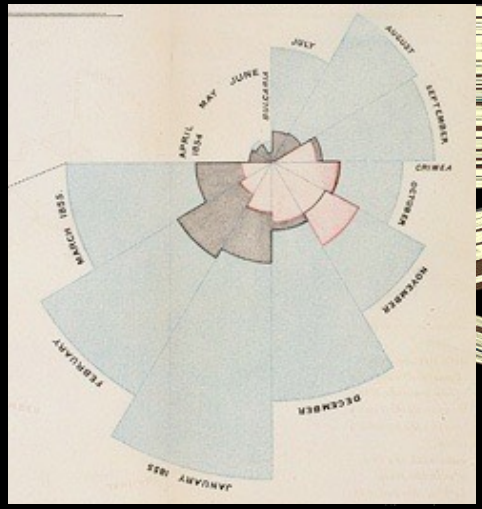
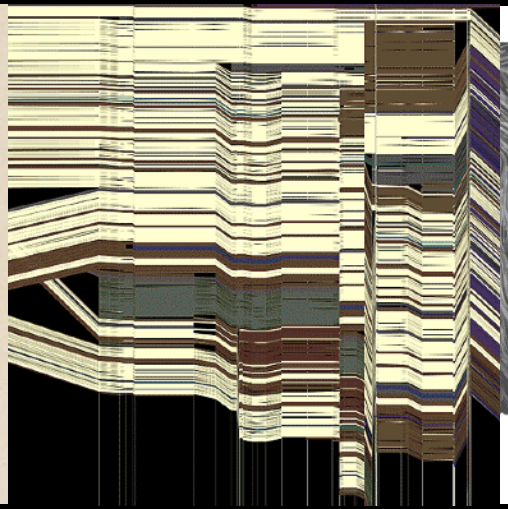
**CSE 442** - Data Visualization

# Deceptive Visualization



Jeffrey Heer U. Washington (slide credits to **Michael Correll**)

# Deceptive Visualizations

Incorrect Visualizations

Illegible Visualizations

Bullshit Visualizations

Unconventional Visualizations

# Deceptive Visualizations

**Incorrect Visualizations**

Illegible Visualizations

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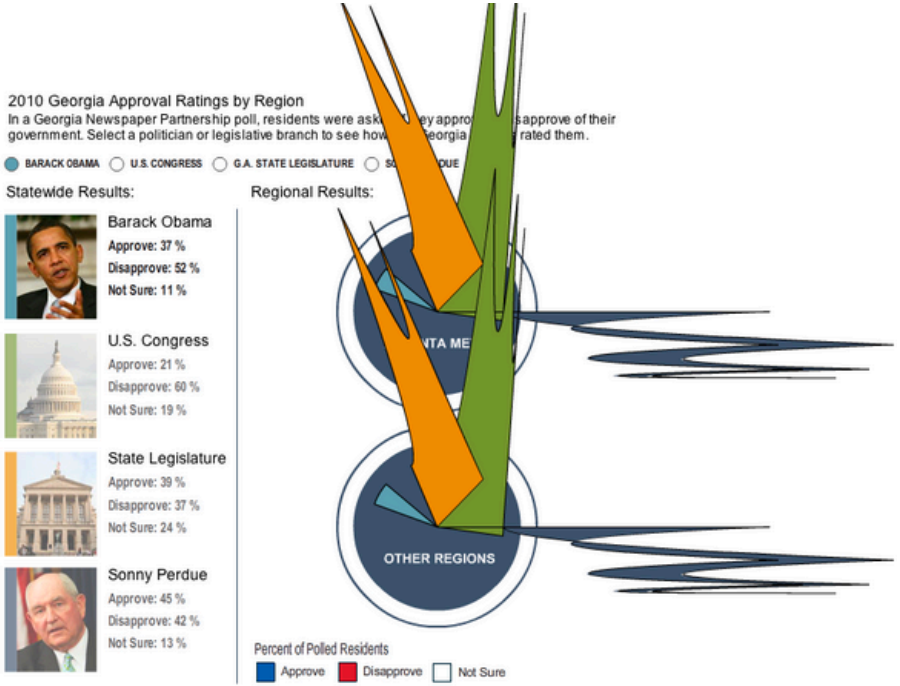
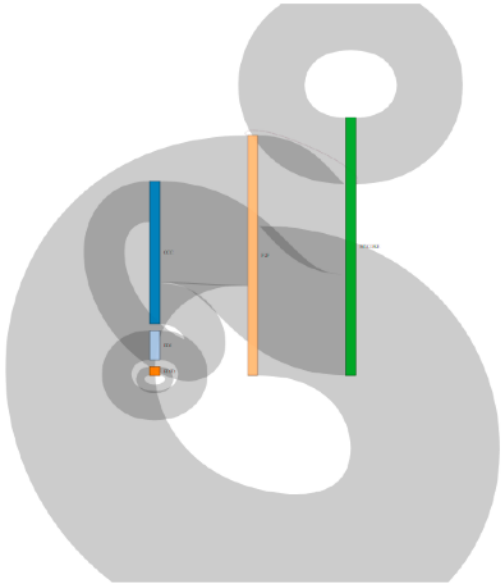
# Incorrect Visualization



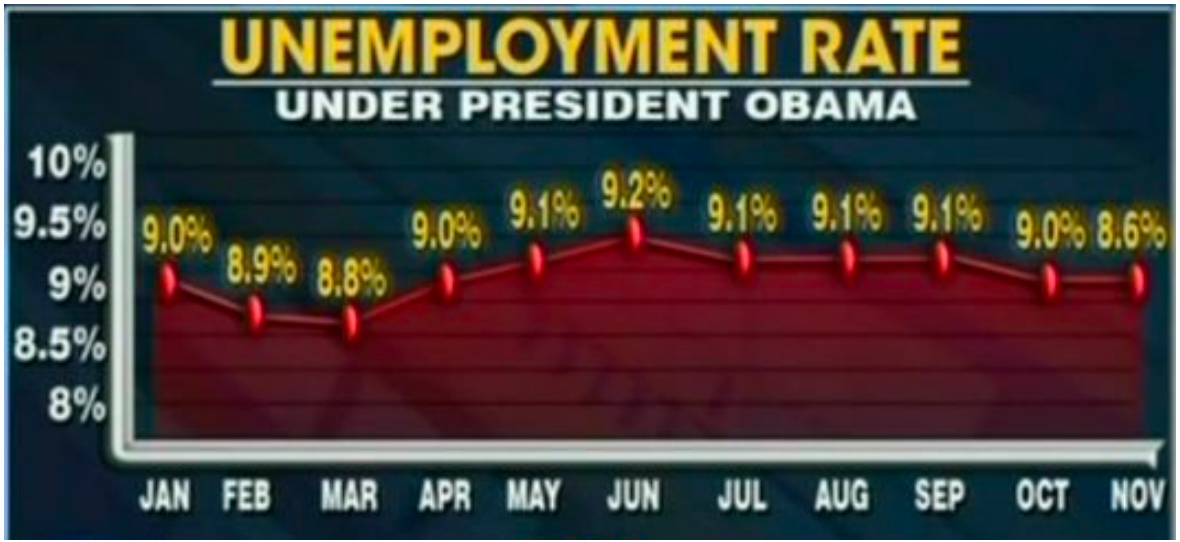



https://accidental-art.tumblr.com/

RIGHT NOW | CHICAGO 71° | DETROIT 66° | HOUSTON 77°

EALTH EVALUATION IN MIRIAM CAREY'S HOME AFTER DC ( CNN.com

RIGHT NOW
TEMPERATURES
FOX 10
AccuWeather
Wickenburg
2385
Cave Creek
2960
Surprise
1350
Deer Valley
65
Fountain Hills
1665
Glendale
66
Scottsdale
64
Buckeye
66
Goodyear
64
Sky Harbor
64
Mesa
63
Apache Junction
64
Ahwatukee
1270
Chandler
63
Gateway
63
Queen Creek
Maricopa
63
Florence
1625
FOX 10
12:20
64°


UNEMPLOYMENT RATE
UNDER PRESIDENT OBAMA
10%
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9%
8.5%
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9.0%
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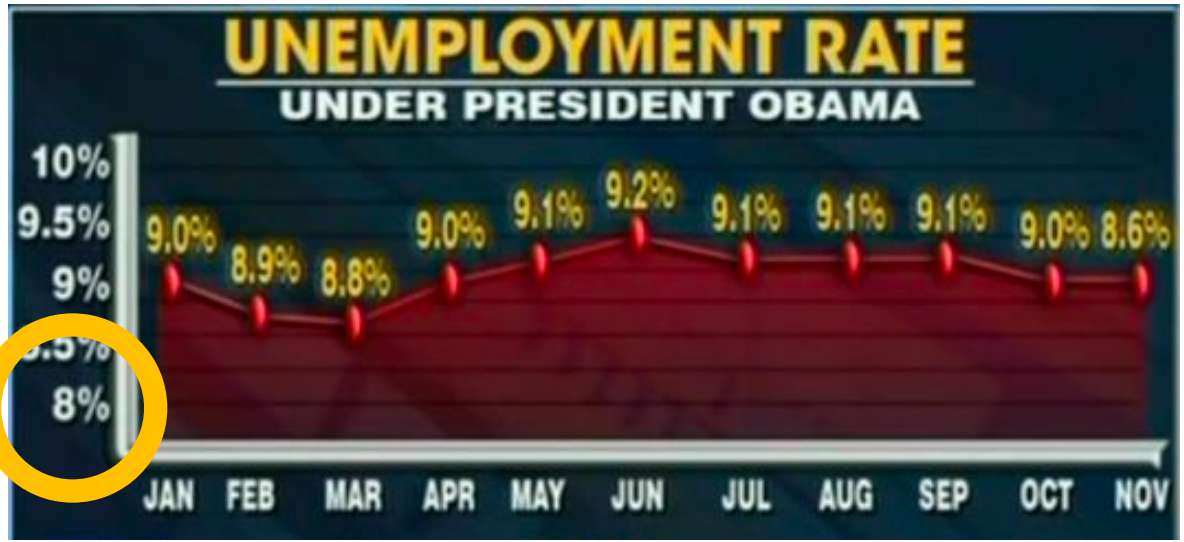
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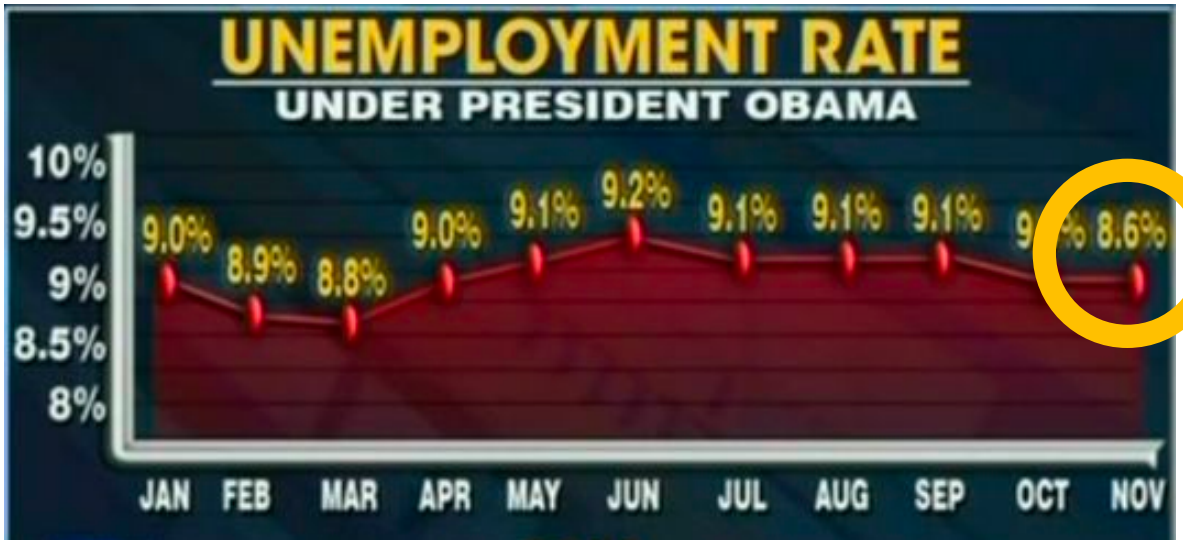
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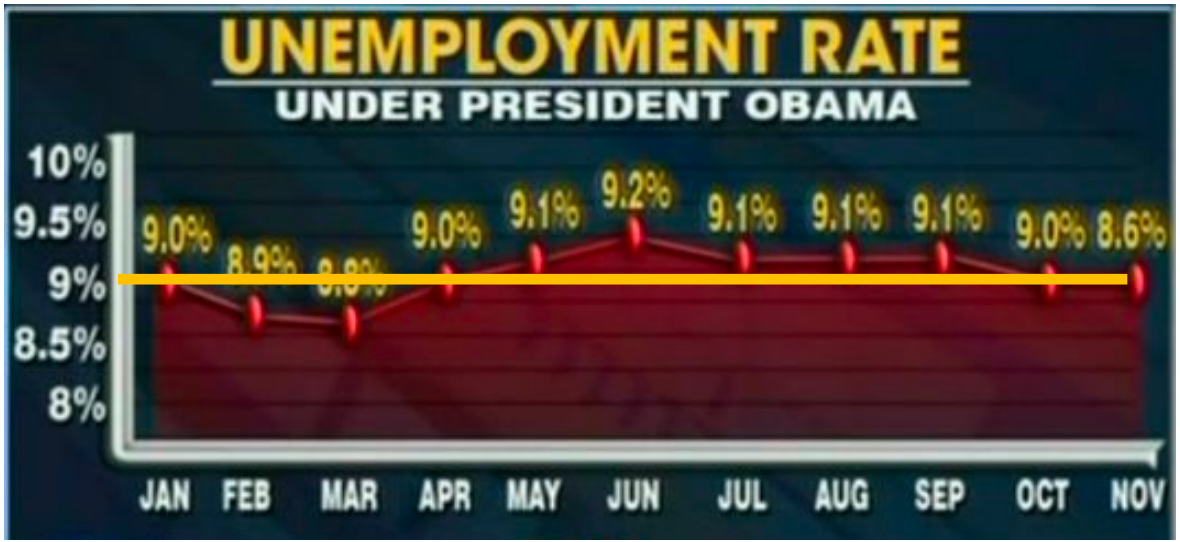
UNEMPLOYMENT RATE
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UNDER PRESIDENT OBAMA
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UNEMPLOYMENT RATE
UNDER PRESIDENT OBAMA
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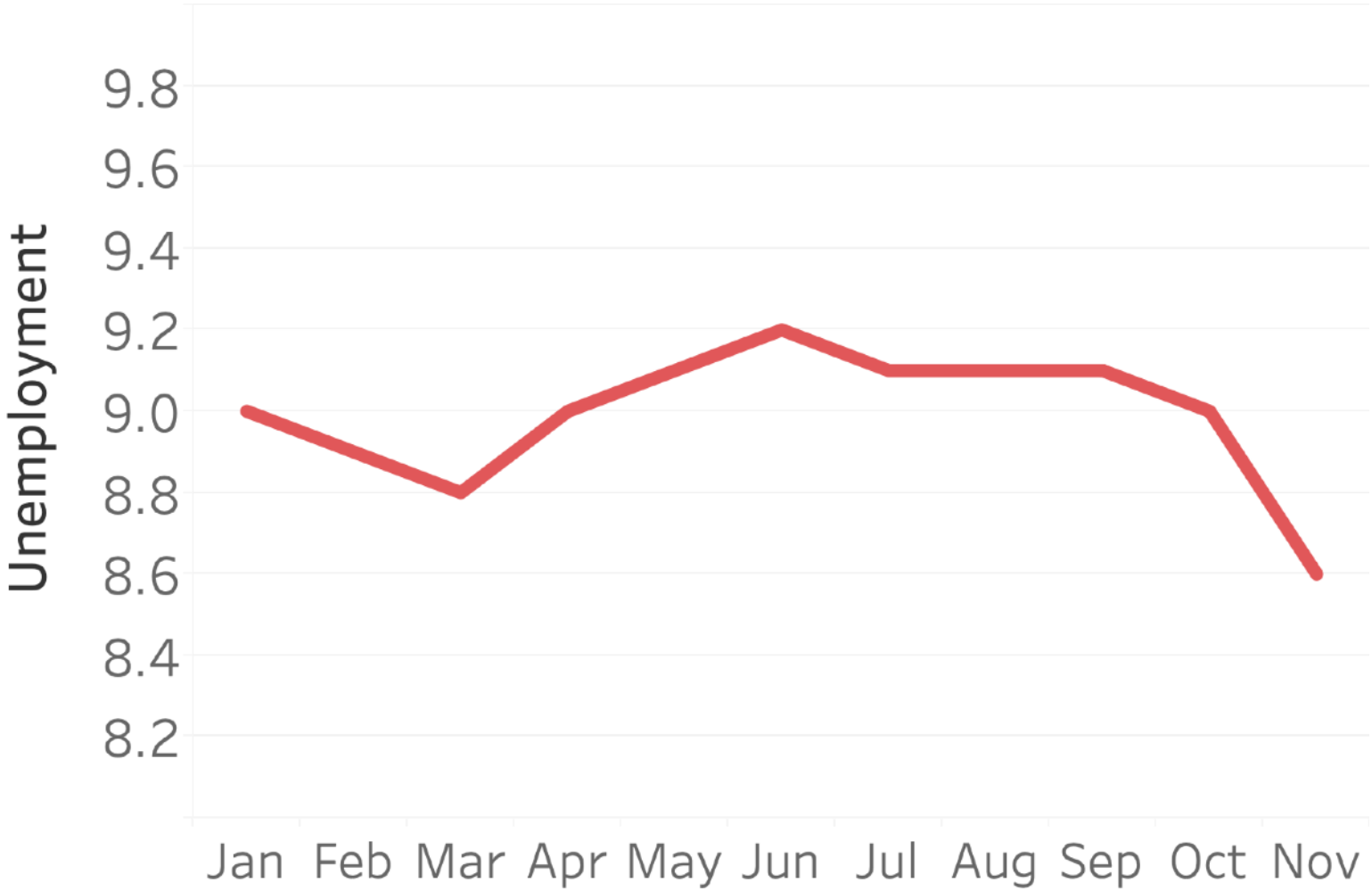
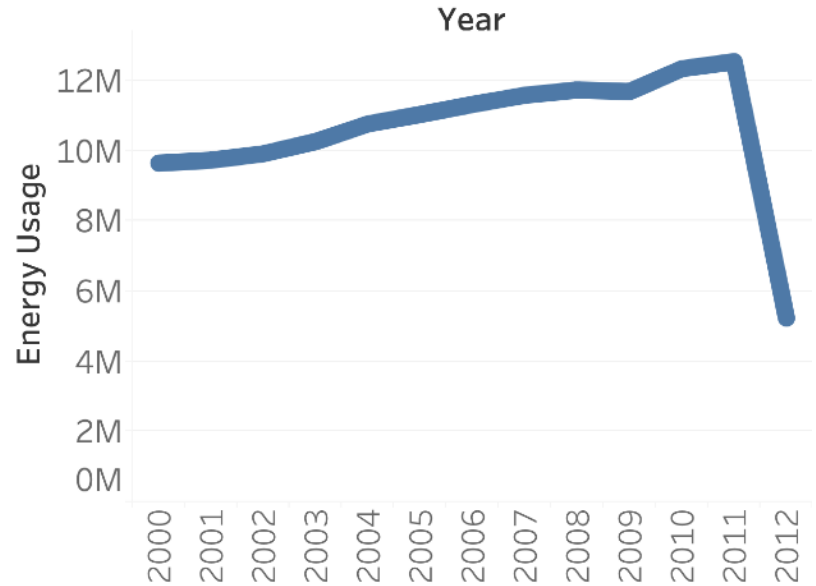
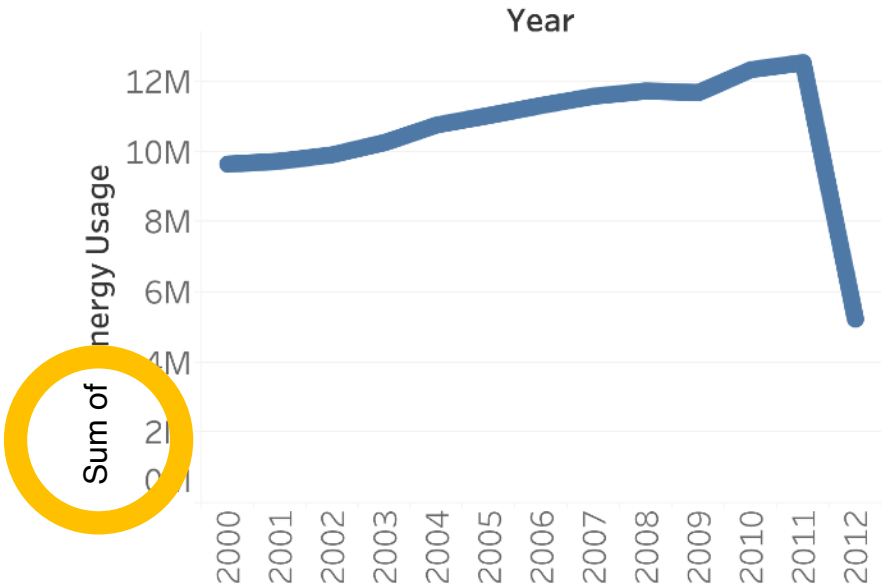

