

# MIS 0855 Fall 2017 – Data Science *Day 14 – Data Distortion*

**Min-Seok Pang**

**Management Information Systems  
Fox School of Business, Temple University  
minspang@temple.edu**

***Sep. 29<sup>th</sup>, 2017***

# Data Visualization Principles

- Principle #1 – Have a clear message to deliver.
- Principle #2 – Select a delivery method based on the message to deliver.
- Principle #3 – Use as little ink as possible.
- Principle #4 – Do not mislead your audience.

# Which is the largest U.S. state by land area?



<http://www.mapsofworld.com/usa/usa-state-and-capital-map.html>



## United States


An **interactive** list of U.S. States, including their (2012) populations, as well as land sizes and densities.

**Click** on any of the bolded headings to sort this state list.

**Type** the name of a state you're looking for in the search bar to find its individual stats.

Show  entries

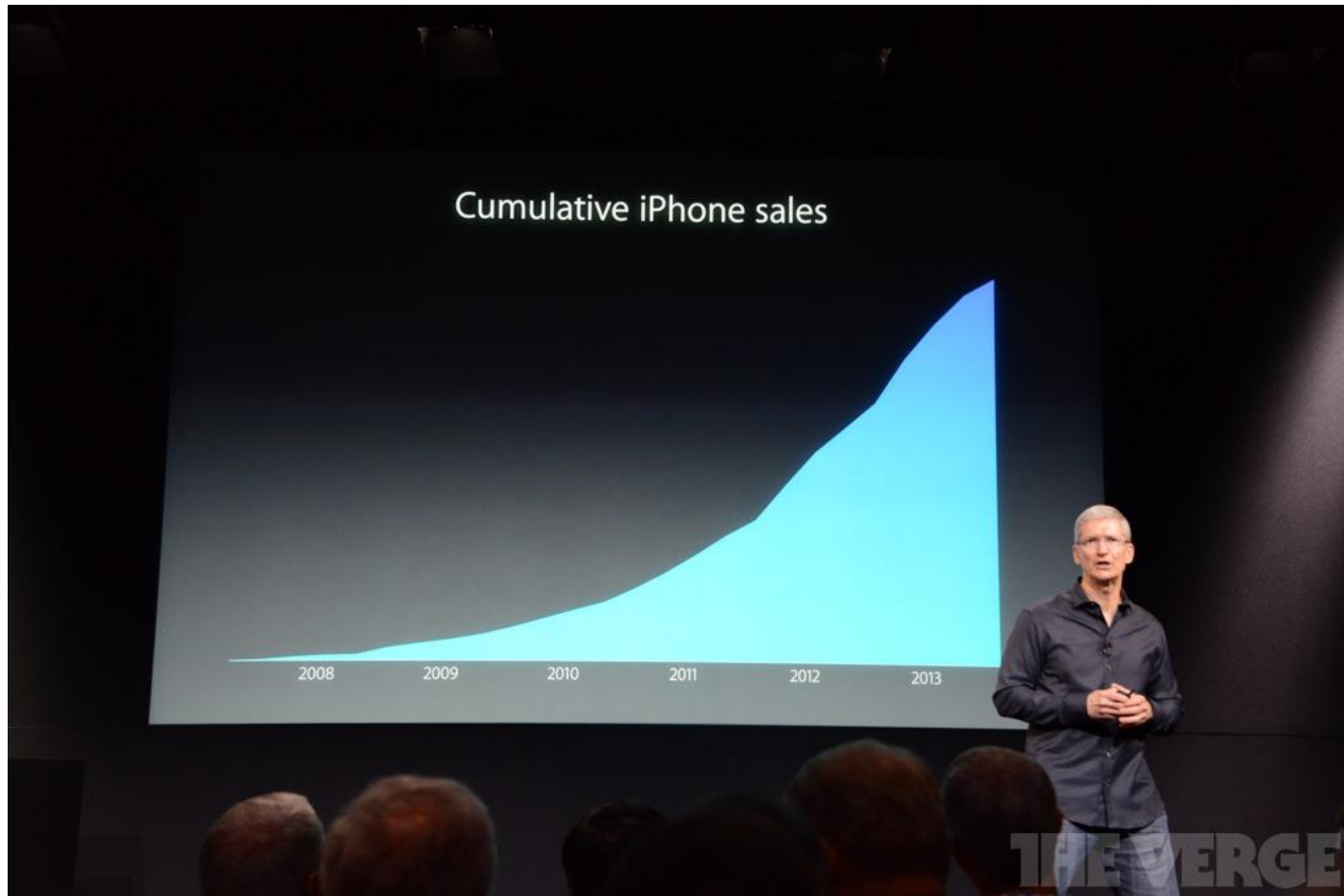
Search:

