

assess visual representations

Applying what we know

Let's evaluate...

Car / Nation	USA	Japan	Germany	France	Sweden
Accord		x			
AMC Pacer	x				
Audi 5000			x		
BMW 320i			x		
Champ	x				
Chevy Nova	x				
Saab 9000					x

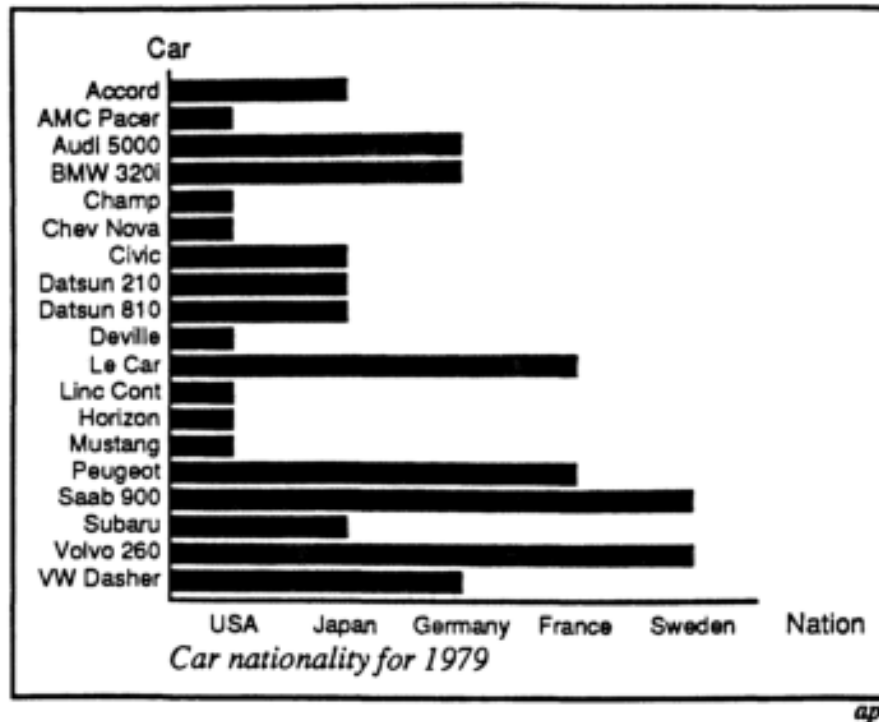
What kind of data are we looking at?

Nations: **Nominal**

Cars: **Nominal**

(Nation,Car): **Nominal**

Let's evaluate...

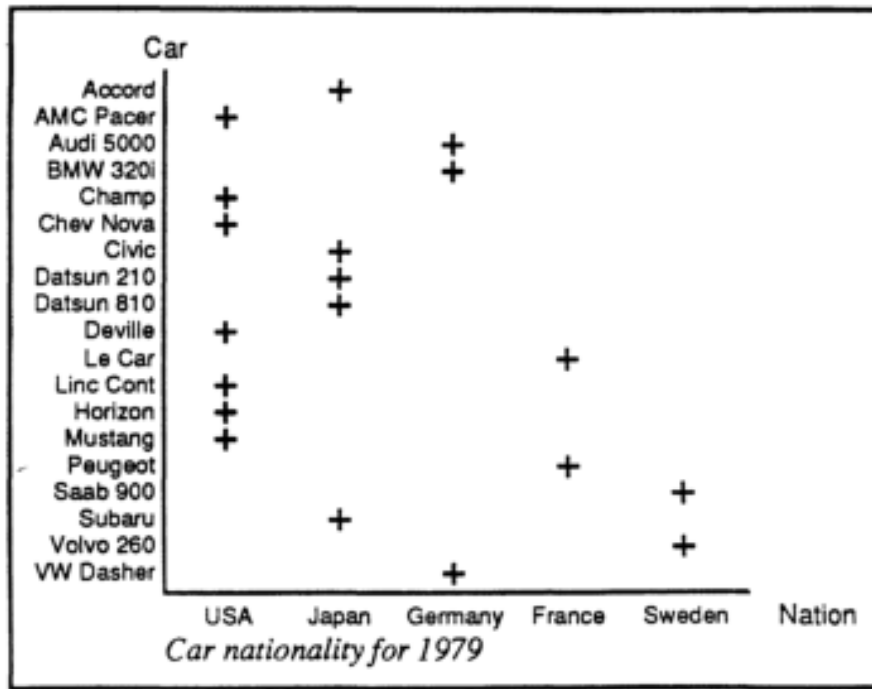


Quantitative	Ordinal	Nominal
Position	Position	Position
Length	Density	Color Hue
Angle	Color Saturation	Texture
Slope	Color Hue	Connection
Area	Texture	Containment
Volume	Connection	Density
Density	Containment	Color Saturation
Color Saturation	Length	Shape
Color Hue	Angle	Length
Texture	Slope	Angle
Connection	Area	Slope
Containment	Volume	Area
Shape	Shape	Volume

Problem:

Length of bar suggests an order or quantity (e.g. Swedish cars are better)

Let's evaluate...



apt



Quantitative

Ordinal

Nominal

- Position
- Length
- Angle
- Slope
- Area
- Volume
- Density
- Color Saturation
- Color Hue
- Texture
- Connection
- Containment
- Shape

- Position
- Density
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- Color Hue
- Texture
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- Length
- Angle
- Slope
- Area
- Volume
- Shape

- Position
- Color Hue
- Texture
- Connection
- Containment
- Density
- Color Saturation
- Shape
- Length
- Angle
- Slope
- Area
- Volume

Better!

Let's evaluate...

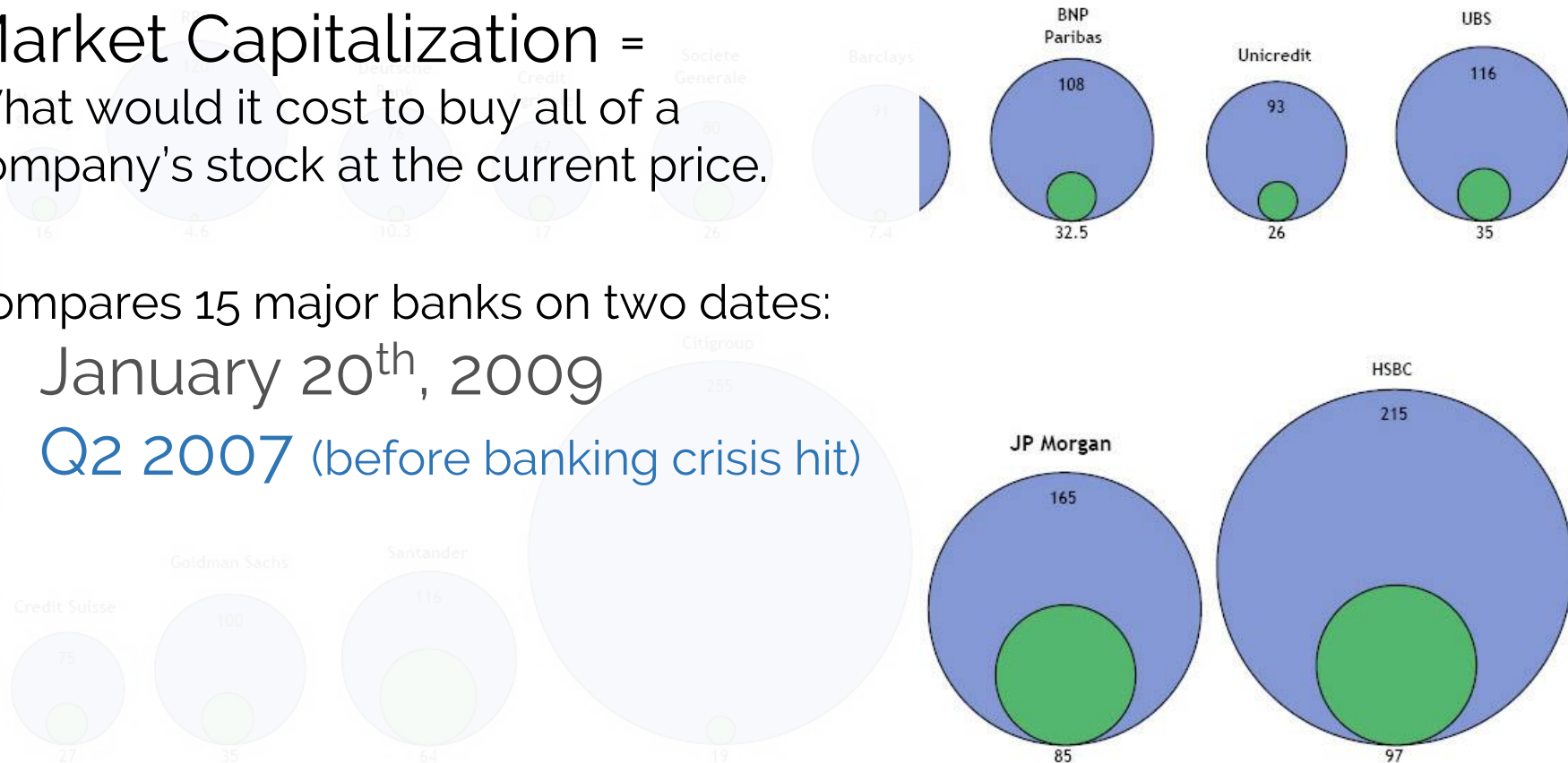
Banks: Market Cap

- Market Value as of January 20th 2009, \$Bn
- Market Value as of Q2 2007, \$Bn

Market Capitalization =
What would it cost to buy all of a
company's stock at the current price.