Unemployment
9.8
9.6
9.4
9.2
9.0
8.8
8.6
8.4
8.2
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov

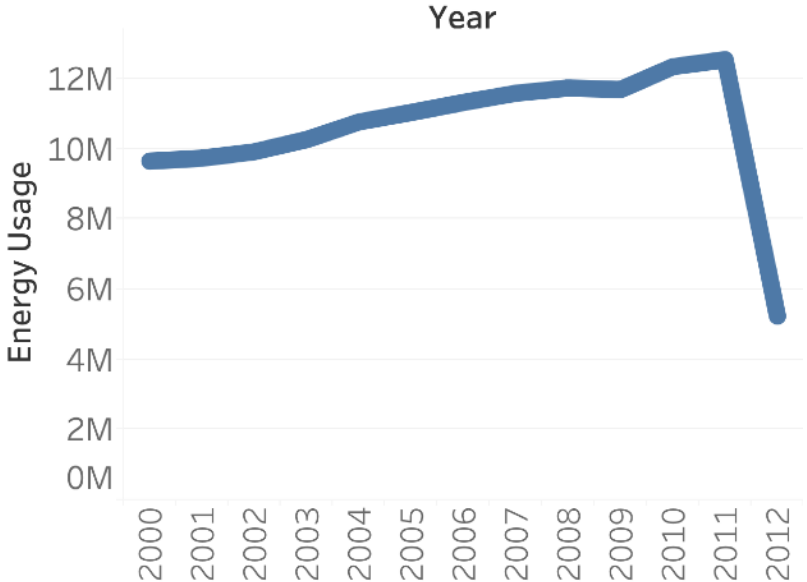
Energy Usage Down?

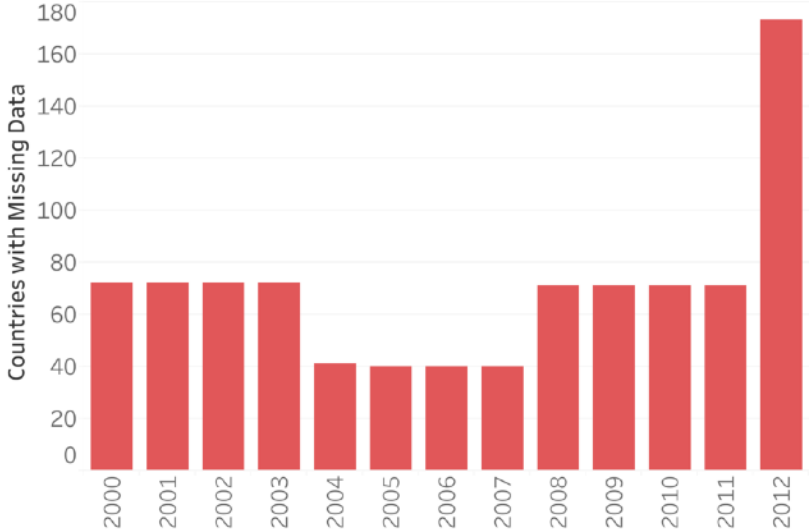


Energy Usage Down?

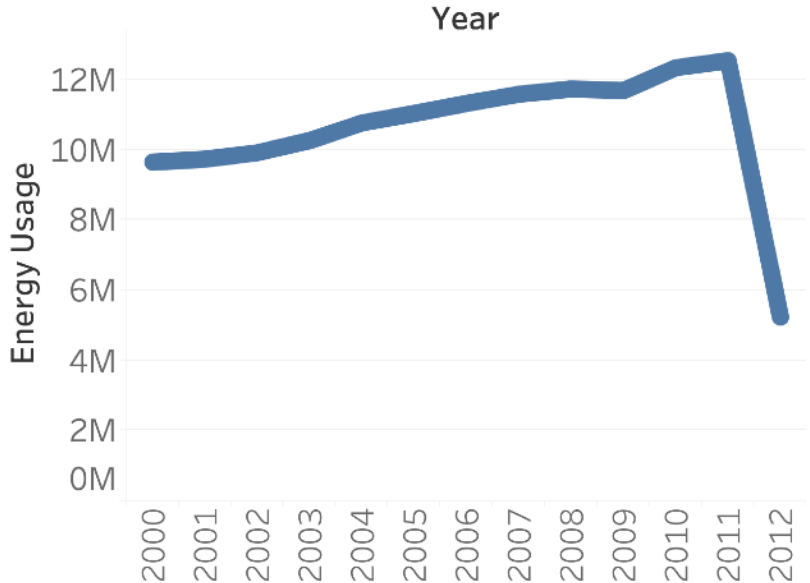


Energy Usage Down?

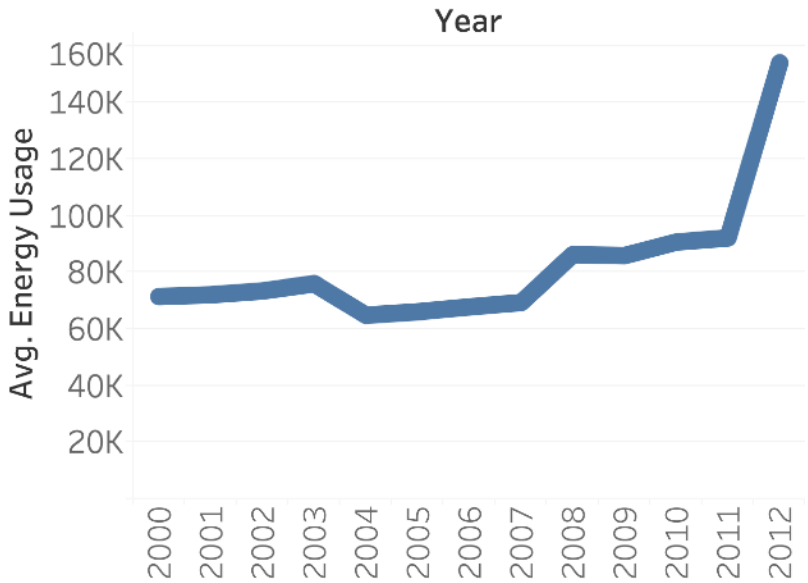


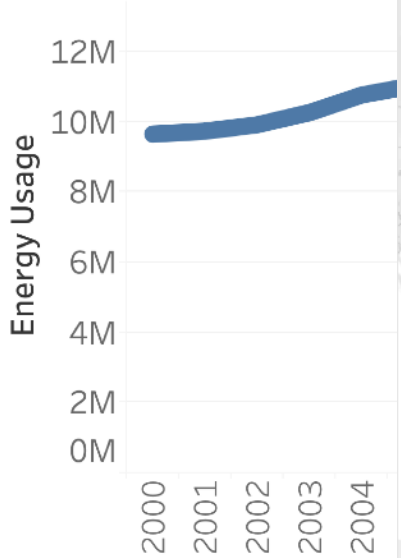
Energy Usage Down?



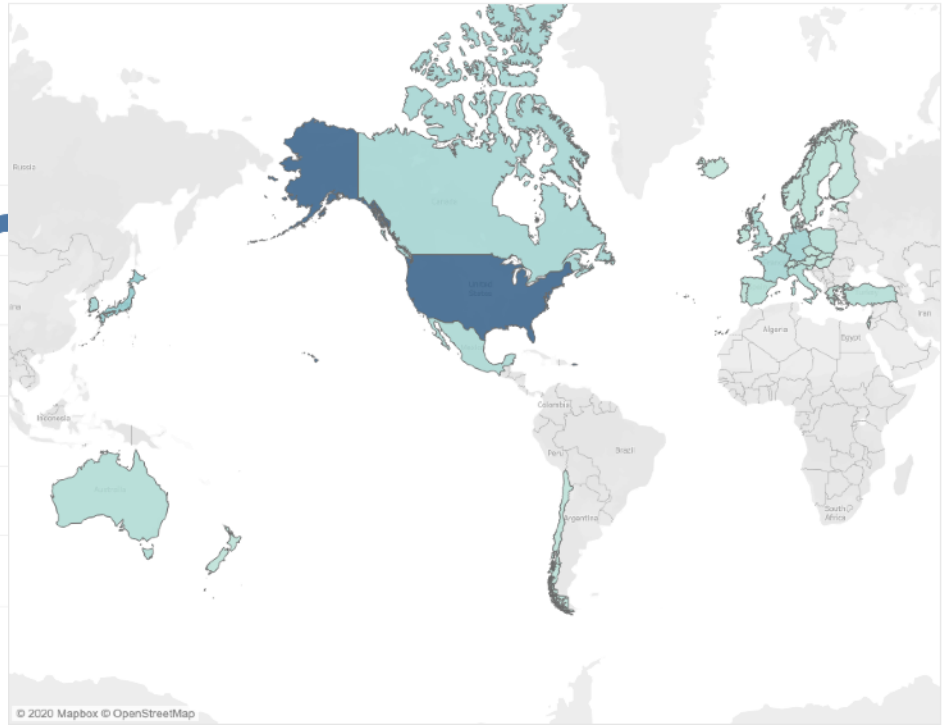

Energy Usage Up?