		<b>STATE</b> ⬆	<b>Abbr.</b> ⬆	<b>Population</b> ⬆	<b>Land Area (sq. km.)</b> ⬇	<b>Pop. Density (per sq. km.)</b> ⬆	<b>Land Area (sq. mi.)</b> ⬆	<b>Pop. Density (per sq. mi.)</b> ⬆
1		Alaska	AK	731,449	1,481,346.00	0.46	571,951	1.20
2		Texas	TX	26,059,203	678,051.12	35.88	261,797	92.92
3		California	CA	38,041,430	403,931.96	91.00	155,959	235.68
4		Montana	MT	1,005,141	376,977.95	2.57	145,552	6.65
5		New Mexico	NM	2,085,538	314,310.60	6.31	121,356	16.35

# Don't mess with Alaska!

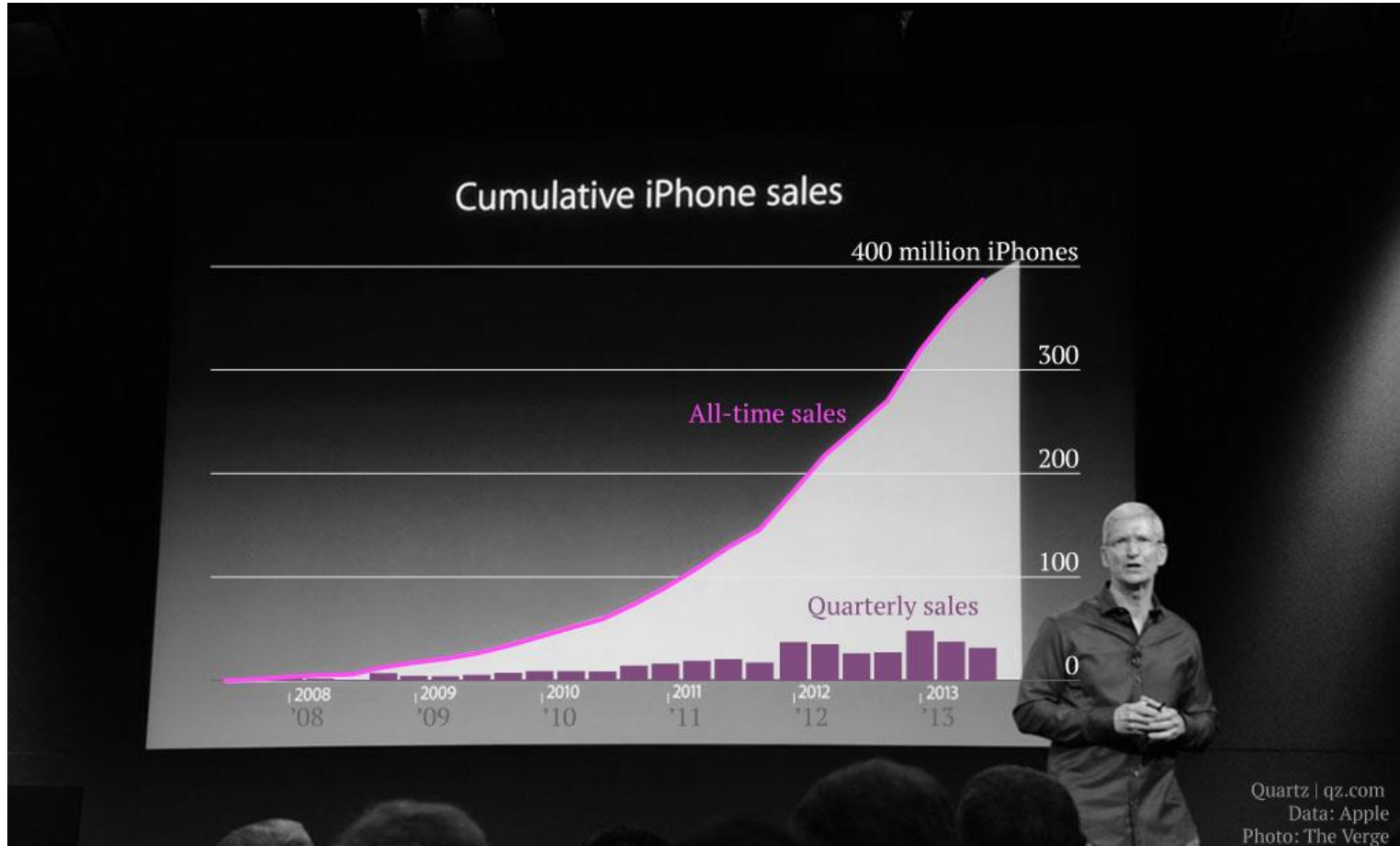


# Tim Cook is Cooking His Graph!



<http://qz.com/122921/the-chart-tim-cook-doesnt-want-you-to-see/>

# This looks less cool, but less misleading.



<http://qz.com/122921/the-chart-tim-cook-doesnt-want-you-to-see/>

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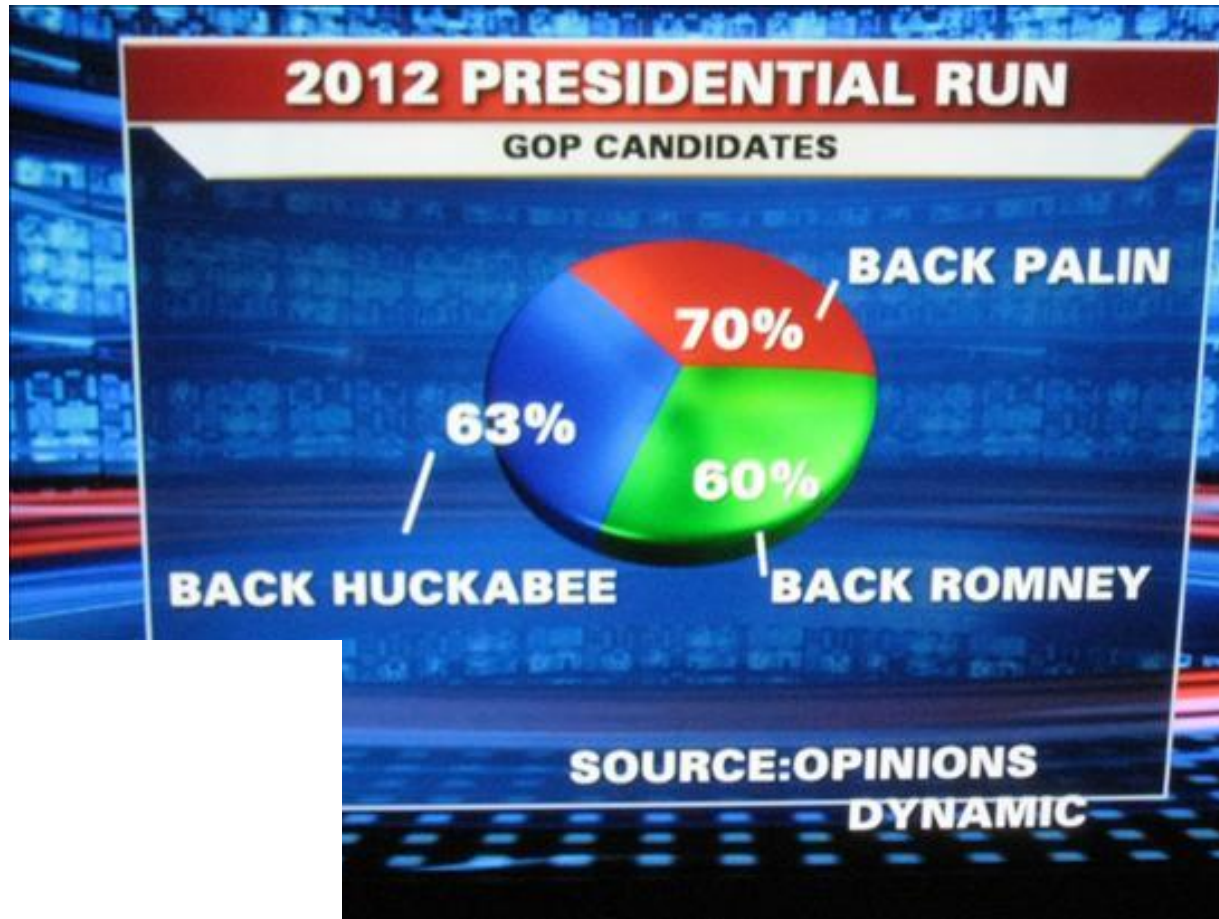
## What are Misleading Graphs?