Compares 15 major banks on two dates:

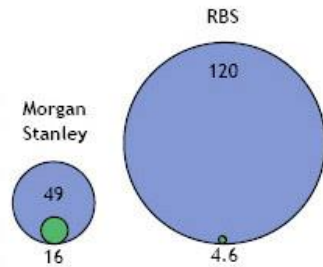
- January 20th, 2009
- Q2 2007 (before banking crisis hit)



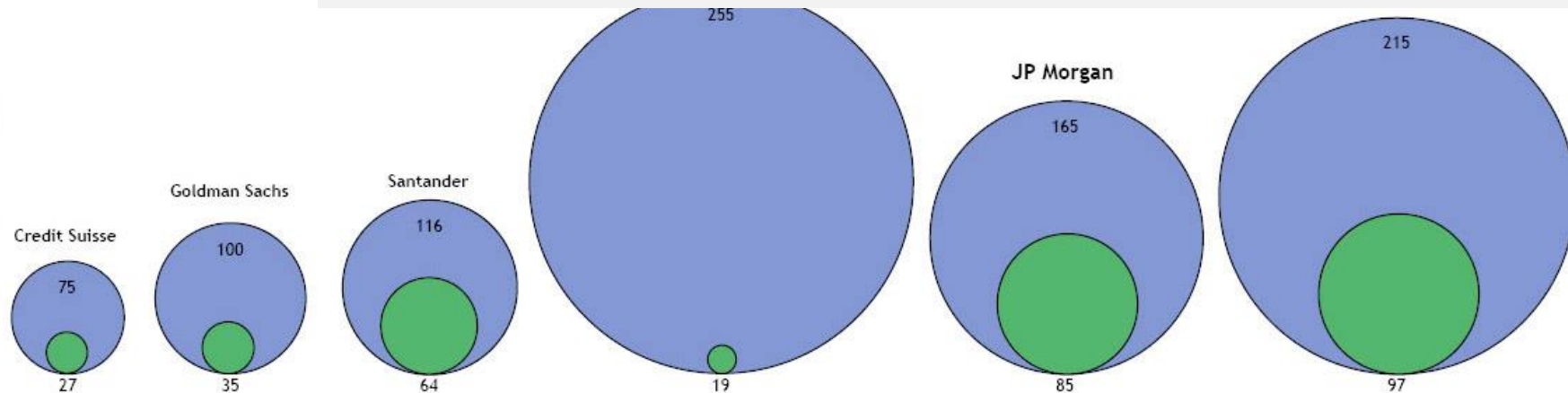
Problems here?

Banks: Market Cap

- Market Value as of January 20th 2009, \$Bn
- Market Value as of Q2 2007, \$Bn



We are not good at comparing areas.
(And the areas here are actually misleading!)

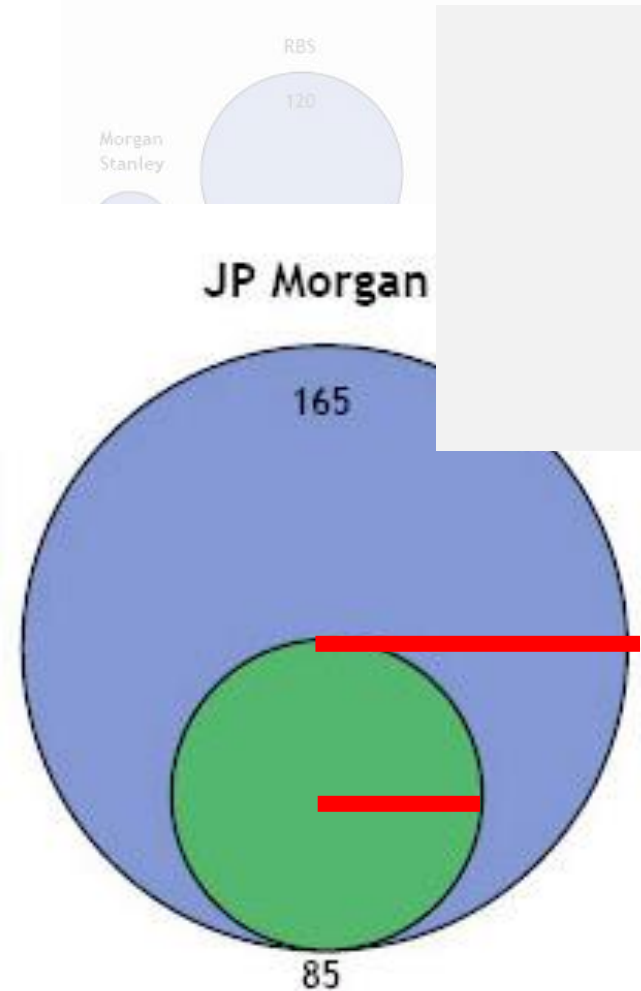


J.P.Morgan

Problems here?

Banks: Market Cap

- Market Value as of January 20th 2009, \$Bn
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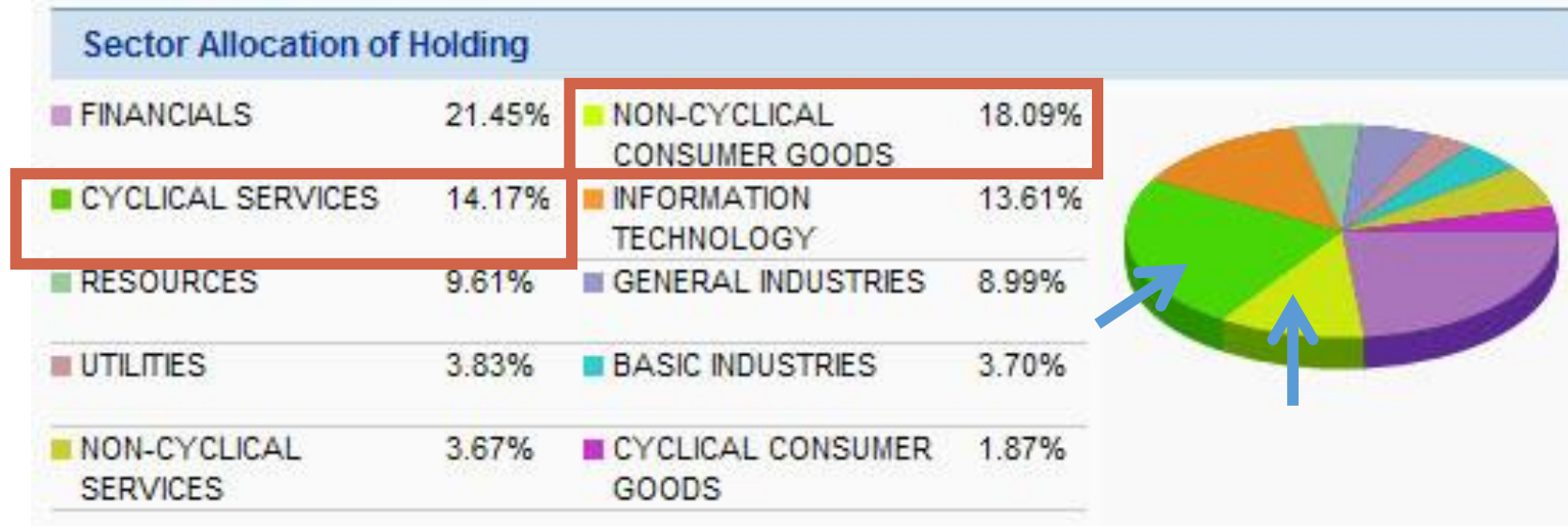
(And the areas here are actually misleading!)

$$85 / 165 = \sim 50\%$$

But this is actually the ratio of the radii, not the areas!

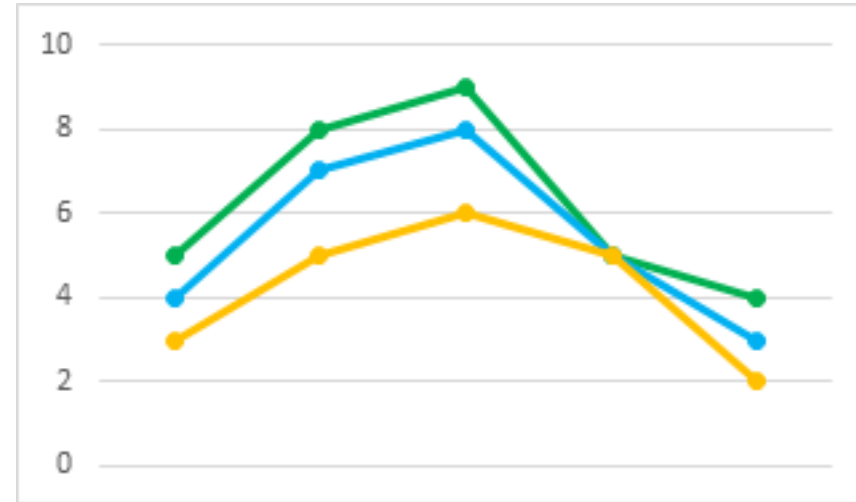
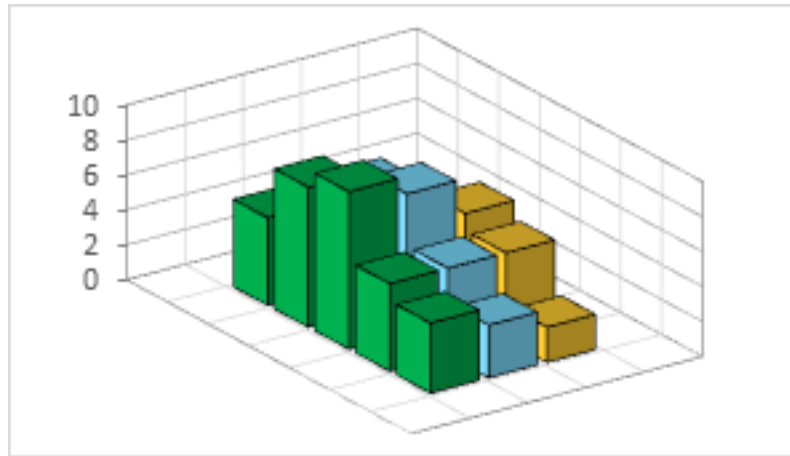
A bar chart would be better.