Energy Usage Down?




2012 Non-Nulls Are OECD Countries



# Incorrect Visualizations

People assume that visualizations properly encode their data

…if we violate that assumption, we can do anything we want.

# Deceptive Visualizations

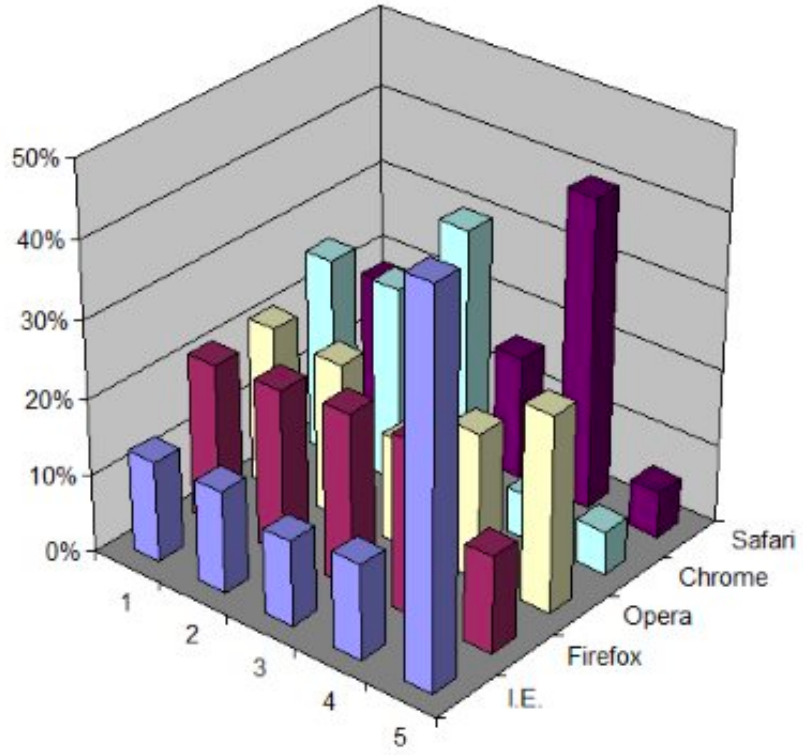
Incorrect Visualizations

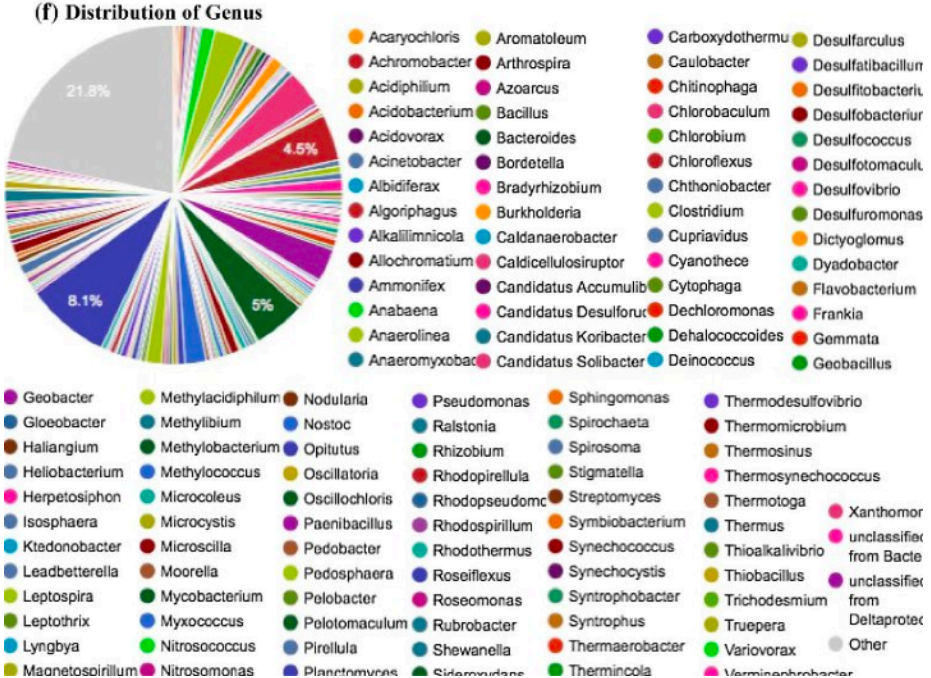
**Illegible Visualizations**

Bullshit Visualizations

Unconventional Visualizations

# Illegible Visualization



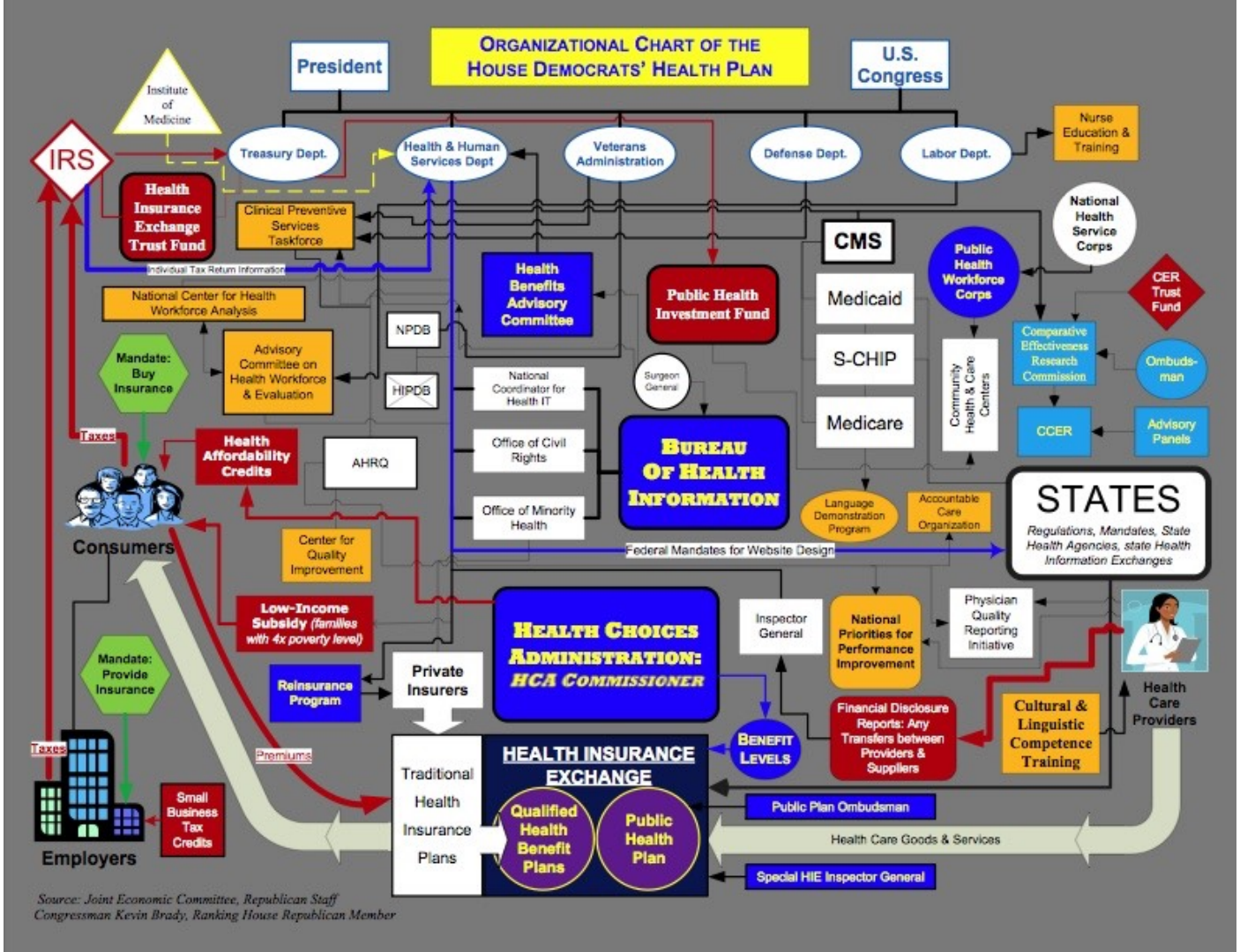
# *Interactive Weekly Unemployment Insurance Claims*

Initial_Claims_byCounty | Historical

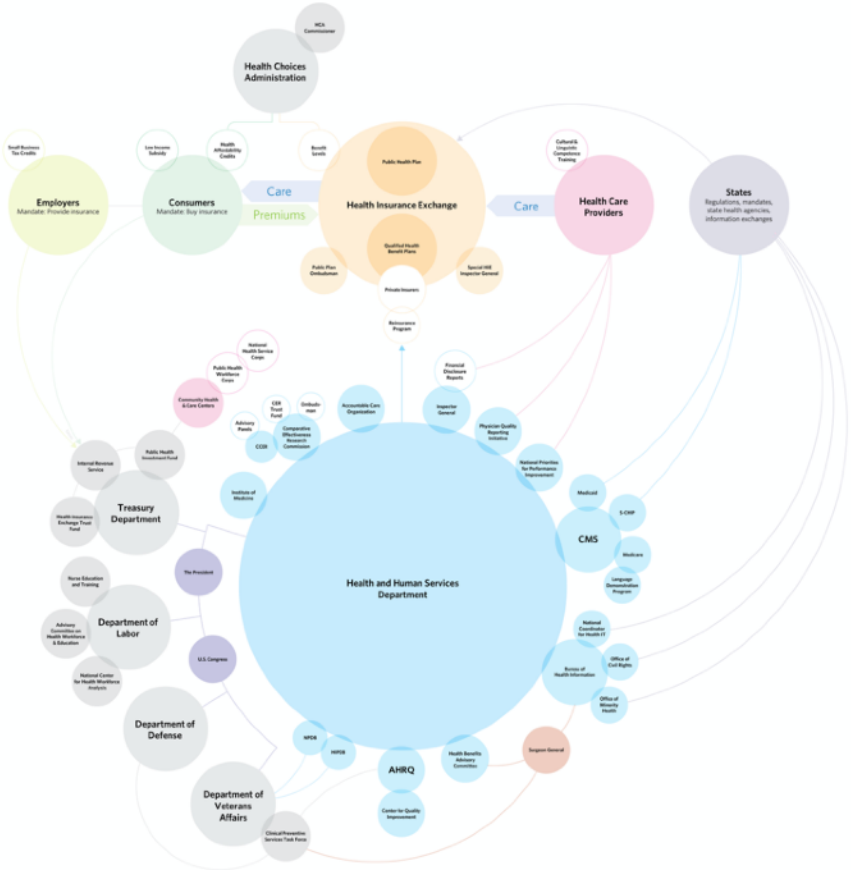
County
Total

| | |
|---|---|
| 2020-12-26 | 5,506 |
| 2021-01-02 | 10,986 |
| 2021-01-09 | 14,084 |
| 2021-01-16 | 11,983 |
| 2021-01-23 | 11,615 |
| 2021-01-30 | 12,664 |
| 2021-02-06 | 13,464 |
| 2021-02-13 | 12,087 |
| 2021-02-20 | 11,395 |
| 2021-02-27 | 11,624 |
| 2021-03-06 | 13,592 |
| 2021-03-13 | 16,506 |
| 2021-03-20 | 13,994 |
| 2021-03-27 | 18,710 |
| 2021-04-10 | 10,909 |
| 2021-04-17 | 8,983 |
| 2021-04-24 | 8,704 |
| 2021-05-01 | 10,325 |
| 2021-05-08 | 10,841 |
| 2021-05-15 | 9,377 |
| 2021-05-22 | 8,698 |
| 2021-06-05 | 7,290 |
| 2021-06-12 | 6,847 |
| 2021-06-19 | 7,108 |
| 2021-06-26 | 5,816 |
| 2021-07-03 | 7,295 |
| 2021-07-10 | 5,435 |
| 2021-07-17 | 4,254 |
| 2021-07-24 | 3,977 |
| 2021-07-31 | 6,793 |
| 2021-08-07 | 6,196 |
| 2021-08-14 | 5,469 |
| 2021-08-21 | 5,407 |
| 2021-08-28 | 5,431 |
| 2021-09-04 | 5,095 |