Any graph that distracts the reader from fully understanding what he/she is viewing can be considered misleading.

- ✓ *graphs with no title*
- ✓ *graphs with no labels on the axes*
- ✓ *graphs with no key - when one is required*
- ✓ *graphs with a vertical axis that doesn't start at 0*
- ✓ *graphs with different sized graphing icons or bars*
- ✓ *graphs without equal intervals on any axis*
- ✓ *graphs with a "broken" or "squished" axis*



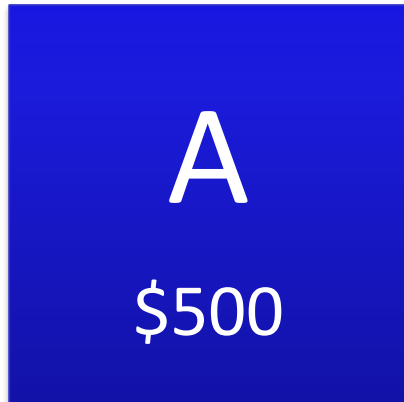
**70% + 63% + 60% = ?**



# Can you guess the source of this?



**2 X 2 = 4, not 2!**



**WIDTH of A is twice width of B,  
but AREA of A is 4x area of B!**

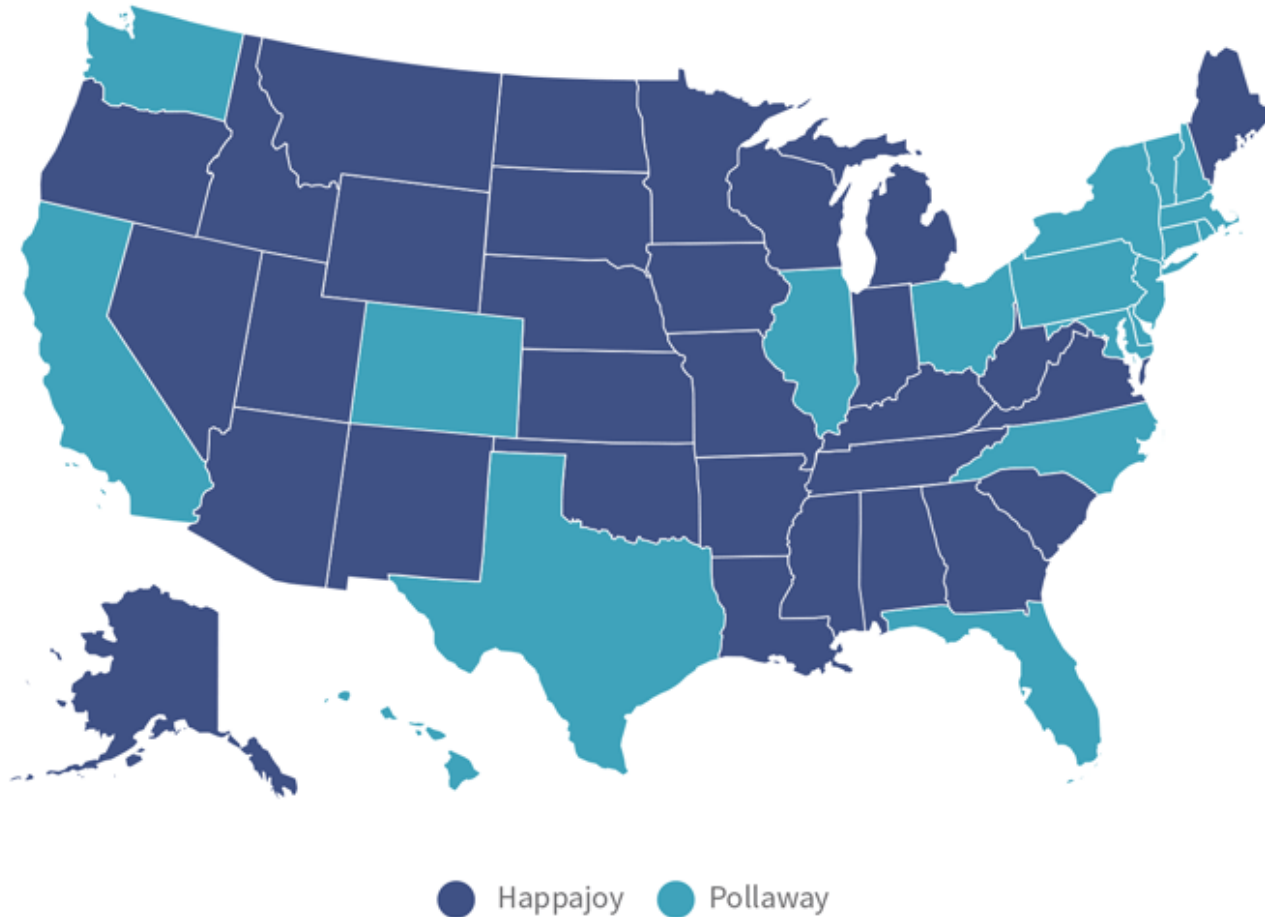
**Overstates relative value by  
factor of two!**