Problem here?

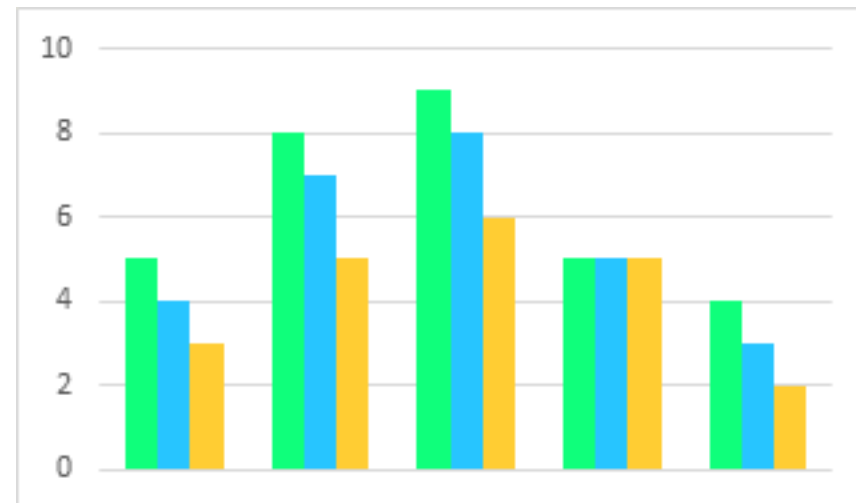


- There is likely a **bug or error** in the data
- Pie slices are difficult to compare by **area** or by **angle**
- **Similar colors** are difficult to distinguish
- **Perspective distortion** adds to the problem

Similarly...3D bar charts are not recommended



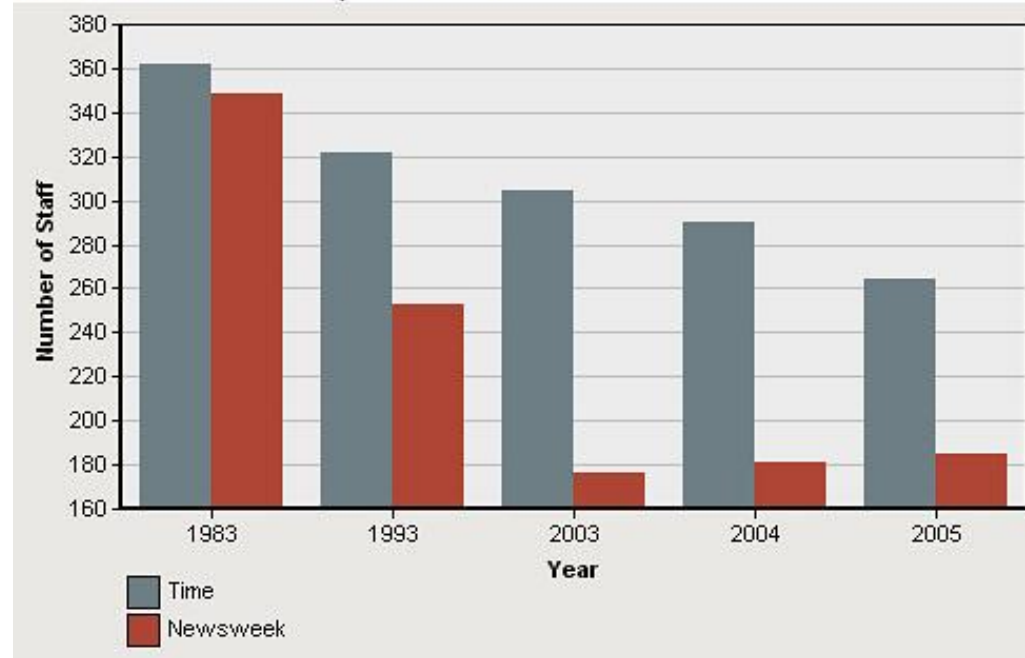
These are **much easier** to read & compare!



Problem here?

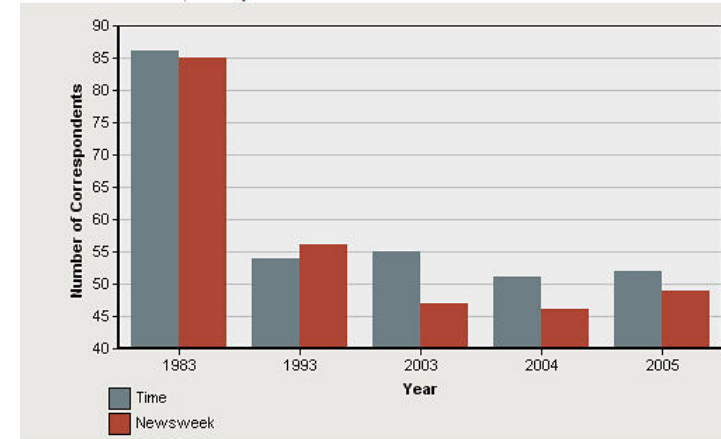
NEWS MAGAZINE STAFF SIZE OVER TIME

Time and Newsweek select years 1983 - 2005



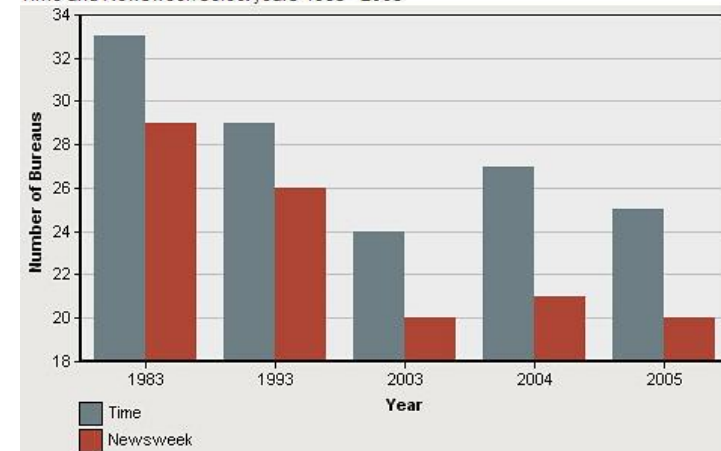
NUMBER OF CORRESPONDENTS IN BUREAUS OVER TIME

Time and Newsweek, select years 1983 - 2005

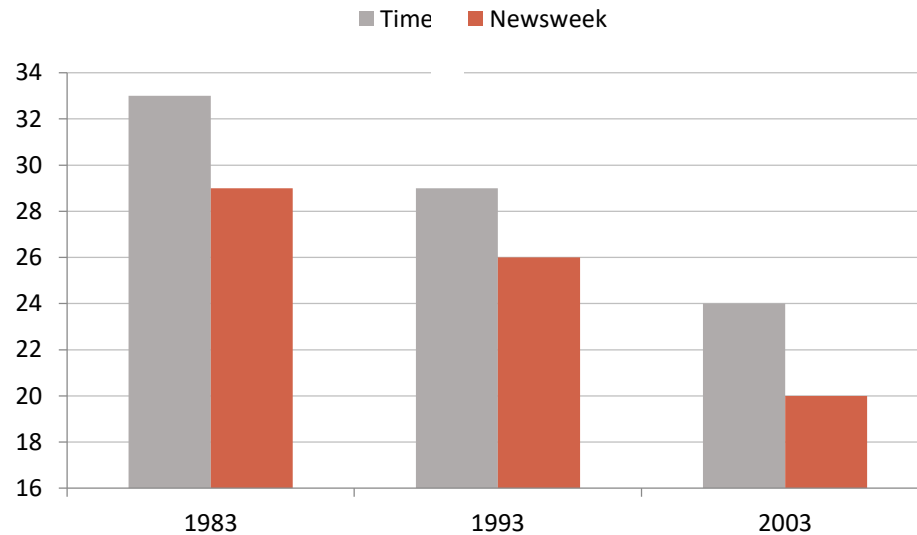


NEWS MAGAZINE BUREAUS OVER TIME

Time and Newsweek select years 1983 - 2005

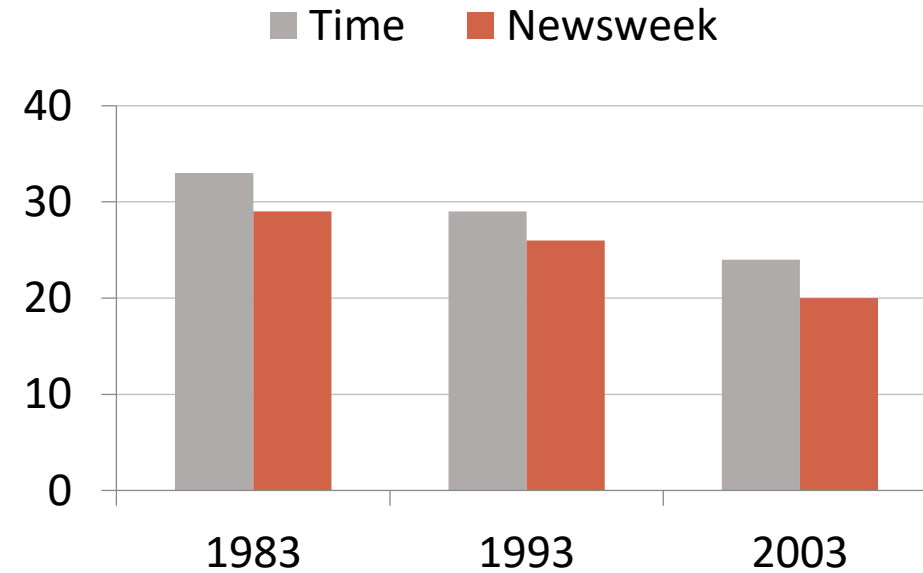


Length Comparison



At first glance:

- A huge overall decline
- In 2003, Newsweek is 50% of Time



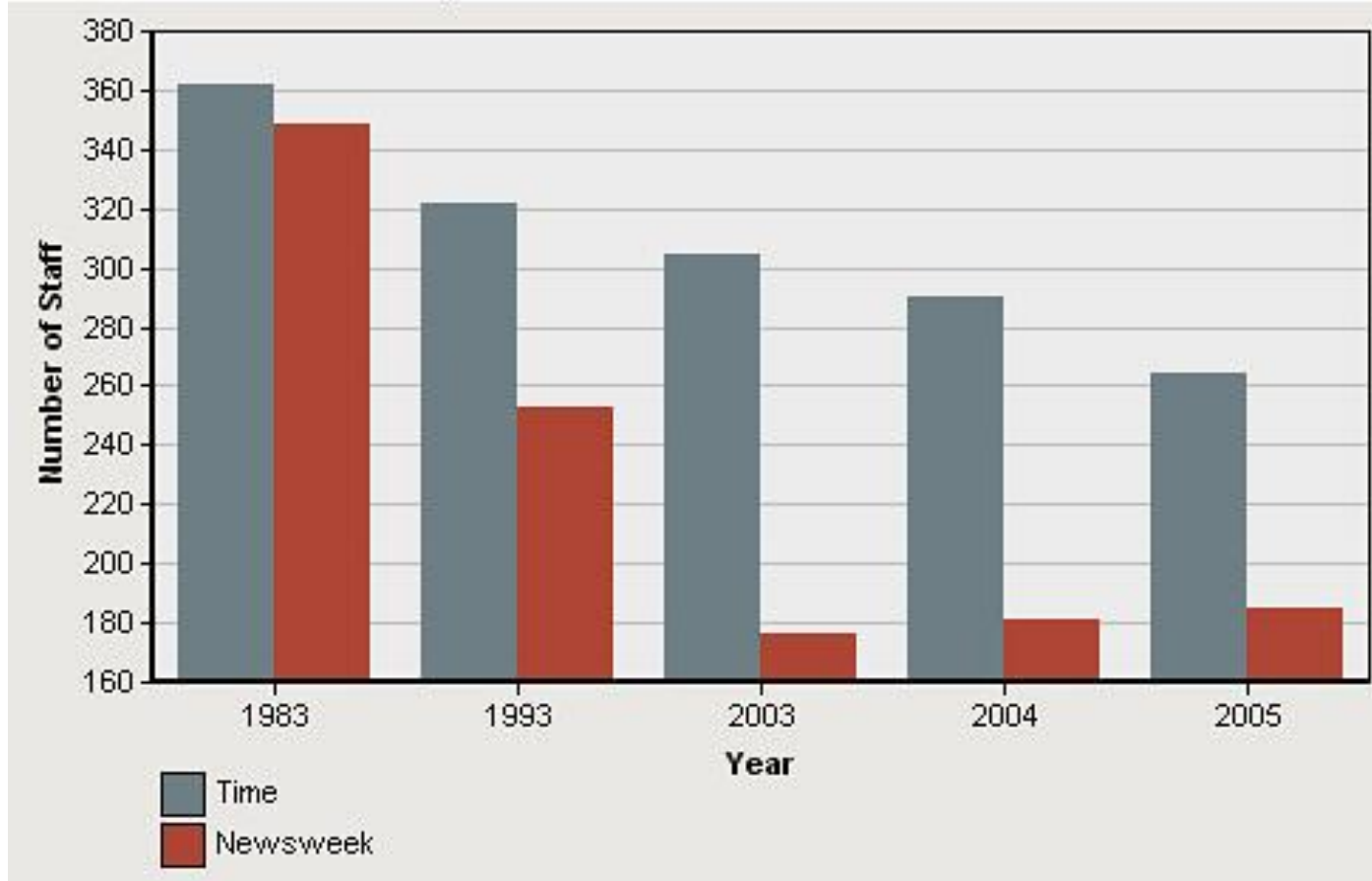
If we add a proper baseline at 0:

- The downward trend is less severe
- 2003: Newsweek is ~80% of Time

Moreover...

NEWS MAGAZINE STAFF SIZE OVER TIME

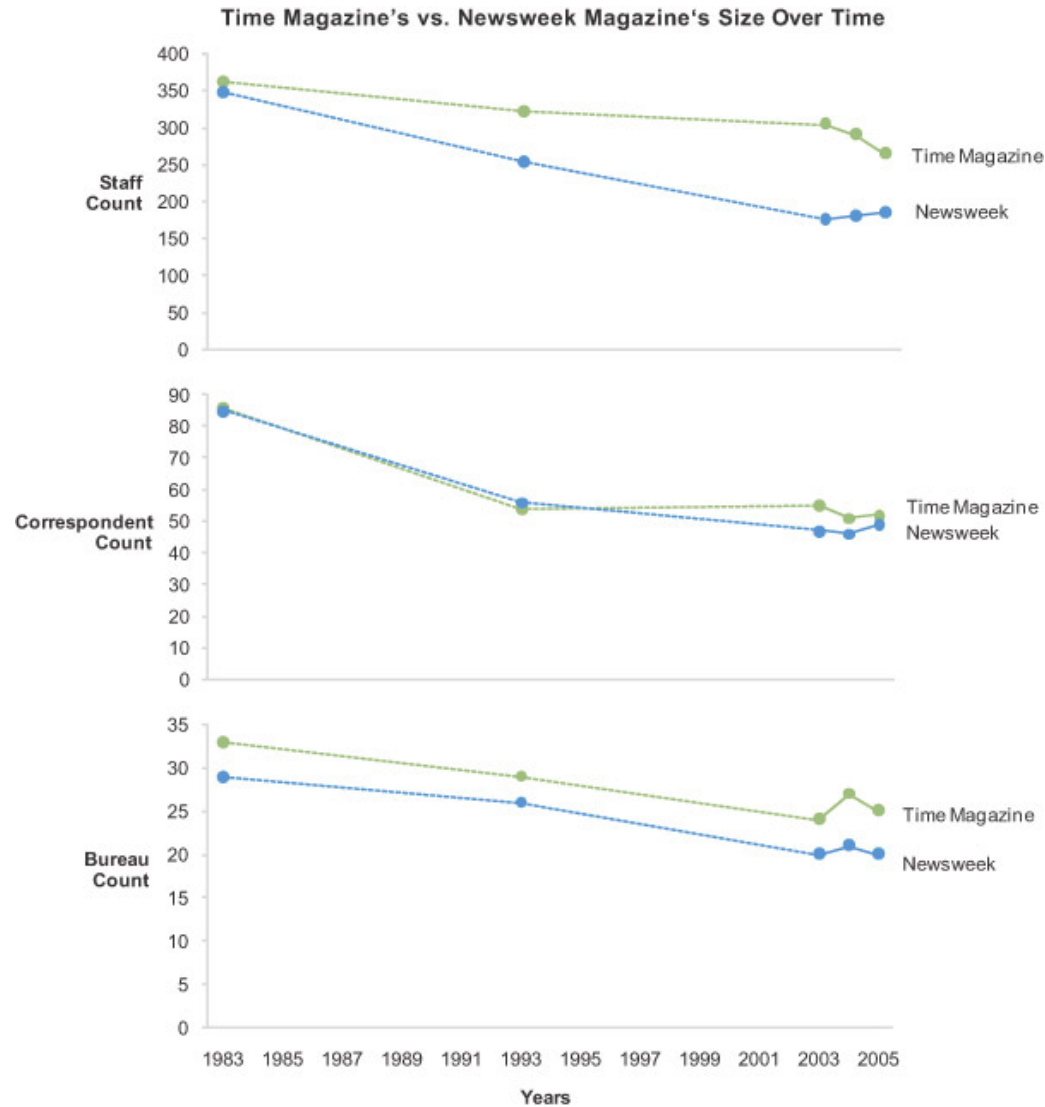
Time and Newsweek select years 1983 - 2005



10 years each

1 year each

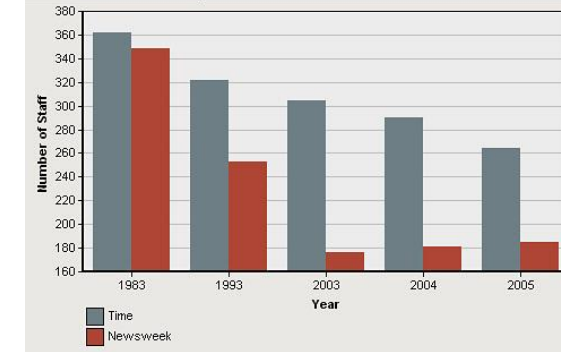
Redesign (by Stephen Few)



Note: A dashed line connecting two points indicates that there are years between the points for which values were not available. If the values were available, the shape of the lines might vary significantly.