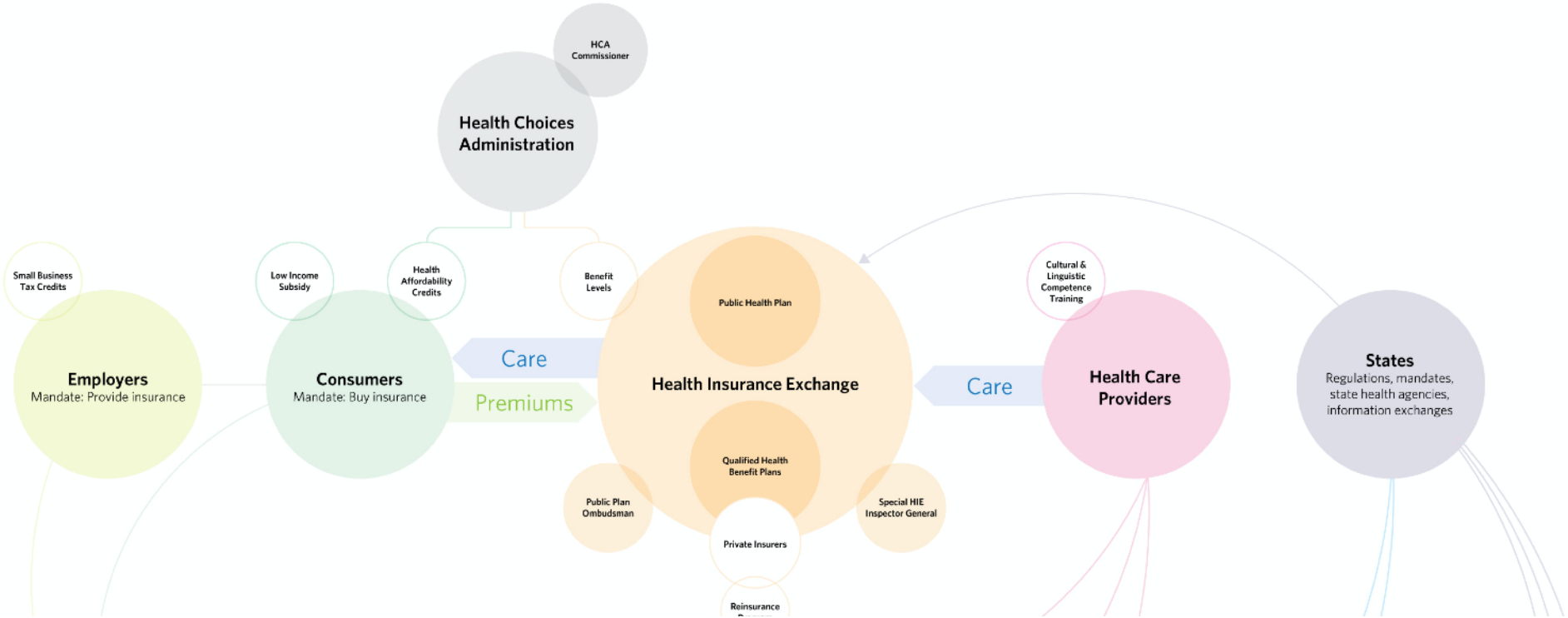
## Historical Initial Claims by Week


ORGANIZATIONAL CHART OF THE HOUSE DEMOCRATS' HEALTH PLAN
President
U.S. Congress
Institute of Medicine
IRS
Treasury Dept.
Health & Human Services Dept
Veterans Administration
Defense Dept.
Labor Dept.
Nurse Education & Training
Health Insurance Exchange Trust Fund
Clinical Preventive Services Taskforce
National Health Service Corps
CMS
Public Health Workforce Corps
CER Trust Fund
Individual Tax Return Information
National Center for Health Workforce Analysis
Health Benefits Advisory Committee
Public Health Investment Fund
Medicaid
S-CHIP
Medicare
Community Health & Care Centers
Comparative Effectiveness Research Commission
Ombuds-man
CCER
Advisory Panels
NPDB
HIPDB
Advisory Committee on Health Workforce & Evaluation
Mandate: Buy Insurance
National Coordinator for Health IT
Surgeon General
Office of Civil Rights
Office of Minority Health
BUREAU OF HEALTH INFORMATION
Taxes
Health Affordability Credits
AHRQ
Consumers
Language Demonstration Program
Accountable Care Organization
STATES
Regulations, Mandates, State Health Agencies, state Health Information Exchanges
Federal Mandates for Website Design
Center for Quality Improvement
Low-Income Subsidy (families with 4x poverty level)
HEALTH CHOICES ADMINISTRATION: HCA COMMISSIONER
Inspector General
National Priorities for Performance Improvement
Physician Quality Reporting Initiative
Mandate: Provide Insurance
Reinsurance Program
Private Insurers
Financial Disclosure Reports: Any Transfers between Providers & Suppliers
Cultural & Linguistic Competence Training
Health Care Providers
Taxes
Premiums
Traditional Health Insurance Plans
HEALTH INSURANCE EXCHANGE
Qualified Health Benefit Plans
Public Health Plan
BENEFIT LEVELS
Public Plan Ombudsman
Health Care Goods & Services
Special HIE Inspector General
Small Business Tax Credits
Employers
Source: Joint Economic Committee, Republican Staff
Congressman Kevin Brady, Ranking House Republican Member

# Organizational Chart of the House Democrats' Health Plan




"Do not fuck with graphic designers" – Robert Palmer




**“Do not fuck with graphic designers” – Robert Palmer**

# Illegible Visualizations

People will get lost in the details or overwhelmed by complexity

…if we make things intentionally complex people then people may just assume we know what we're talking about or will be too dazed to check too closely.

# Deceptive Visualizations

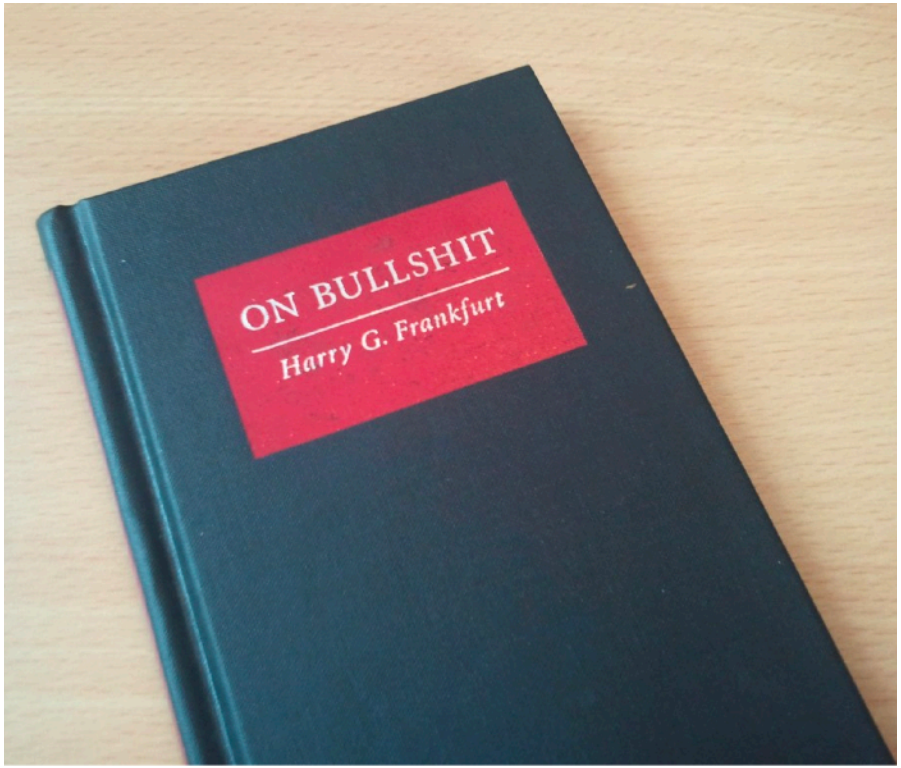
Incorrect Visualizations

Illegible Visualizations

**Bullshit Visualizations**

Unconventional Visualizations

# Bullshit Visualization




## Lie:

"No, officer, I wasn't speeding"

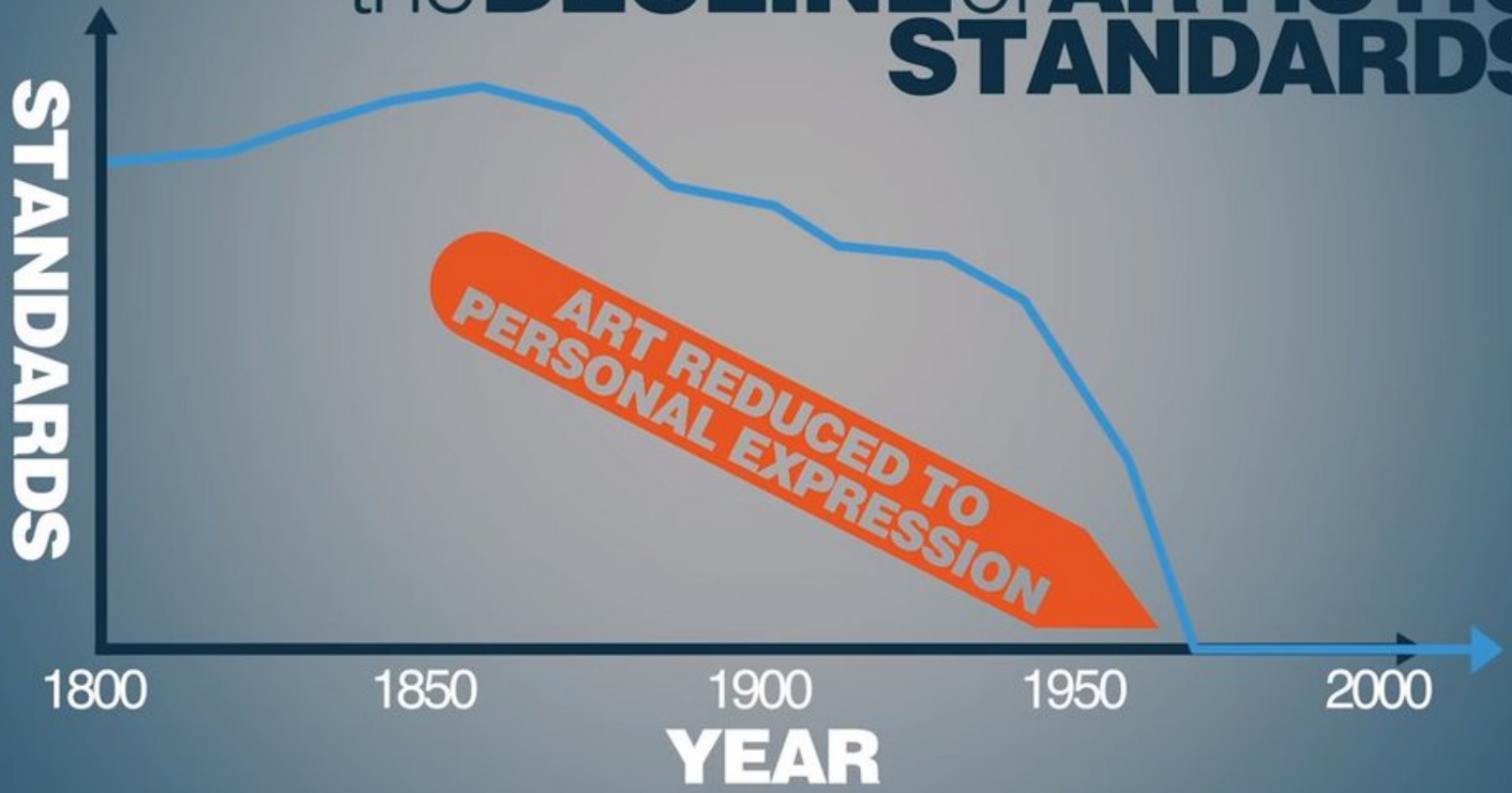
(you know the truth, but intentionally say something you know is untrue)

## Bullshit:

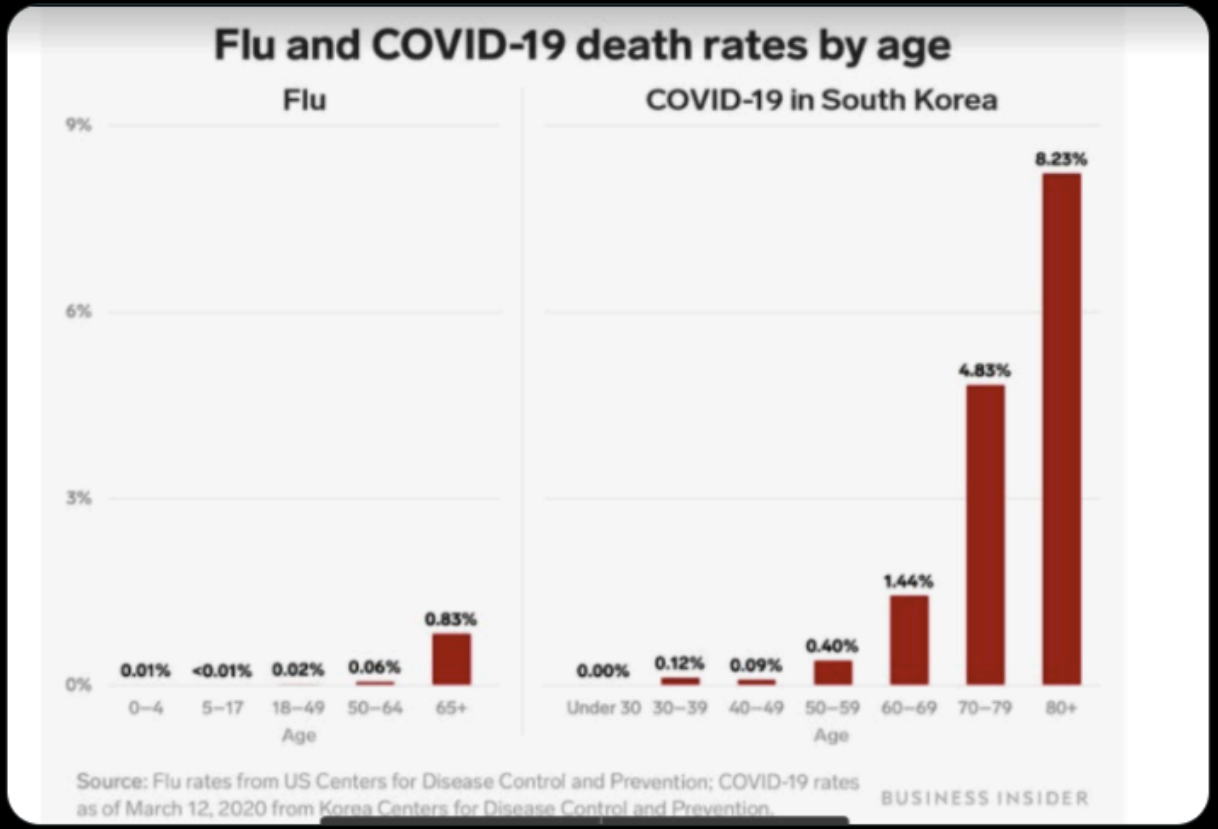
"The party was lame anyways, it's good I wasn't invited"

(you don't know or don't care about the truth, but intentionally say something you hope is persuasive)

# the DECLINE of ARTISTIC STANDARDS



For people under 60, coronavirus is LESS dangerous than the seasonal flu:



# Bullshit Visualizations

You can just make stuff up with no connection to reality

…show stuff that looks like data but isn’t

…assume a conclusion and pretend it’s true

…or give people data they can’t do anything with

# Deceptive Visualizations

Incorrect Visualizations

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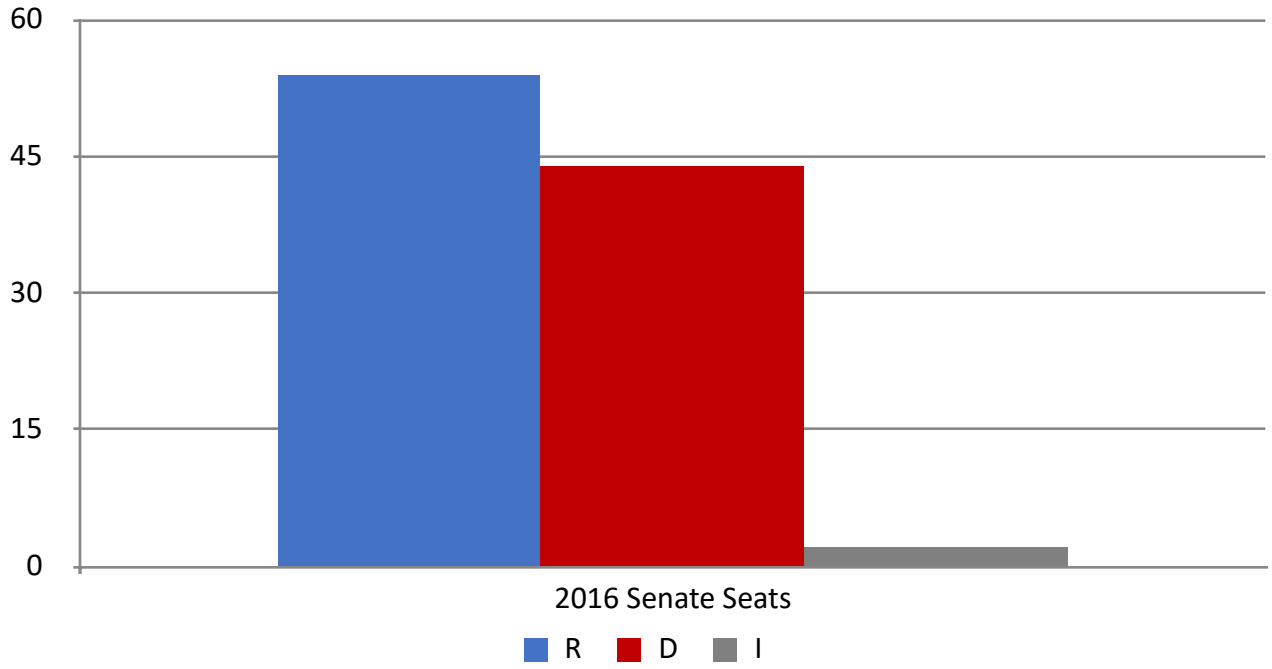
**Unconventional Visualizations**