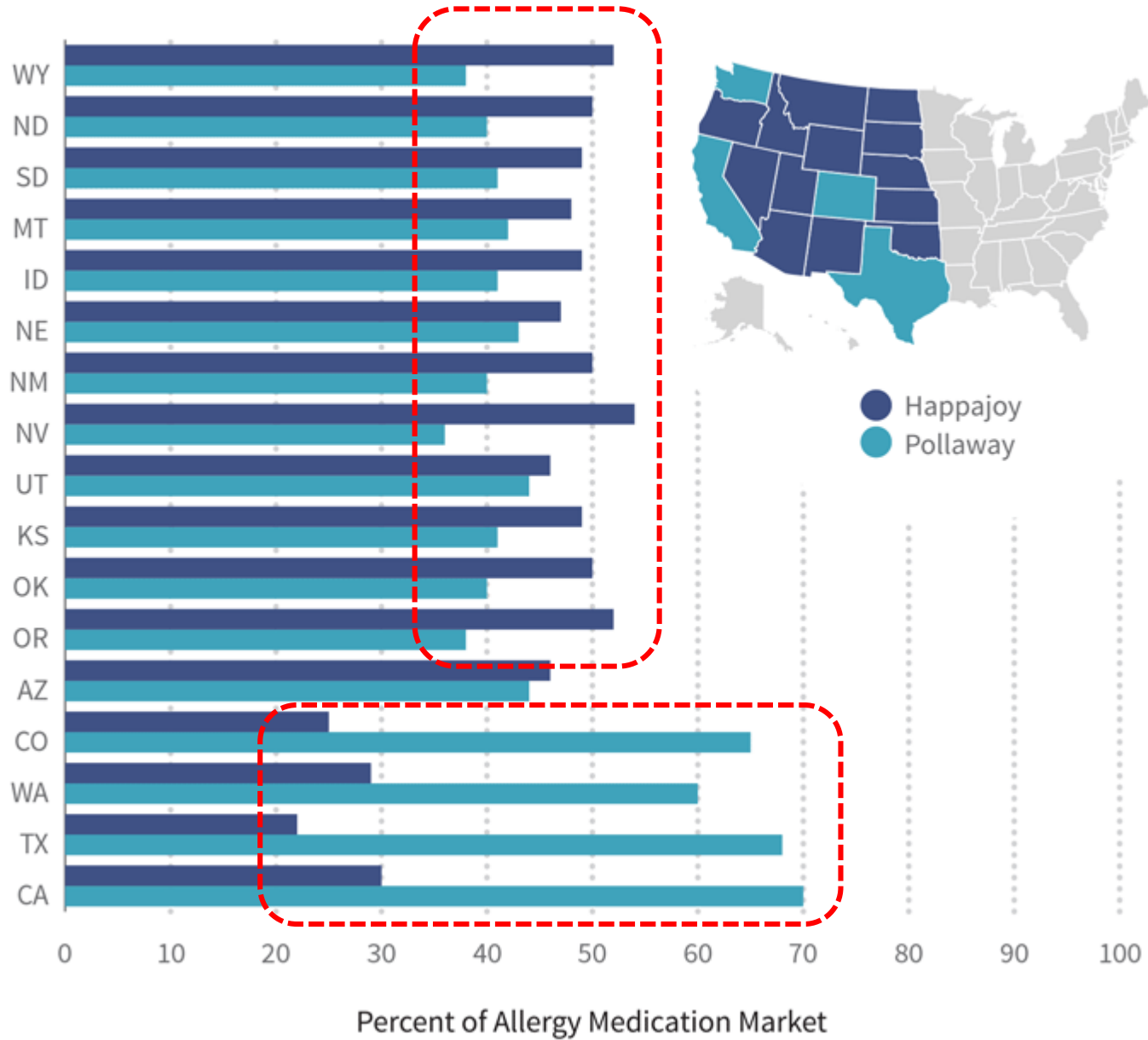
**WIDTH of A is 1.4x width of B,  
so area of A is now 2x area of B!**

