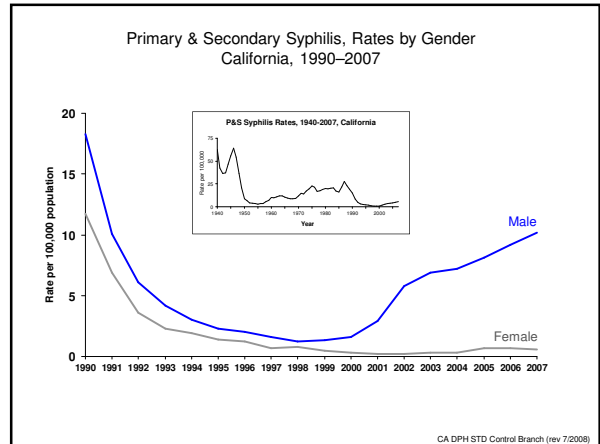


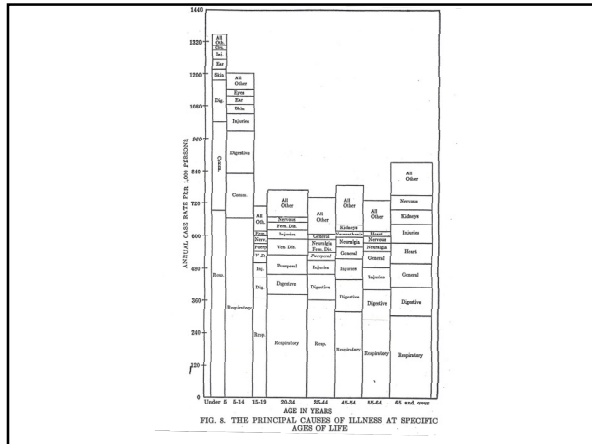




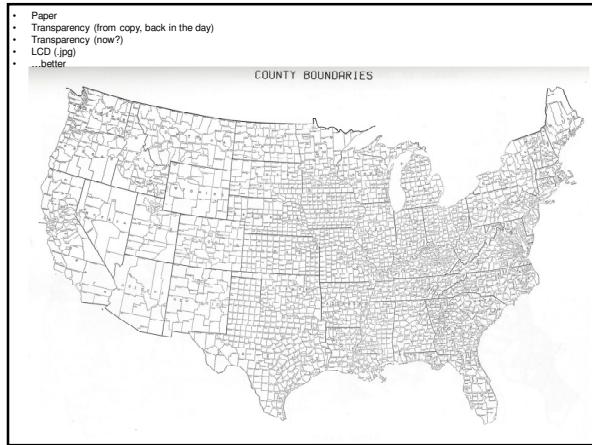


Labels and Legends



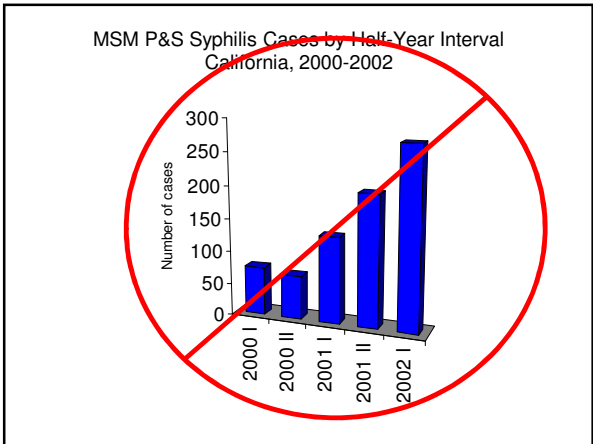
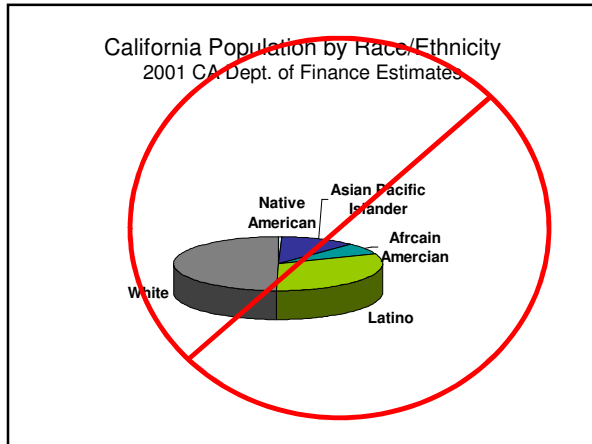