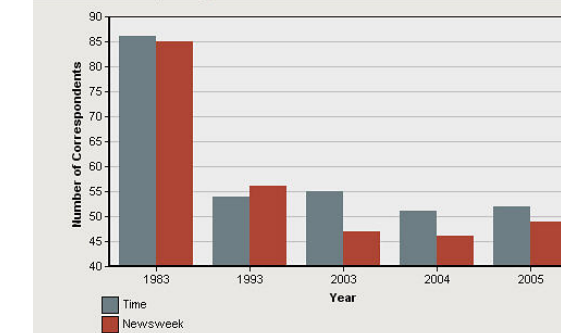
NEWS MAGAZINE STAFF SIZE OVER TIME

Time and Newsweek select years 1983 - 2005



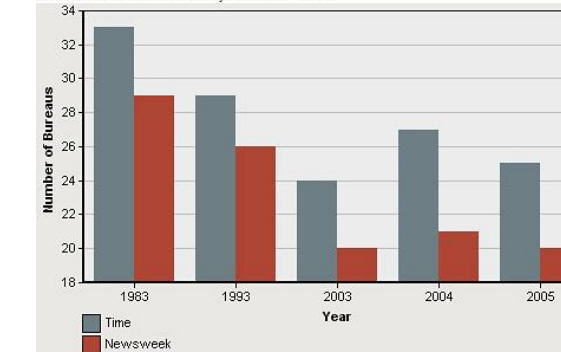
NUMBER OF CORRESPONDENTS IN BUREAUS OVER TIME

Time and Newsweek, select years 1983 - 2005

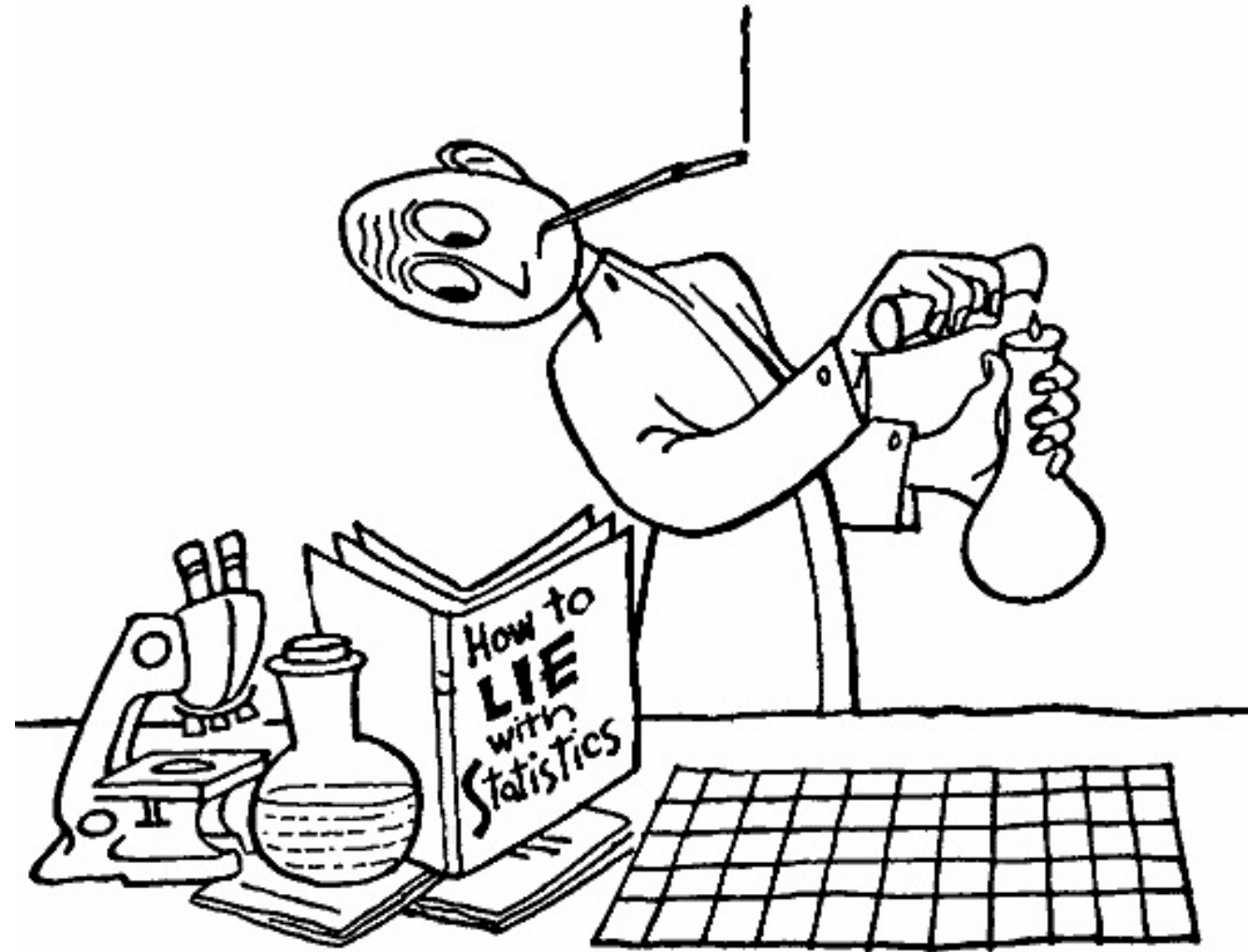


NEWS MAGAZINE BUREAUS OVER TIME

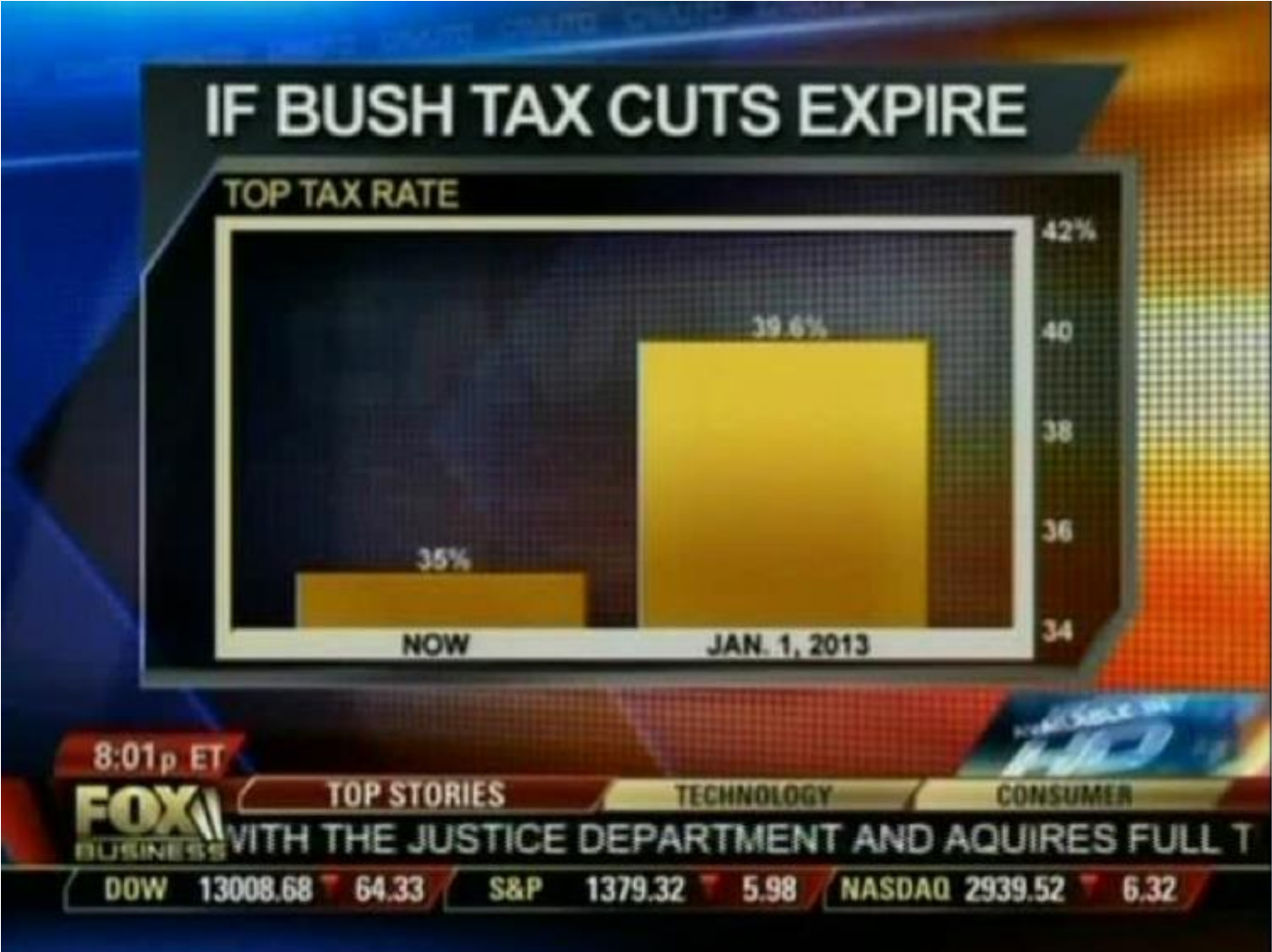
Time and Newsweek select years 1983 - 2005



A few more (classic) guidelines!