# Which company is the market leader?

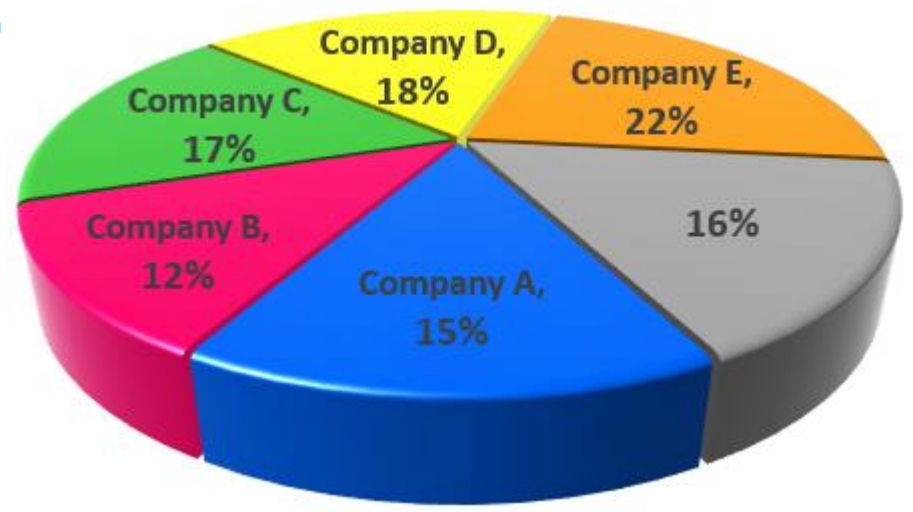
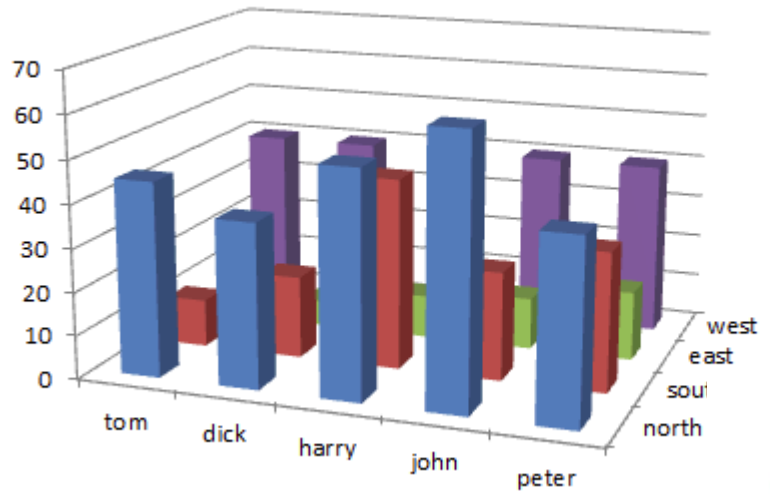
Leading Allergy Medication in Each State