Production and Reproduction



3D Charts

■ Unless there are 3 dimensions and the audience can handle it!



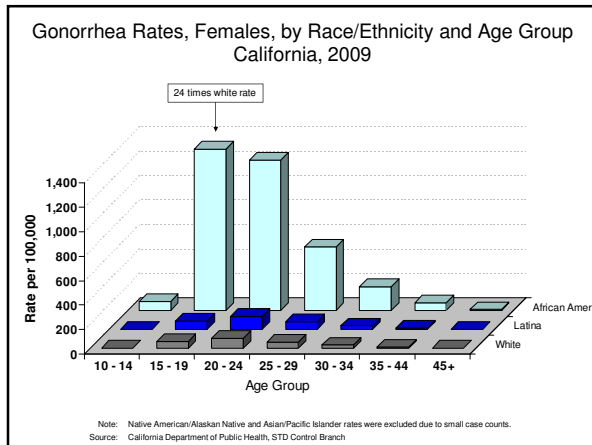
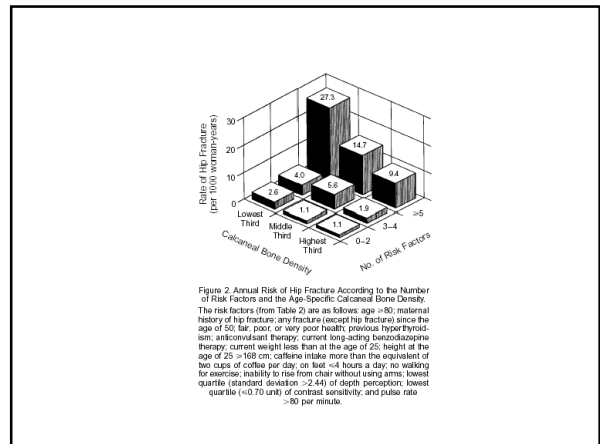
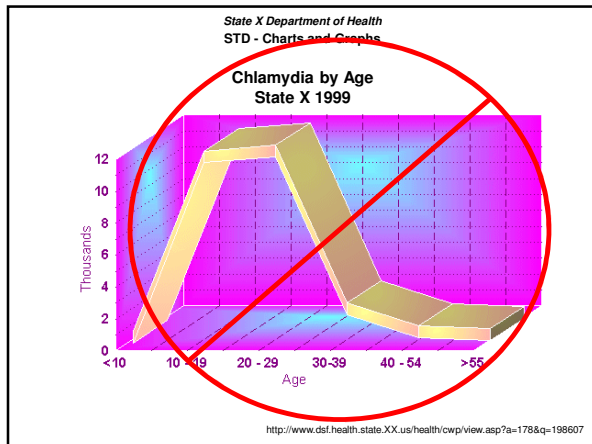
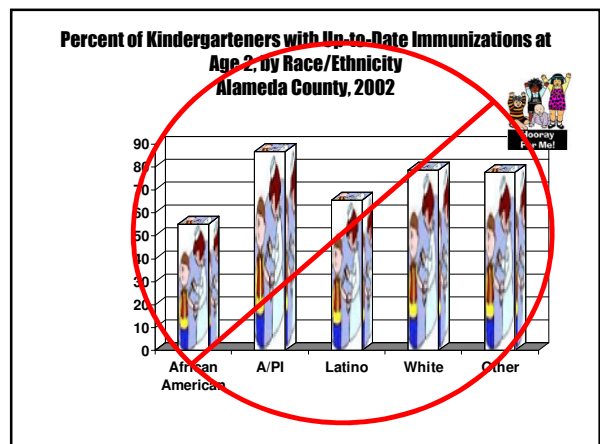
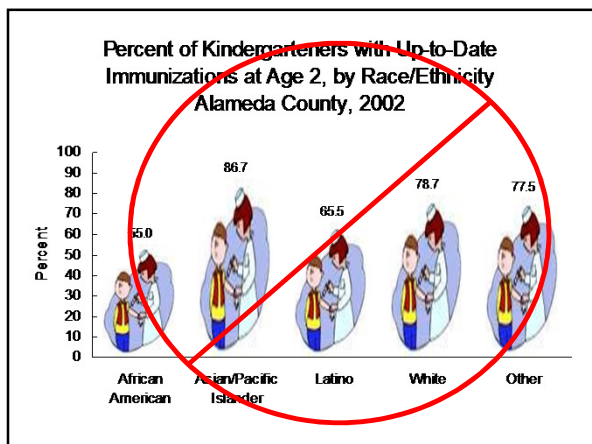
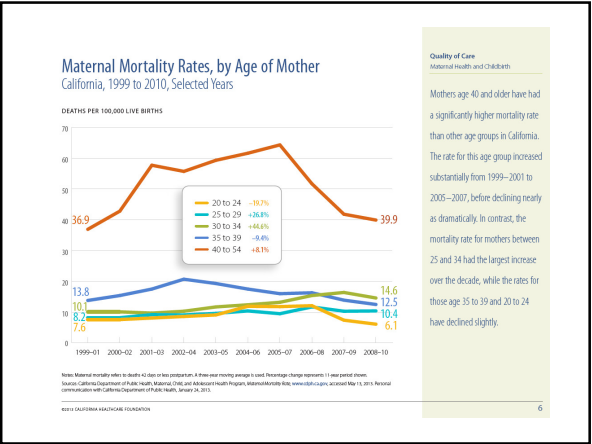