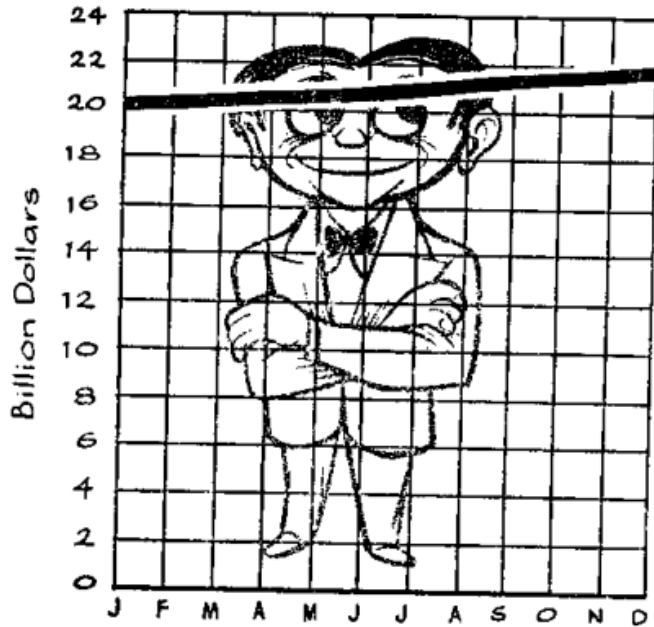
Good reference: *How to Lie with Statistics*, by Darrell Huff (1954)



Via: <https://venngage.com/blog/misleading-graphs/>

Chart Rules

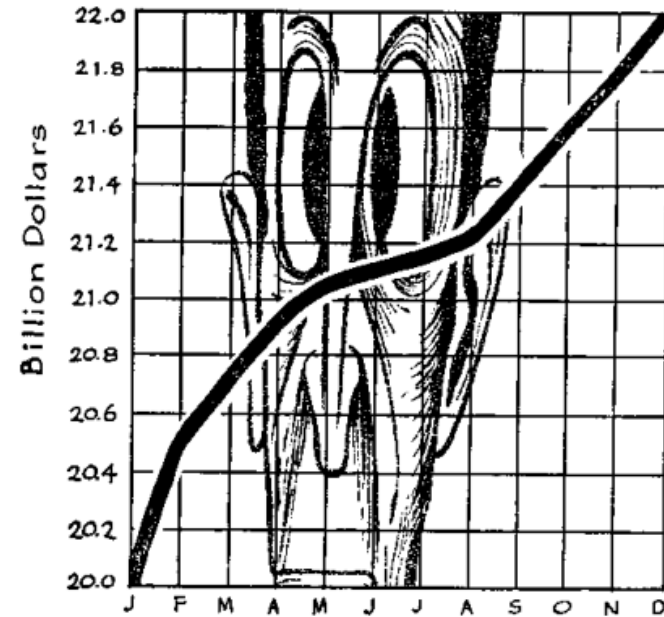
- Provide a proper baseline



A 10% increase. Good!



Already looks more impressive



Wow!



Appellate Judgeships Confirmed During First Congressional Term. Ronald Reagan, 19; George Bush, 18; Bill Clinton, 18; George W. Bush, 16; Barack Obama, 15; Donald Trump, 24. Illustration by Tracy Ma

Appellate Judgeships Confirmed During First Congressional Term

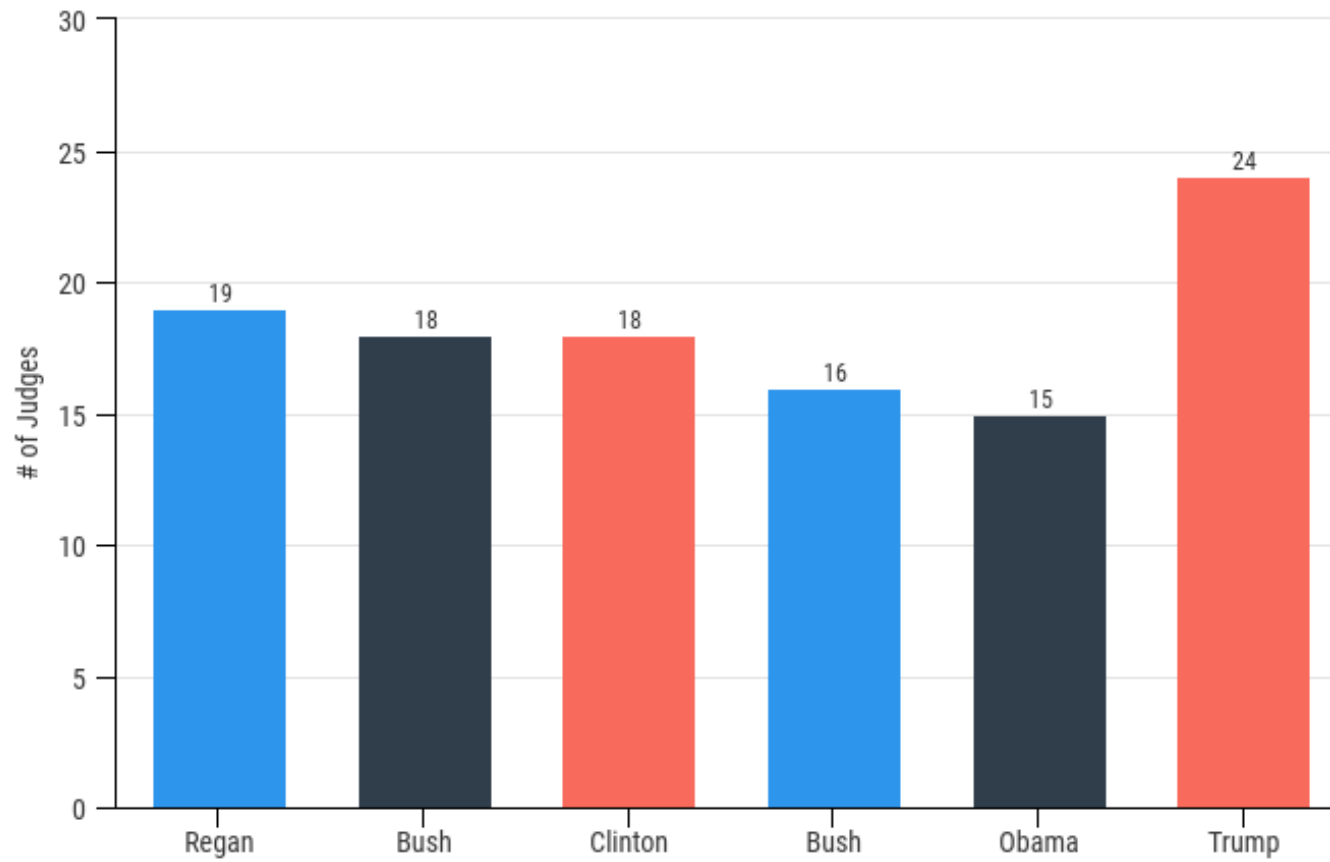


Chart Rules

- Provide a **proper baseline** & **label your axes**

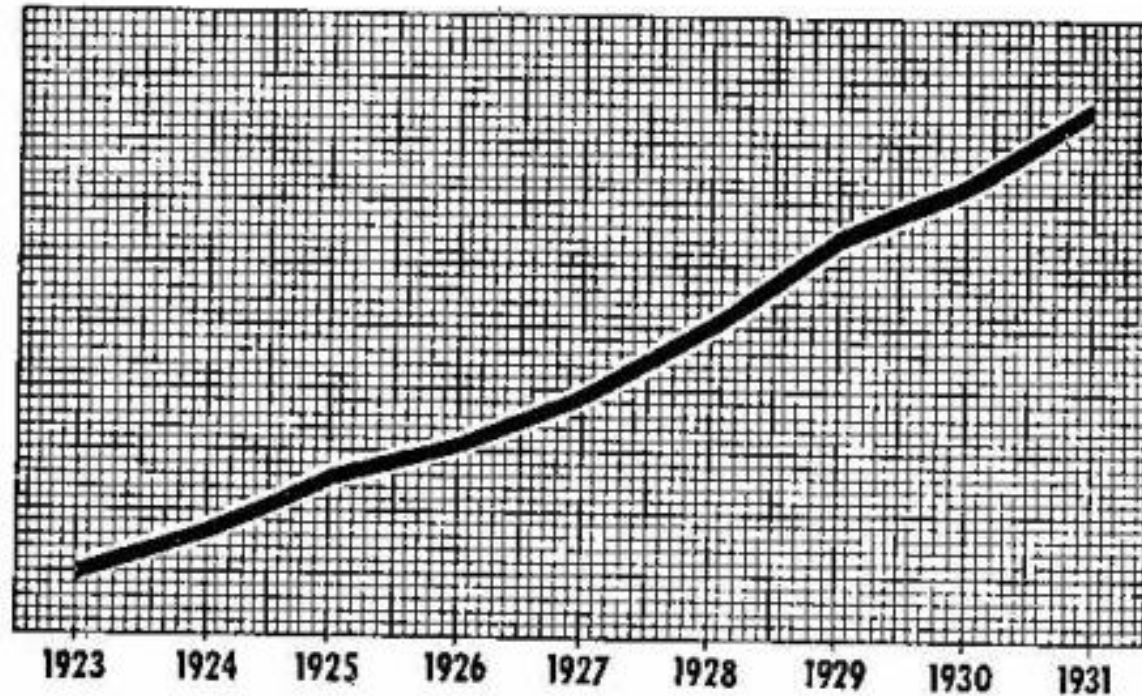
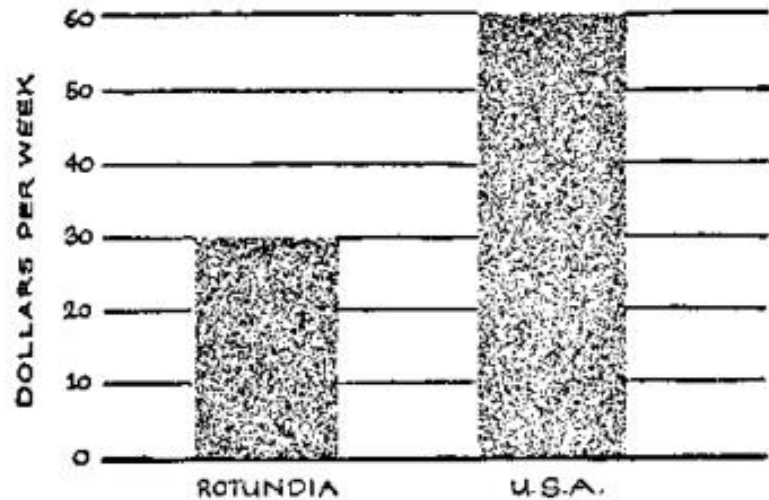