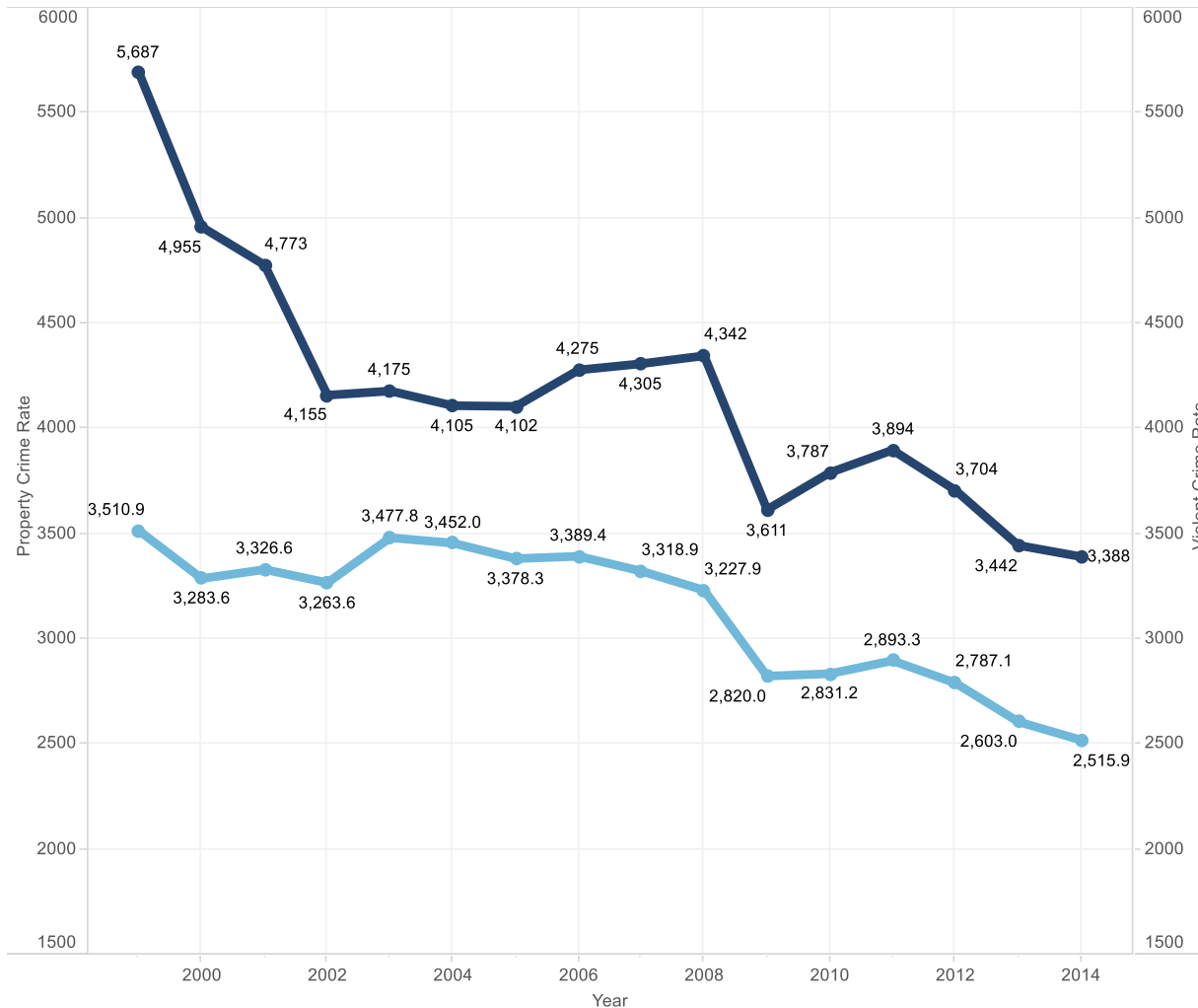
# Market Share in Each State



# Avoid 3-D charts!



# Use as little ink as possible.



# Use as little ink as possible.

state	city	Avg. murder_rate	Avg. violent_r...	Avg. property_rate
CA	Oakland	25	3,210	5,679
	Stockton	14	2,533	5,945
	Fresno	9	2,309	5,390
	Sacramento	9	1,788	5,176
	Los Angeles	11	1,696	2,847
	Riverside	6	1,669	
	Modesto	6	1,546	
	San Francisco	9	1,425	
	Long Beach	9	1,386	
	San Diego	4	1,216	
	Chula Vista	3	1,139	
	Bakersfield	8	1,095	
	San Jose	3	1,058	
	Santa Ana	6	931	
	Anaheim	4	896	
Glendale	2	518		
<b>Total</b>	<b>8</b>	<b>1,526</b>		

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	Sacramento	9	1,788	5,176
	Los Angeles	11	1,696	2,847
	Riverside	6	1,669	3,882
	Modesto	6	1,546	5,415
	San Francisco	9	1,425	4,708
	Long Beach	9	1,386	2,909
	San Diego	4	1,216	3,016
	Chula Vista	3	1,139	2,963
	Bakersfield	8	1,095	4,720
	San Jose	3	1,058	2,401
	Santa Ana	6	931	2,427
	Anaheim	4	896	2,735
Glendale	2	518	1,905	
<b>Total</b>	<b>8</b>	<b>1,526</b>	<b>3,882</b>	



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