60
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2016 Senate Seats
R
D
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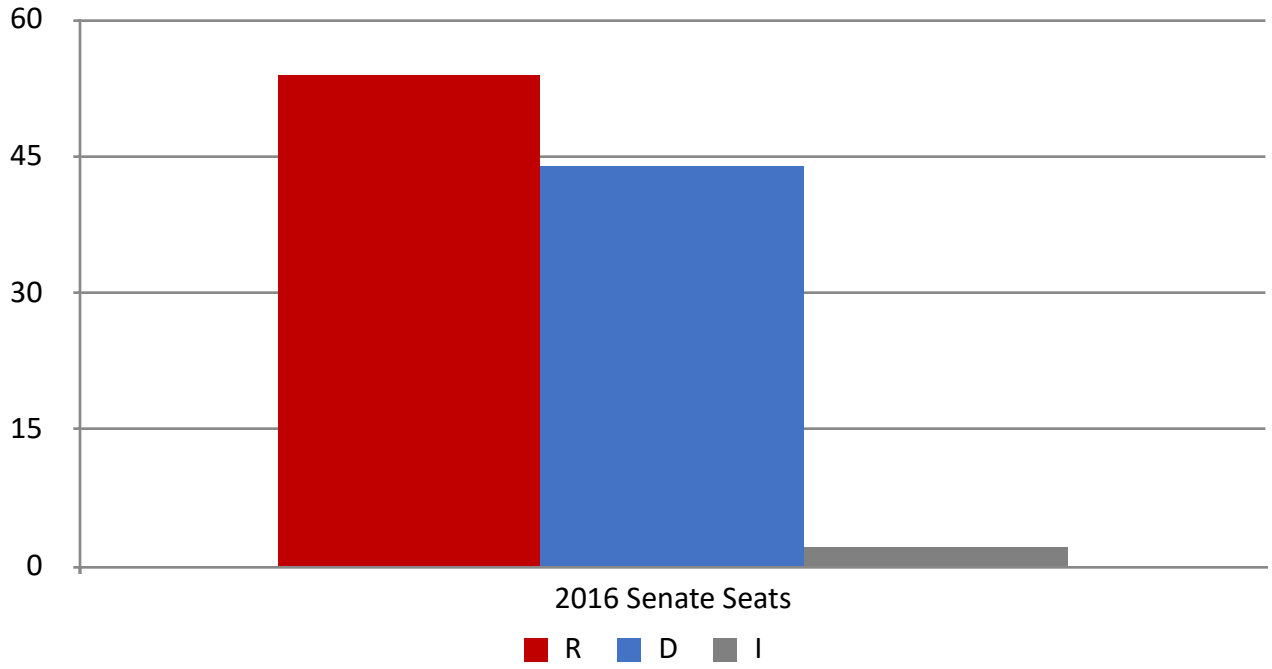
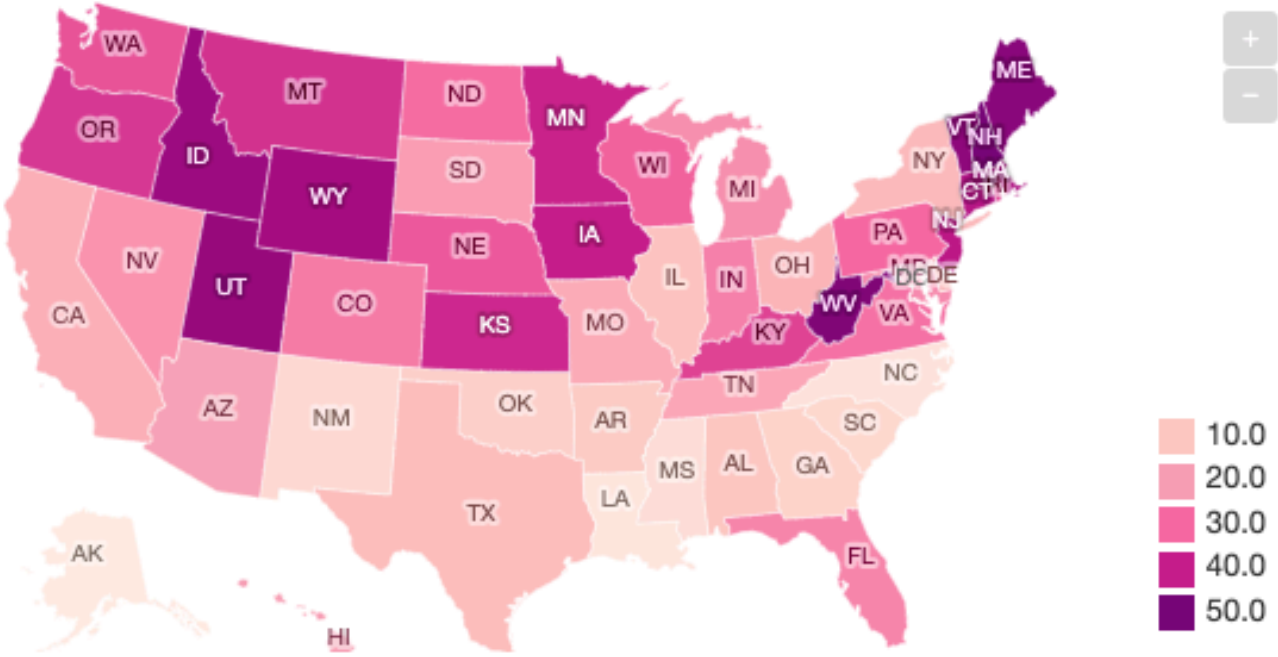
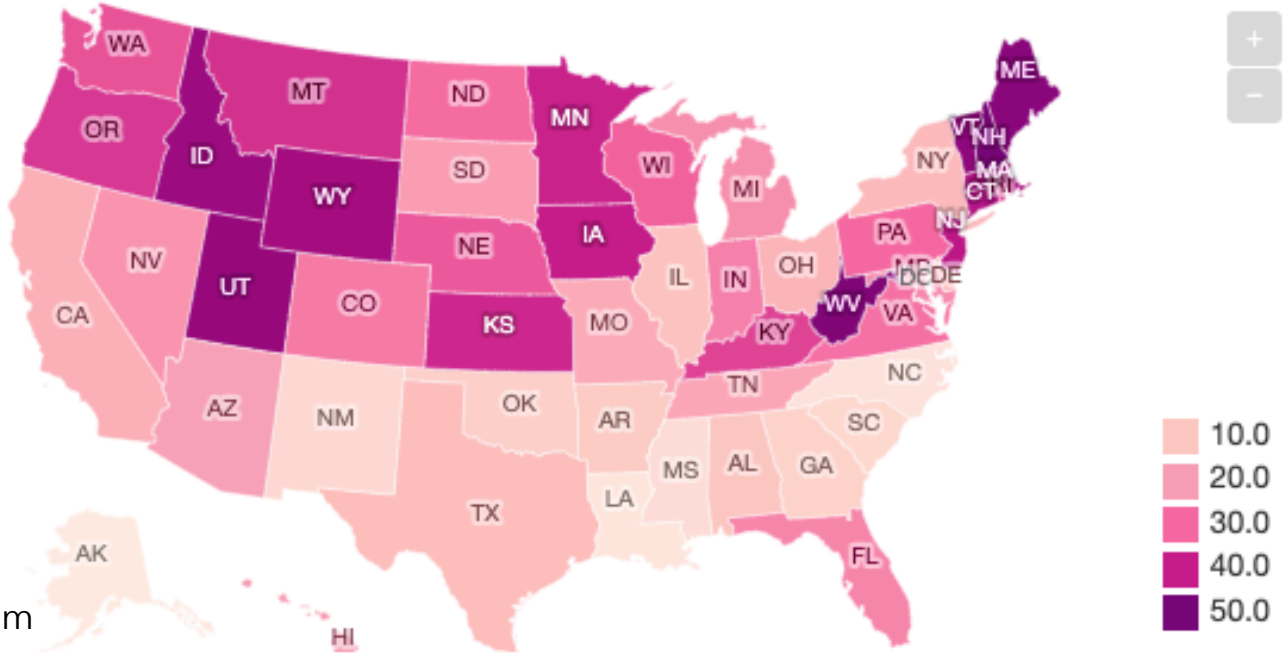

60
45
30
15
0
2016 Senate Seats
R
D
I

# Which states have the most STIs?



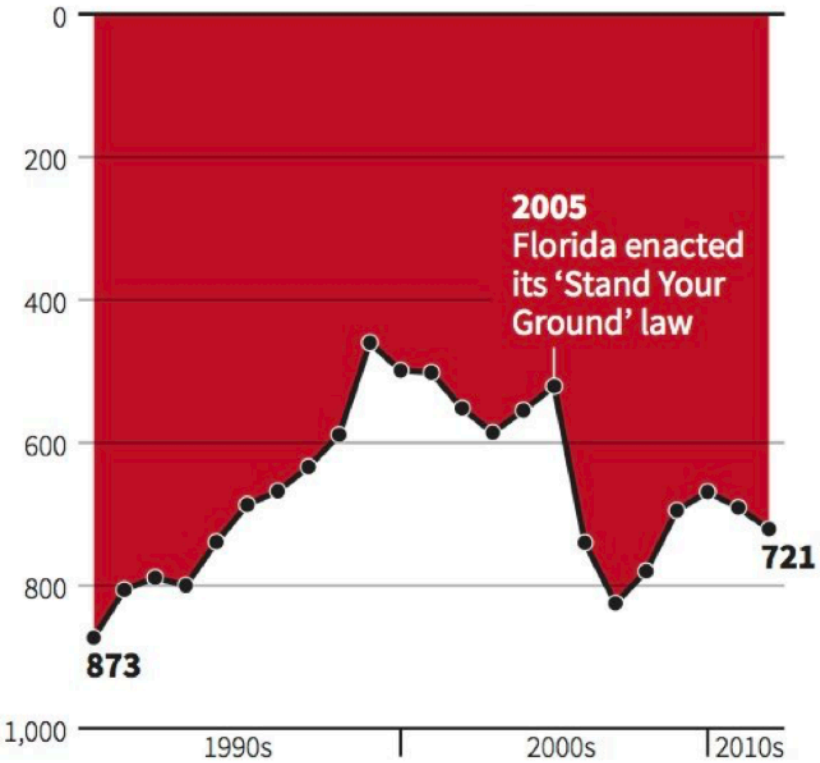
# Which states have the most STIs?




"Each state has been rated from one to 50: the higher the score, the smaller the proportion of STIs. So on the map - the darker the color, the smaller the rate of STIs."

# Gun deaths in Florida

Number of murders committed using firearms



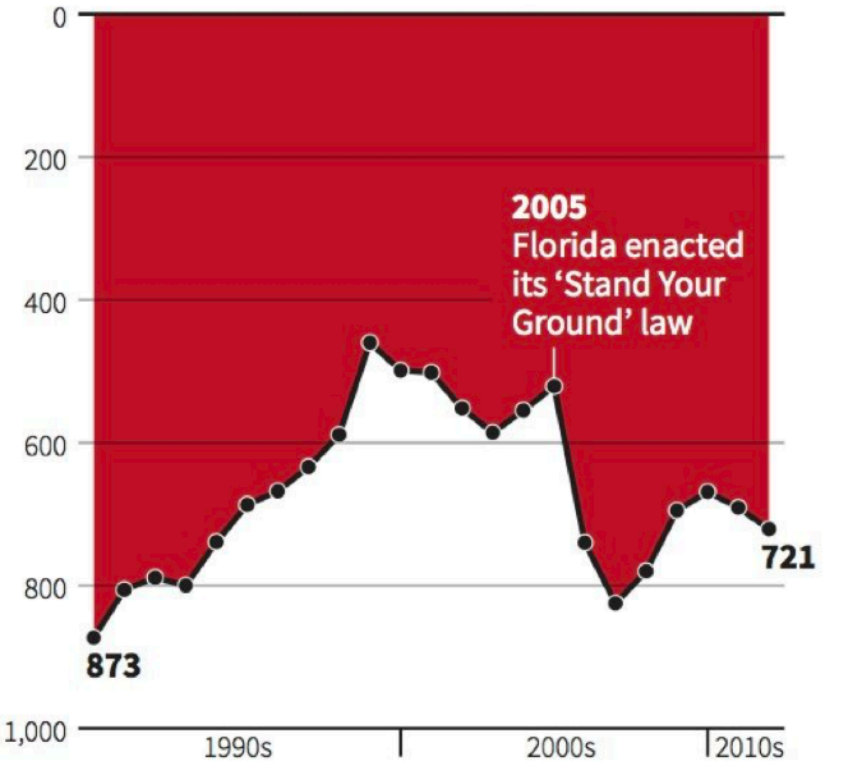

Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

# Gun deaths in Florida

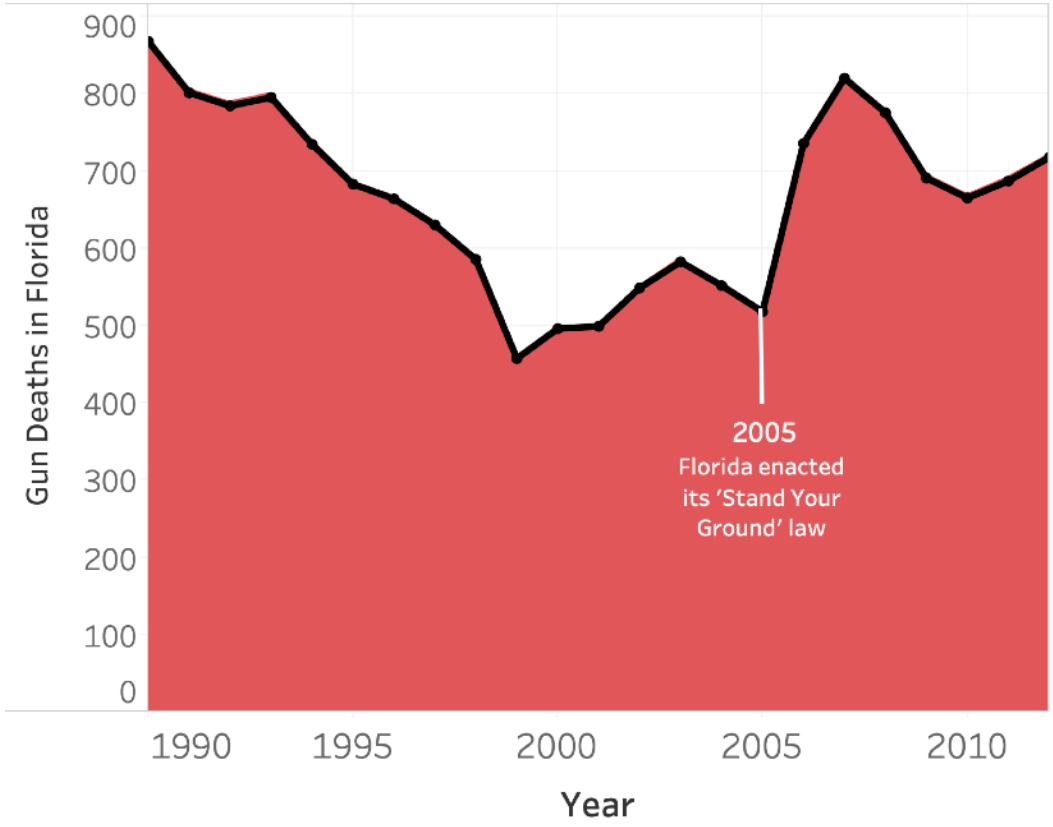
Number of murders committed using firearms




Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS



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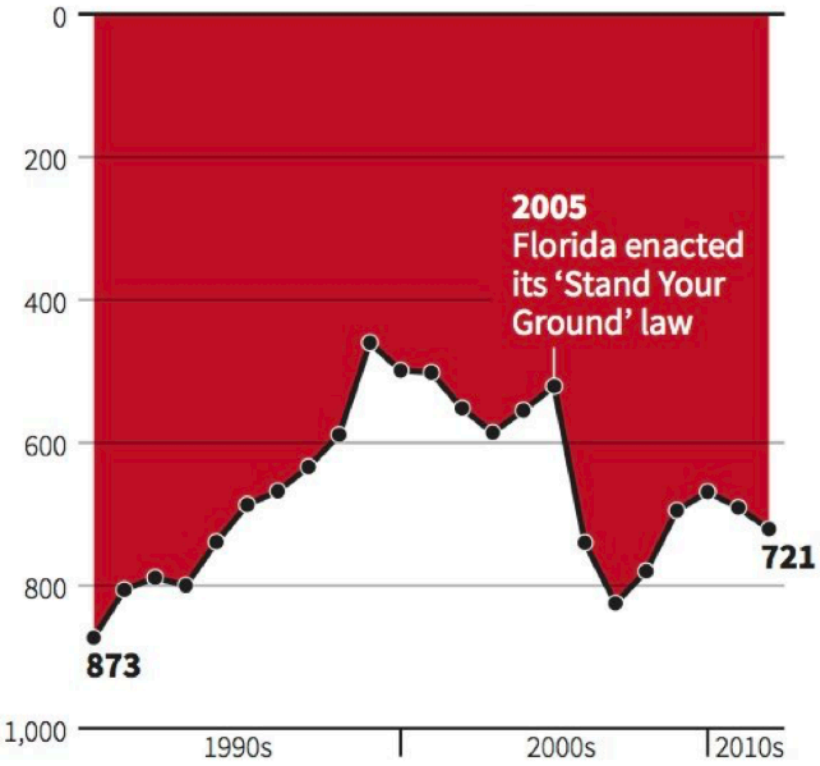
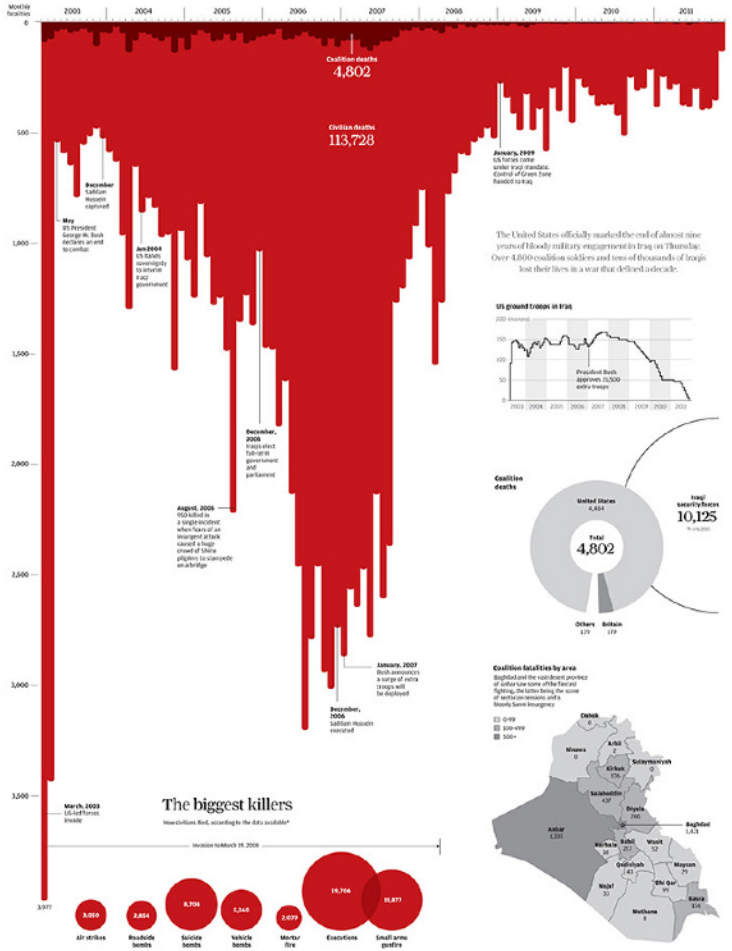



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

# Iraq's bloody toll



Visit us online at http://www.ithacatimes.com

# ITHACA TIMES

Planning Board approves Widewaters development

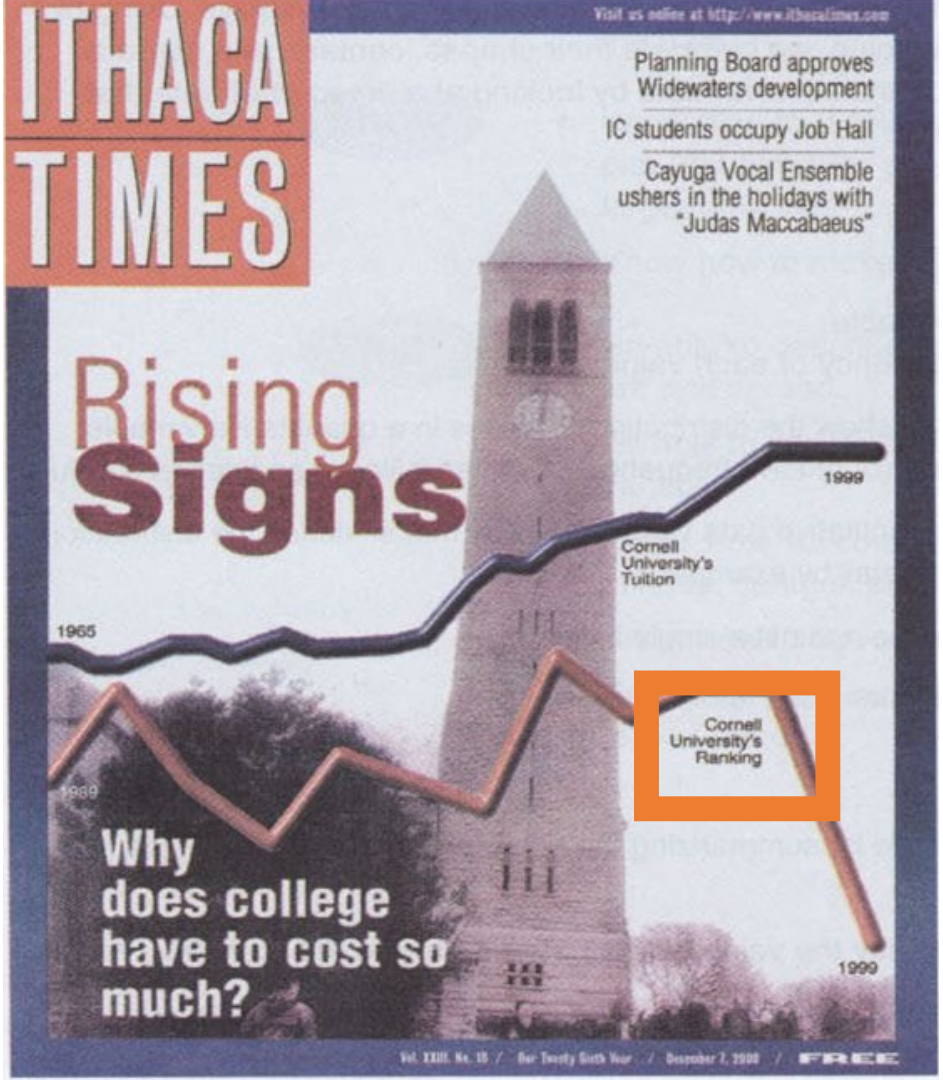
IC students occupy Job Hall

Cayuga Vocal Ensemble ushers in the holidays with "Judas Maccabaeus"

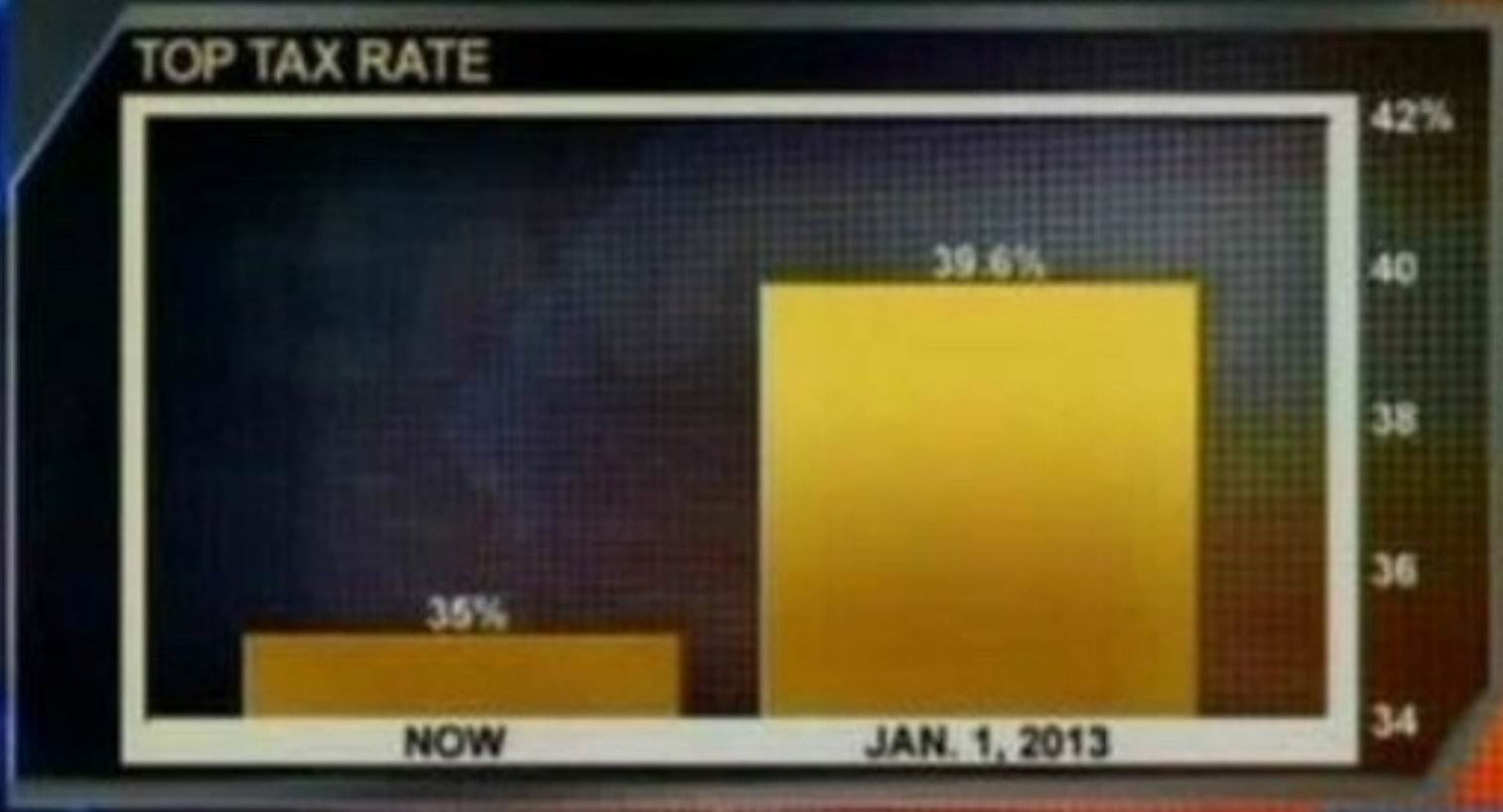
## Rising Signs

## Why does college have to cost so much?

Vol. XXIII, No. 18 / Our Twenty Sixth Year / December 7, 2000 / FREE


ITHACA TIMES
Visit us online at http://www.ithacatimes.com
Planning Board approves Widewaters development
IC students occupy Job Hall
Cayuga Vocal Ensemble ushers in the holidays with "Judas Maccabaeus"
Rising Signs
1999
Cornell University's Tuition
1965
Cornell University's Ranking
1969
1999
Why does college have to cost so much?
Vol. XXIII, No. 18 / Our Twenty Sixth Year / December 7, 2000 / FREE