Chart Rules

- Provide a **proper baseline** & **label your axes**
- Avoid **eye-candy**



Actual data



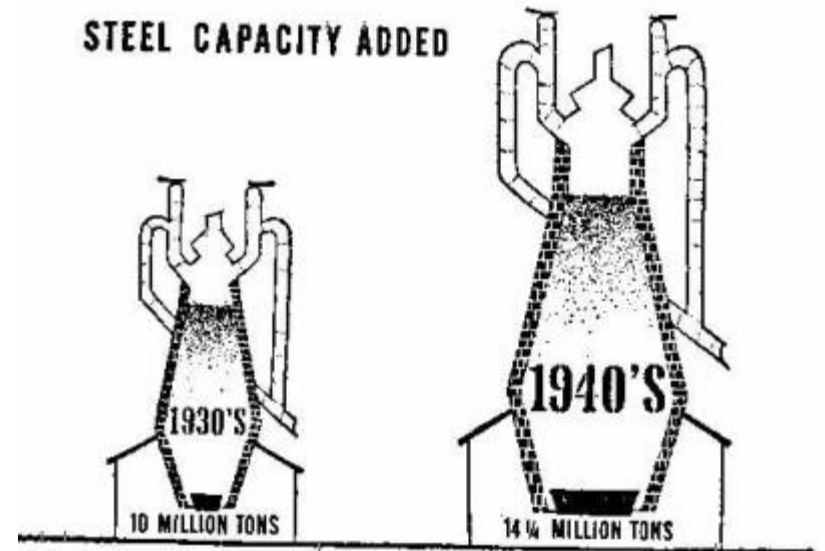
The same data with eye-candy & no numbers ... but at least it tells the same general story.



Impressive, but a lie!

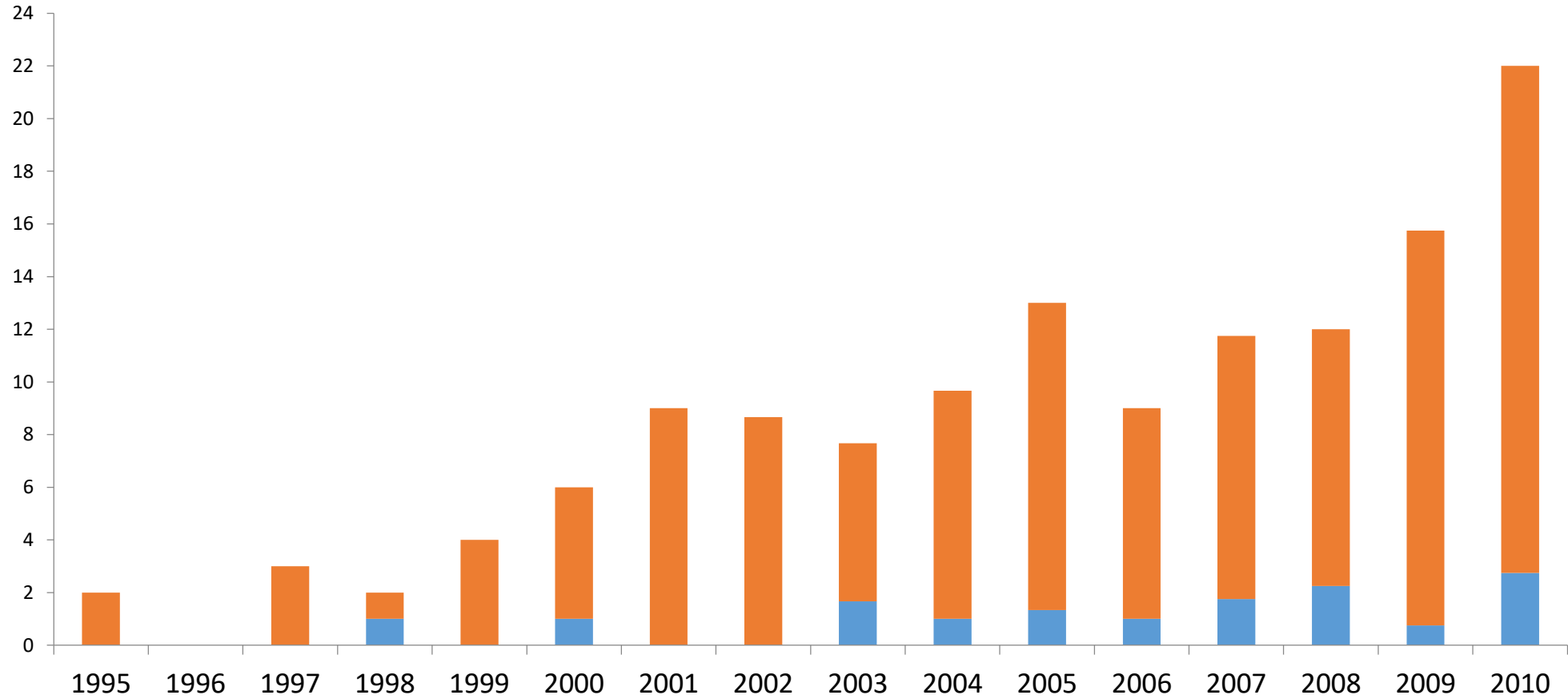
Chart Rules

- Provide a **proper baseline** & **label your axes**
- Avoid **eye-candy**
- Avoid **area comparisons** whenever possible



Adapted by courtesy of STEELWAYS.