Chart Junk



**“Soften the Edges”
“The Human Touch”**



A Healthy Baby Begins With You!

To Have a Healthy Baby You Should...

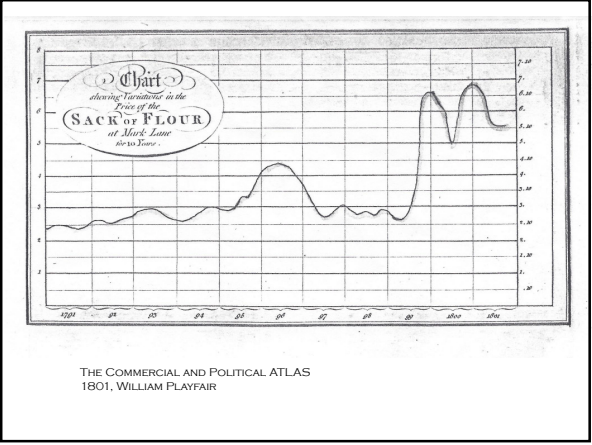
- Wait your doctor for a complete medical check-up and ask about:
 - Taking folic acid to guard against birth defects
 - Eating a healthy diet, low in fat and salt
 - Being at healthy weight
 - Daily exercise
 - Any medicine you are taking

To prevent birth defects or a low birth-weight or preterm baby, you should not:

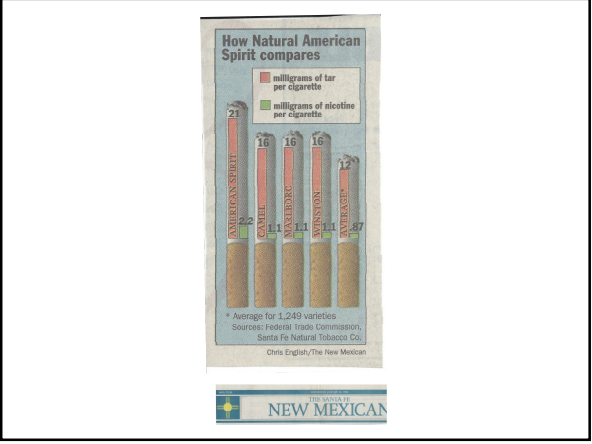
- Drink alcohol
- Use drugs
- Smoke or use tobacco