IF BUSH TAX CUTS EXPIRE

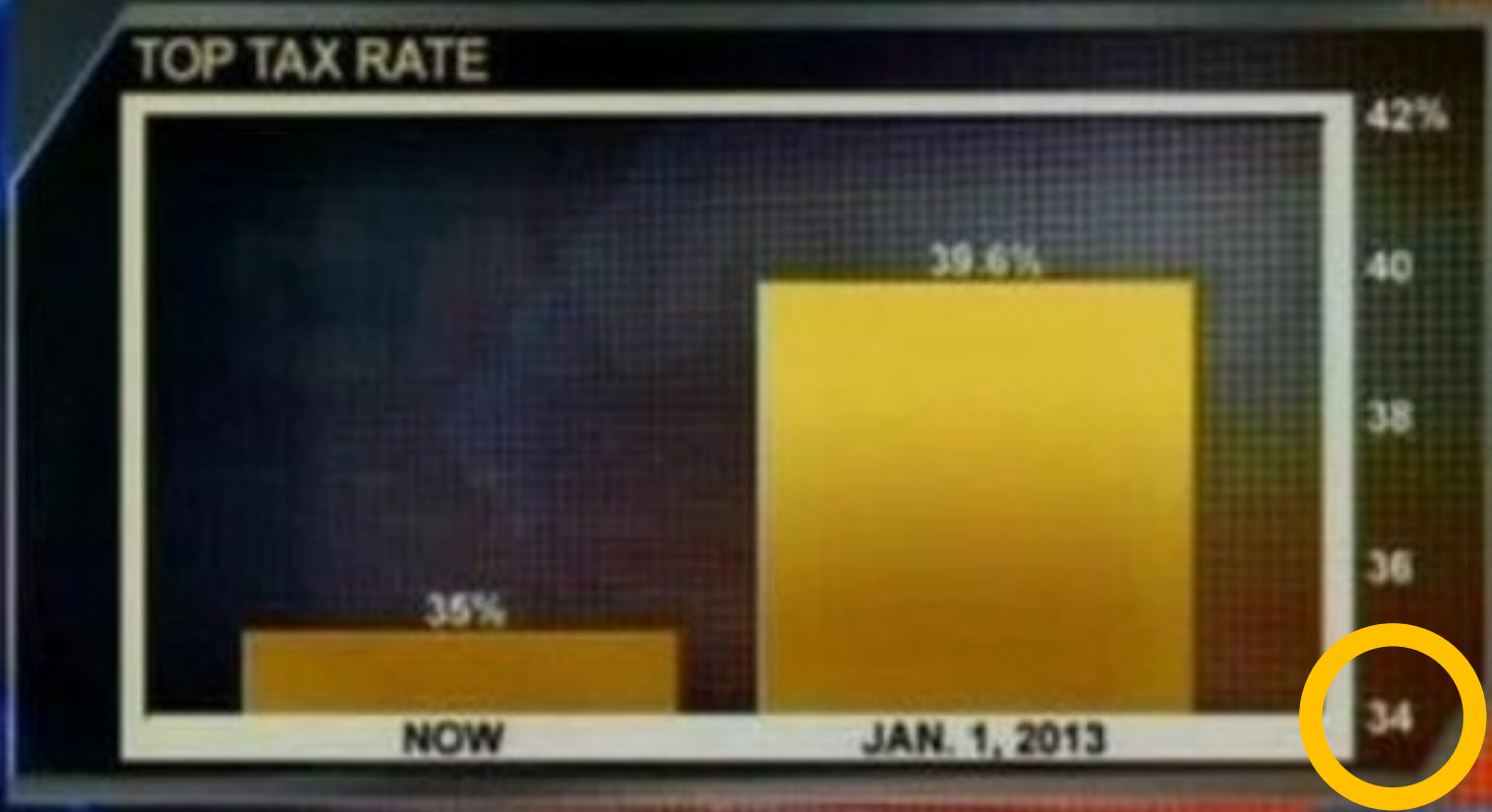



8:01p ET

FOX

TOP STORIES | TECHNOLOGY | CONSUMER

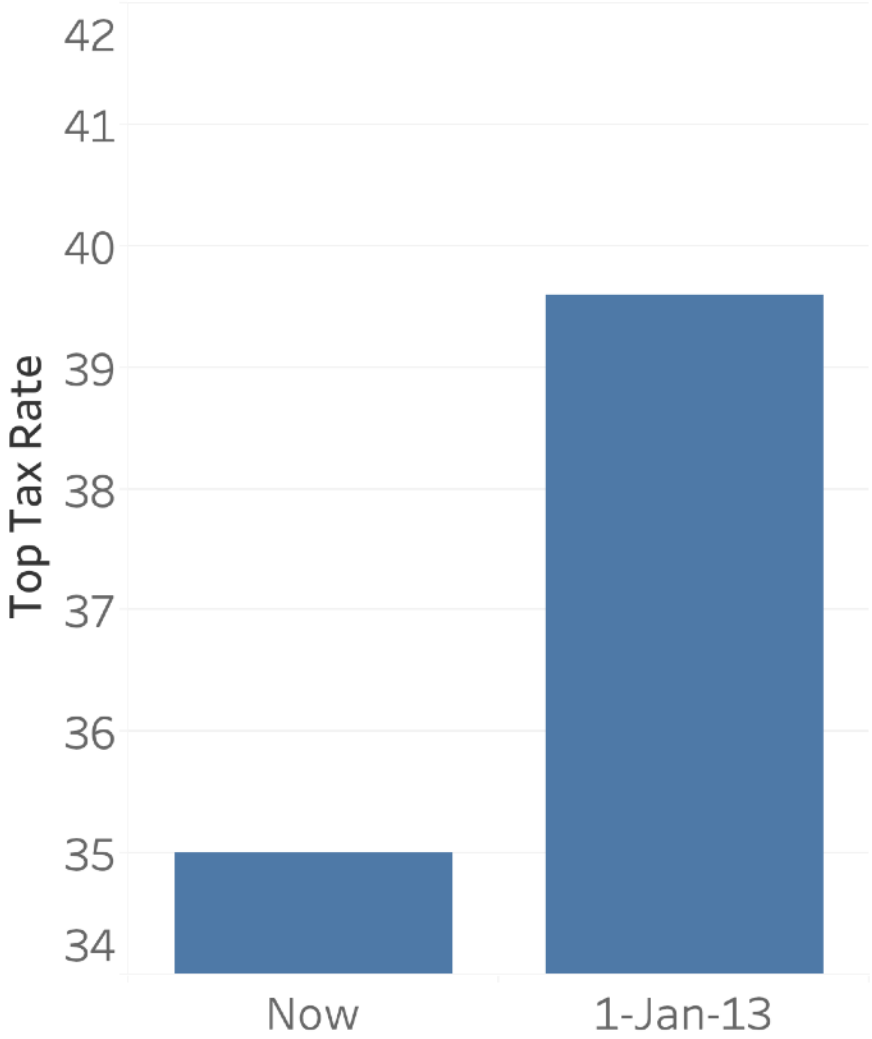
IF BUSH TAX CUTS EXPIRE

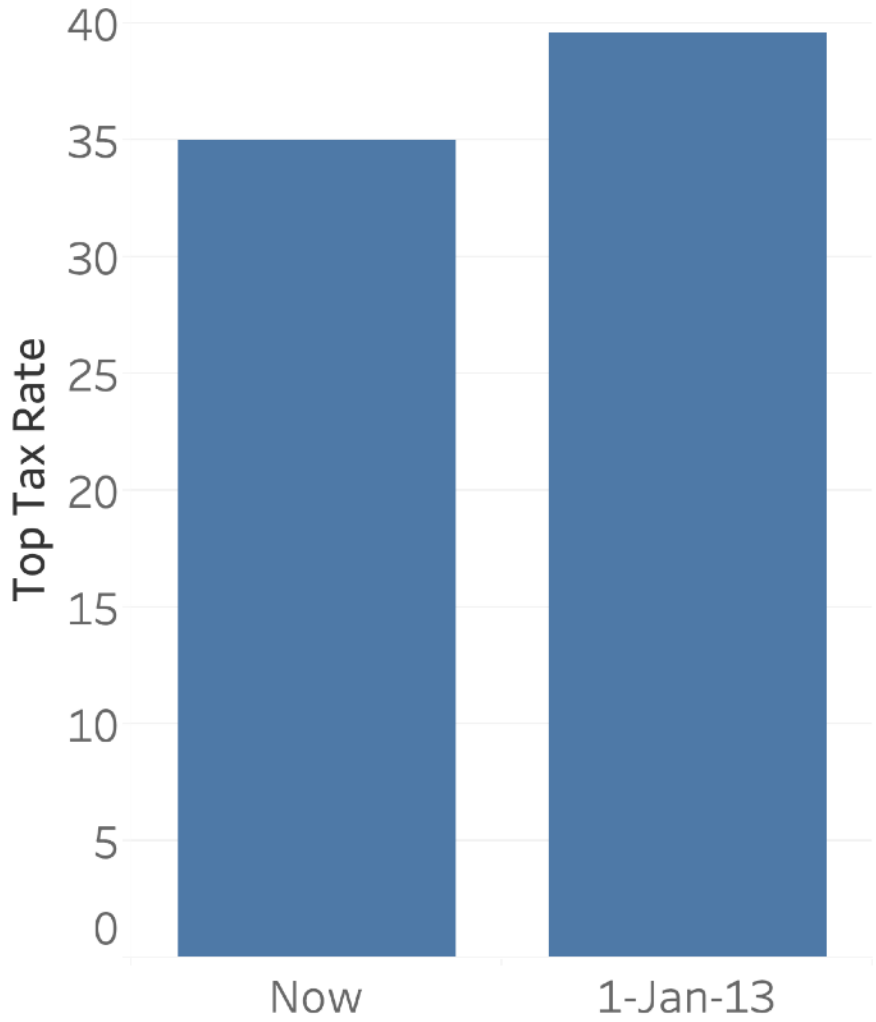


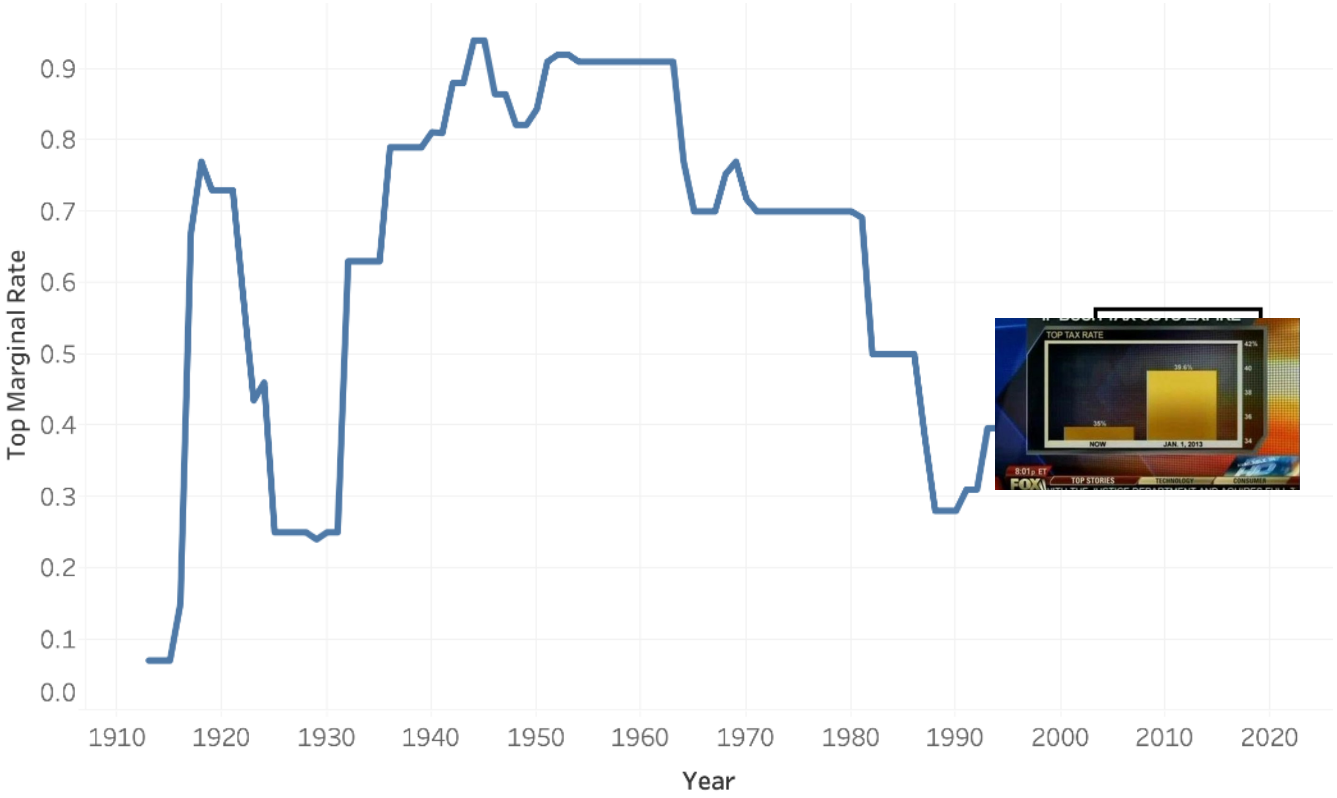

8:01p ET

FOX

TOP STORIES | TECHNOLOGY | CONSUMER


Top Tax Rate
42
41
40
39
38
37
36
35
34
Now
1-Jan-13


Top Tax Rate
40
35
30
25
20
15
10
5
0
Now
1-Jan-13


Top Marginal Rate
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
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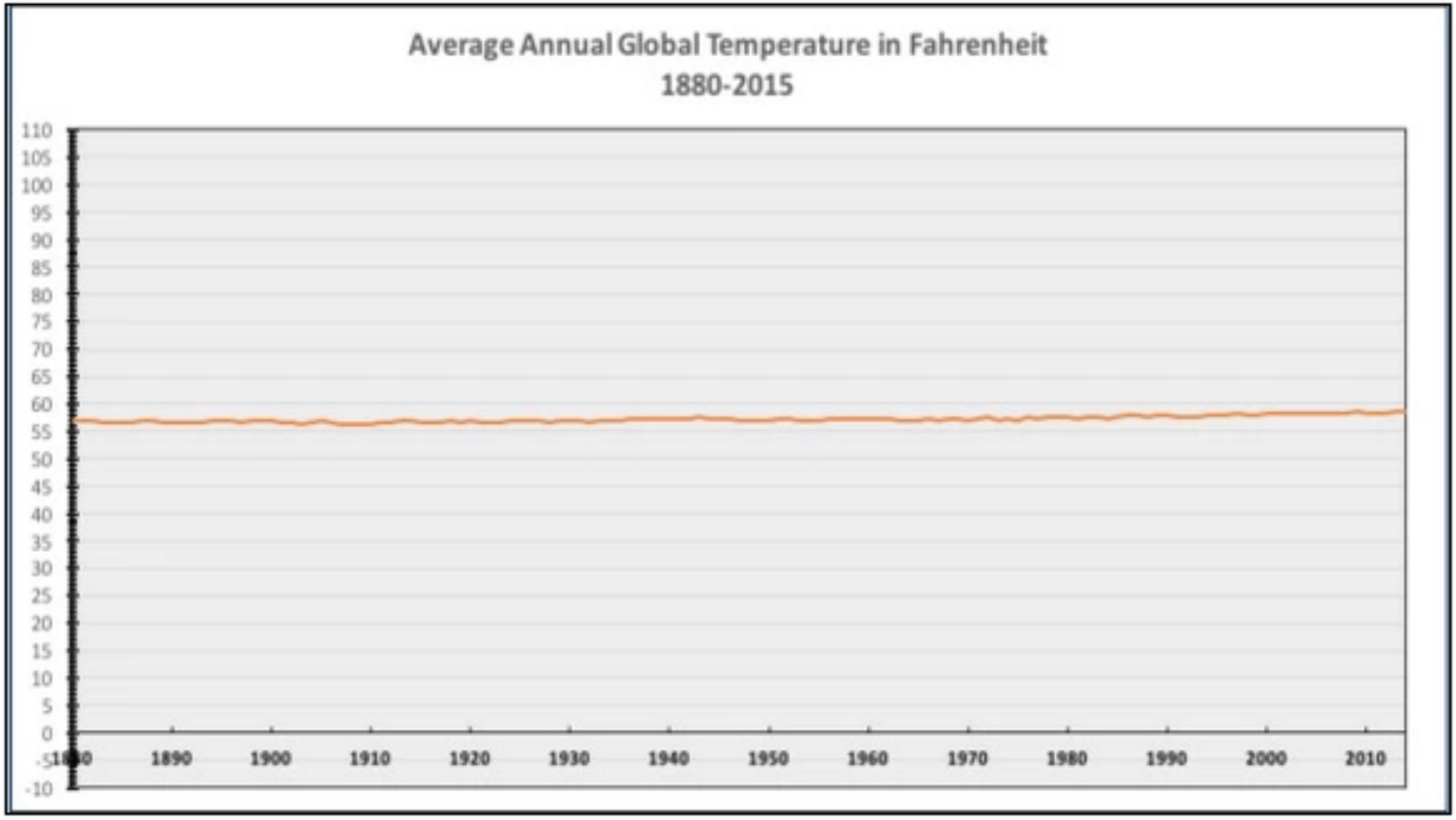
2020
Year
TOP TAX RATE
NOW
JAN. 1, 2013
TOP STORIES


Average Annual Global Temperature in Fahrenheit
1880-2015
110
105
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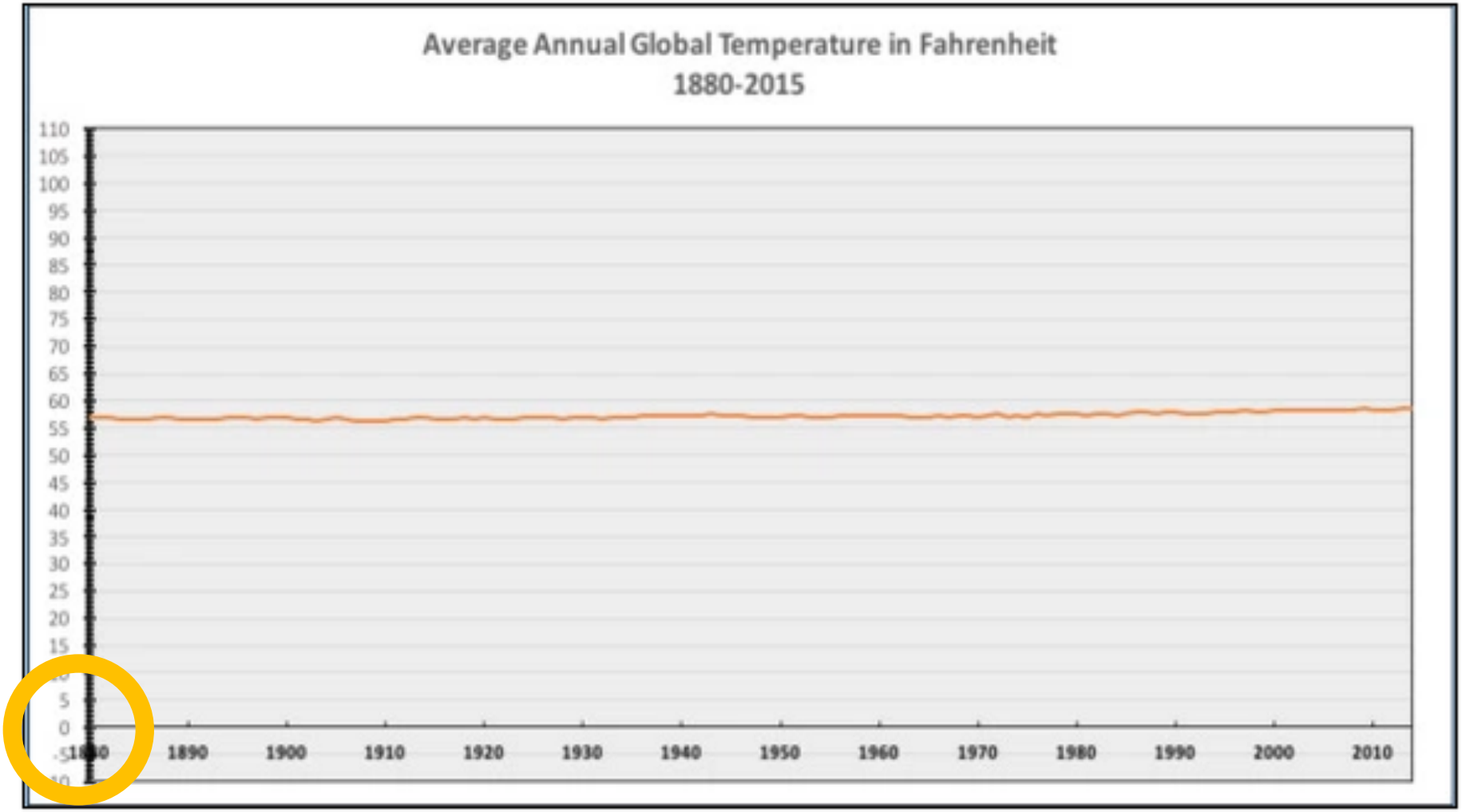
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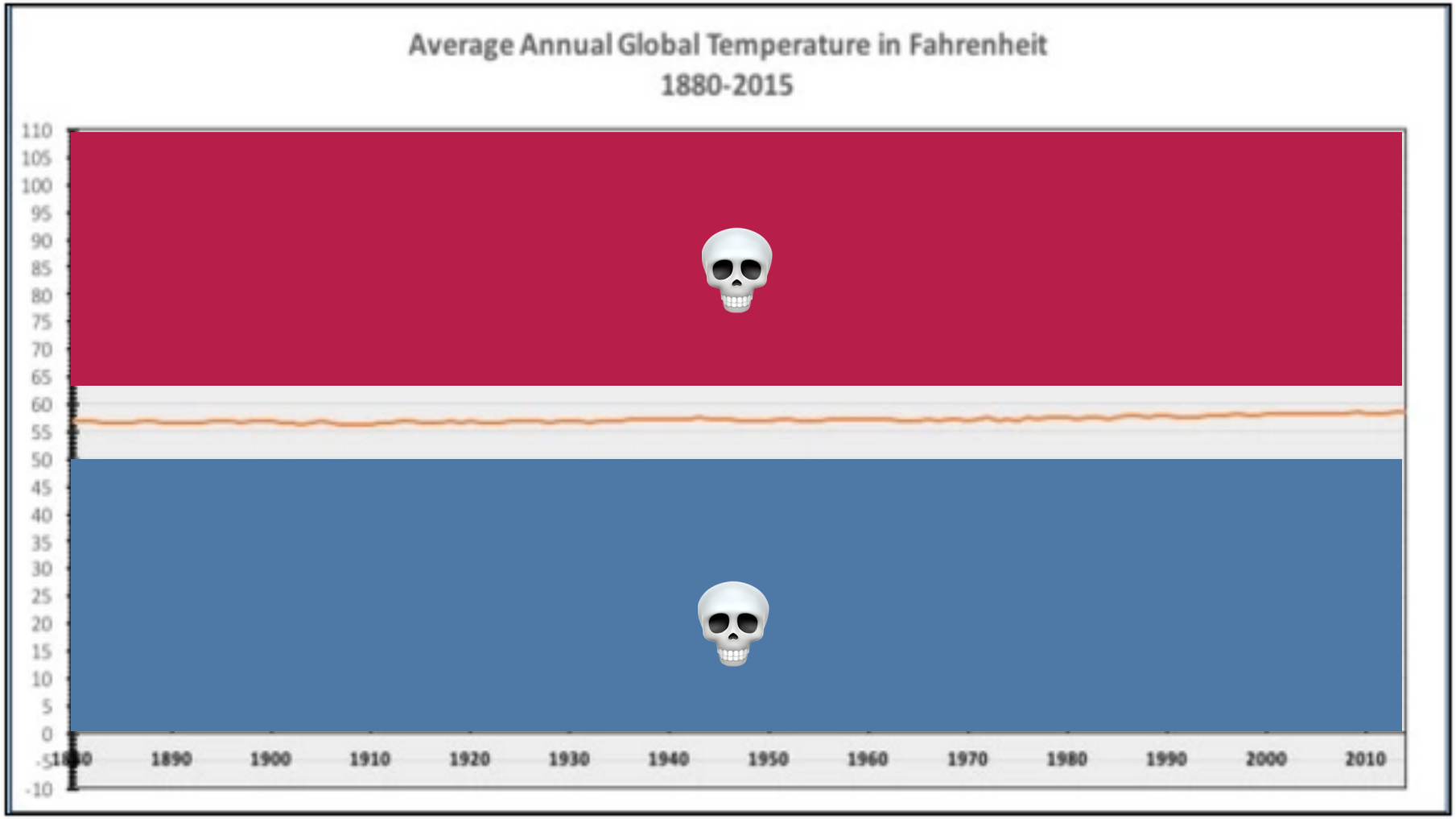
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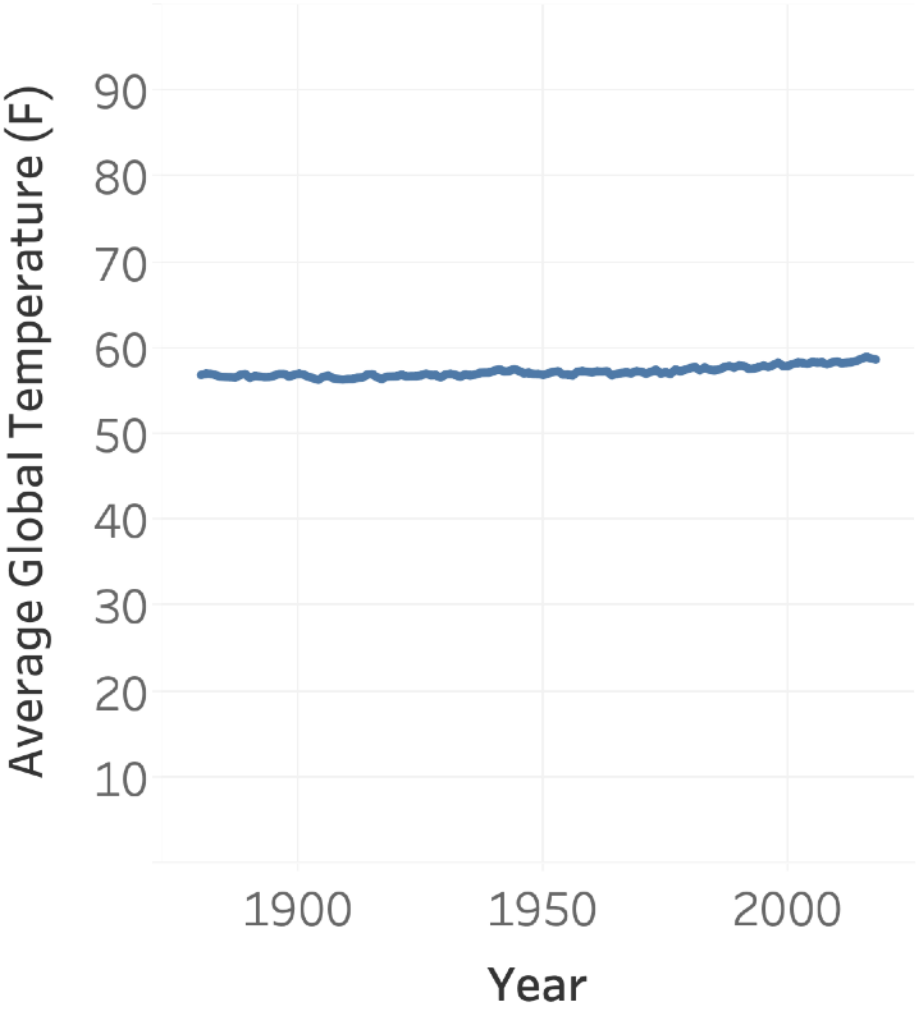
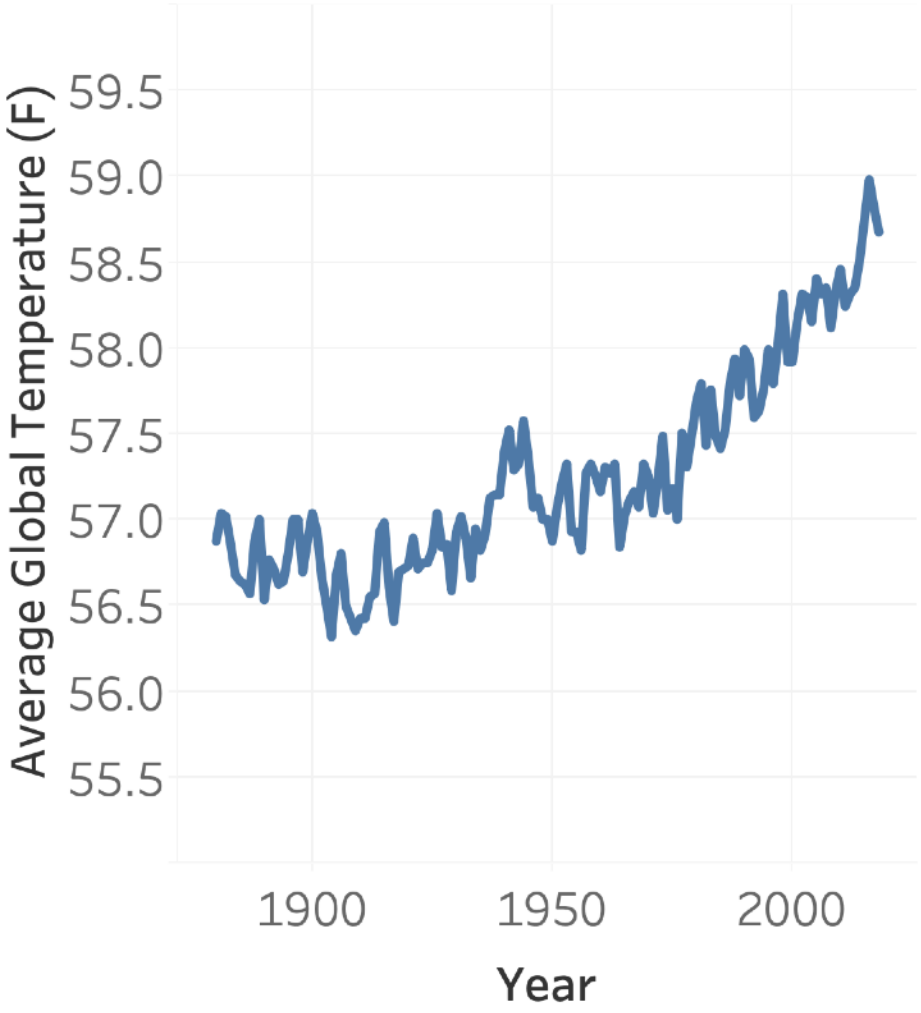
2010

NRO




NRO (Truncated)



# Unconventional Visualizations

People have tacit conventions on how they interpret charts (around colors, axes, slopes)

…if you violate those conventions, you can catch people off guard.

# Deceptive Visualization Wrap-Up

**Ways to mislead:**

Breaking assumptions, expectations, conventions, drowning people in details… or just making stuff up.

**Context matters:**

Not every chart that breaks a design “rule” is misleading

Not every chart that follows the design “rules” is truthful

# Administrivia

# A2: Deceptive Visualization

Design **two** static visualizations for a dataset:

1. An *earnest* visualization that faithfully conveys the data
2. A *deceptive* visualization that tries to mislead viewers

Your two visualizations may address different questions.

Try to design a deceptive visualization that appears to be earnest: *can you trick your classmates and course staff?*

You are free to choose your own dataset, but we have also provided some preselected datasets for you.

Submit two images and a brief write-up on Gradescope.

Due by **Wed 1/24 11:59pm**.