CALIFORNIA'S HEALTH CARE COSTS 2009

MULTICULTURAL HEALTH MONTH APRIL 2009



“Infographics”



<http://www.cdc.gov/features/salmonellapoultry/>



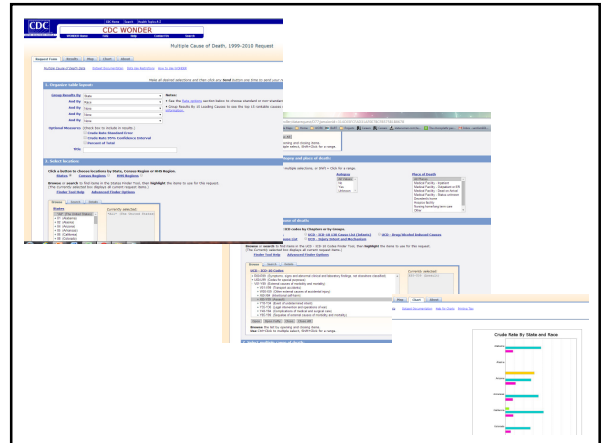
SNAP-Ed WORKS

Healthier Lives Through Nutrition Education



<http://www.phi.org/resources/?resource=snapedworks>

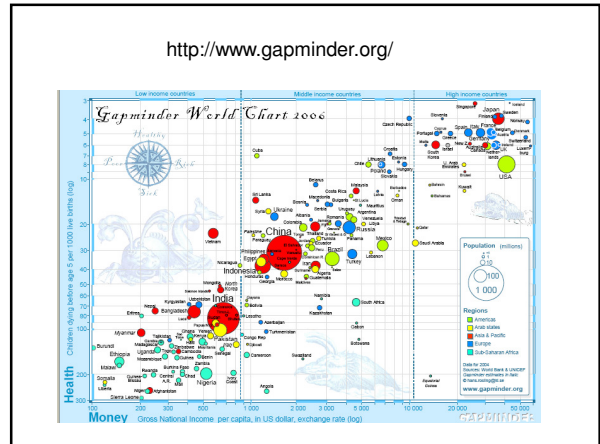
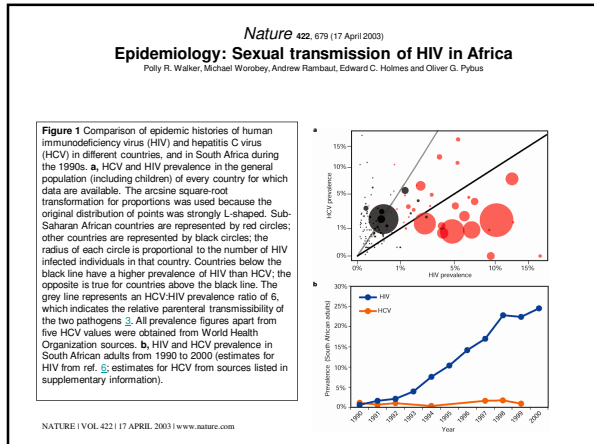
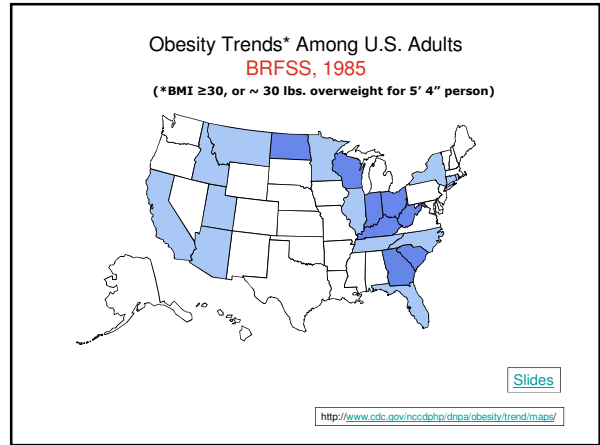
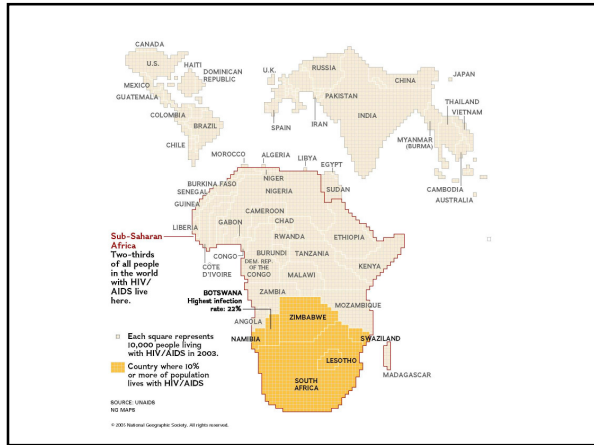
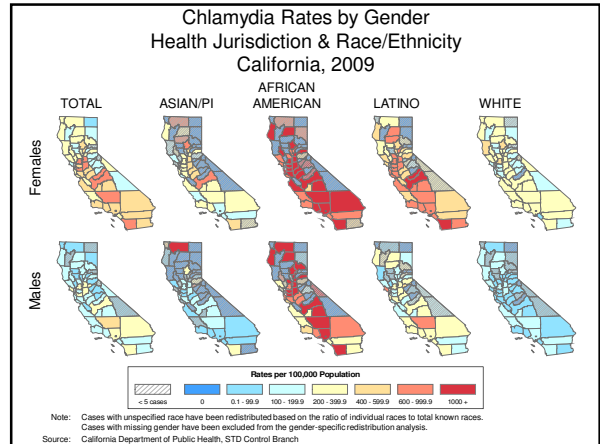
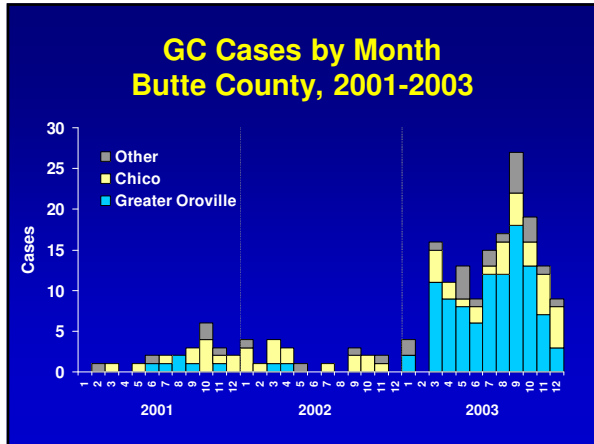
Query Systems



Great Graphs

<http://www.bloomberg.com/dataview/2014-04-17/how-americans-die.html>



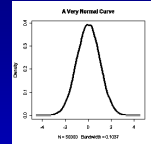


In Conclusion

- Make displays that matter
- Know your audience
- Simple ↔ Complex
- Less is more
- Pay attention to “nuts and bolts” details

For More Information:

- Michael.Samuel@cdph.ca.gov
- 510.620.3198



Part 1 "General Concepts"
Part 1a: http://youtu.be/1c41eMOjt_U
Part 1b: <http://youtu.be/XIKA2hgg-rY>

Part 2 "Nuts and Bolts"
Part 2a: <http://youtu.be/pUDcGlufW8>
Part 2b: <http://youtu.be/YCRyVPpz-yk>