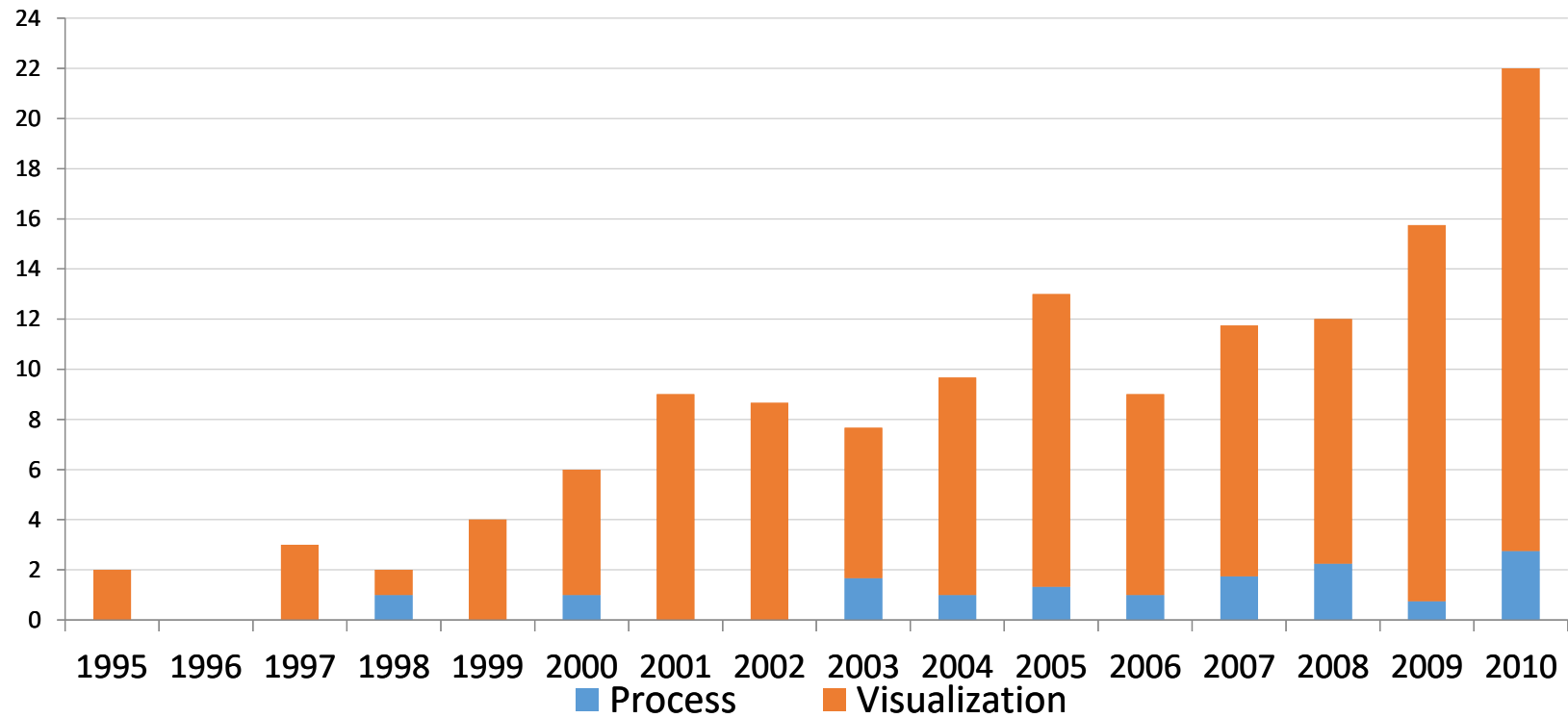
Provide Legends



Grids Help

but make them subtle

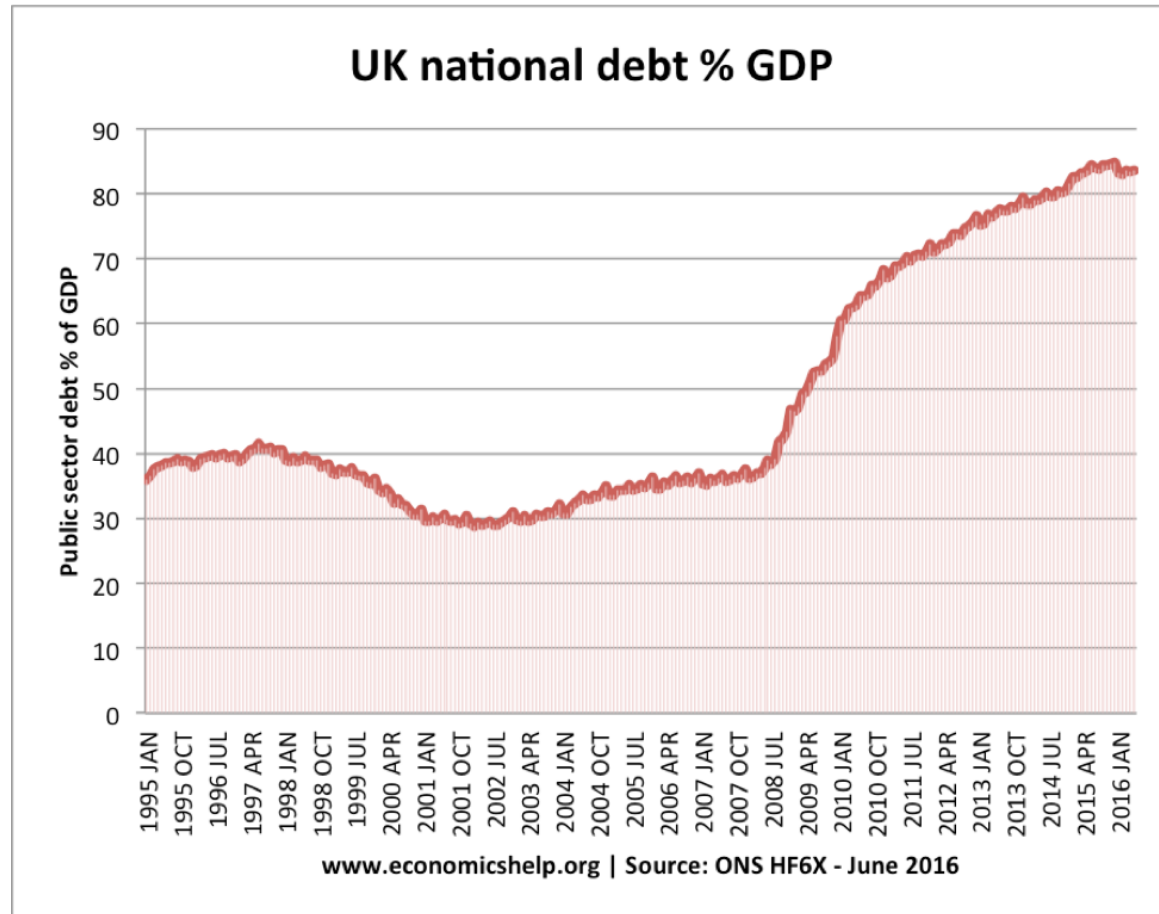
(about 20% opacity – **no black lines**)

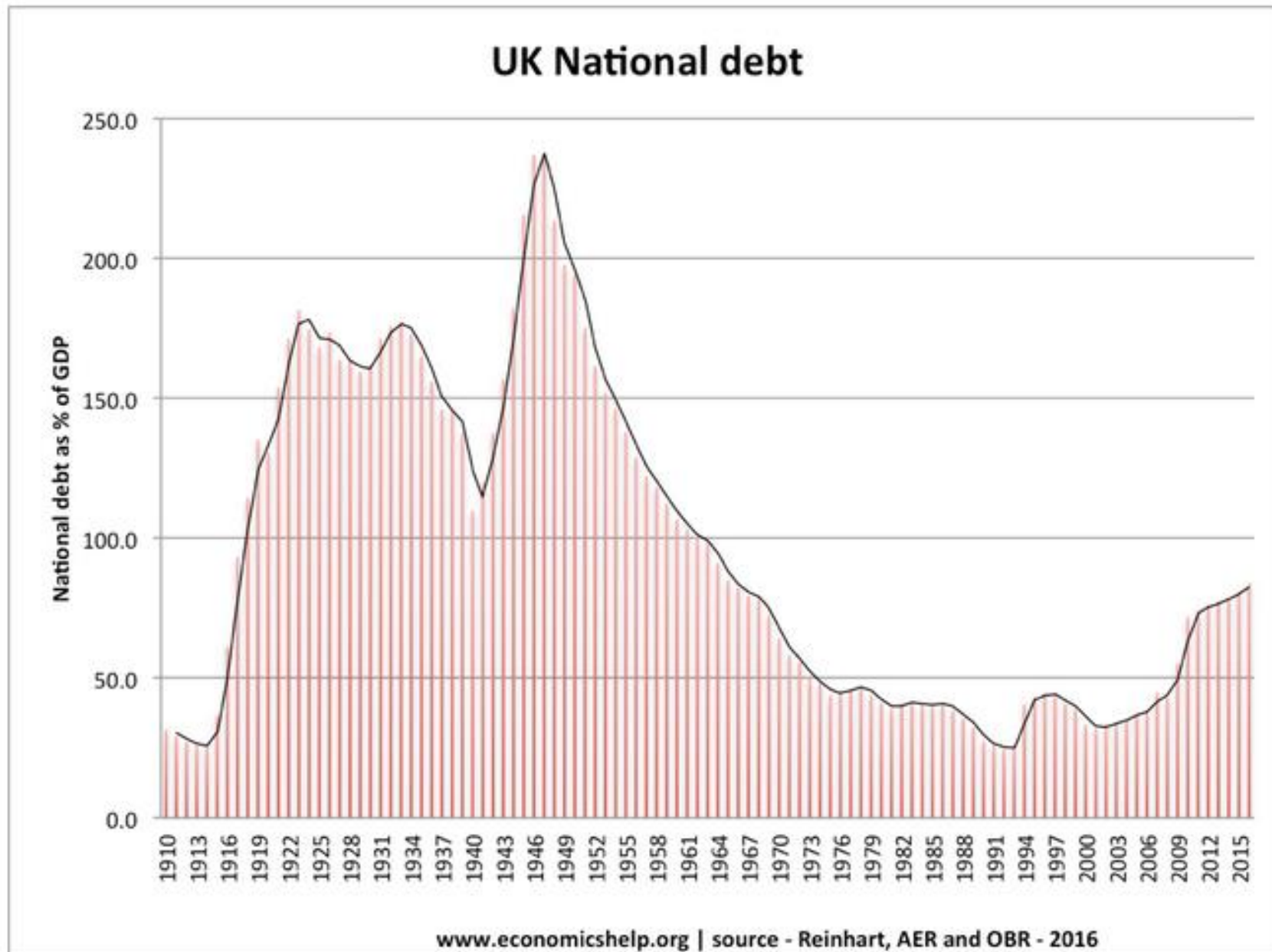


Cherrypicking Data



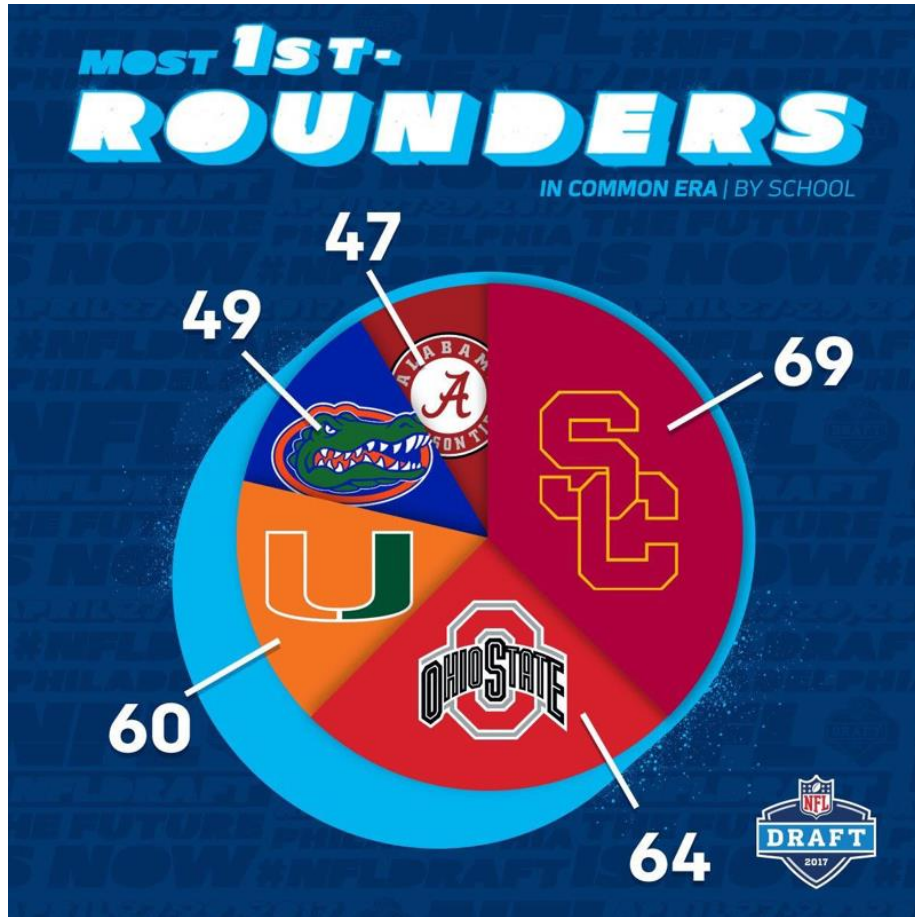
Omitting Data





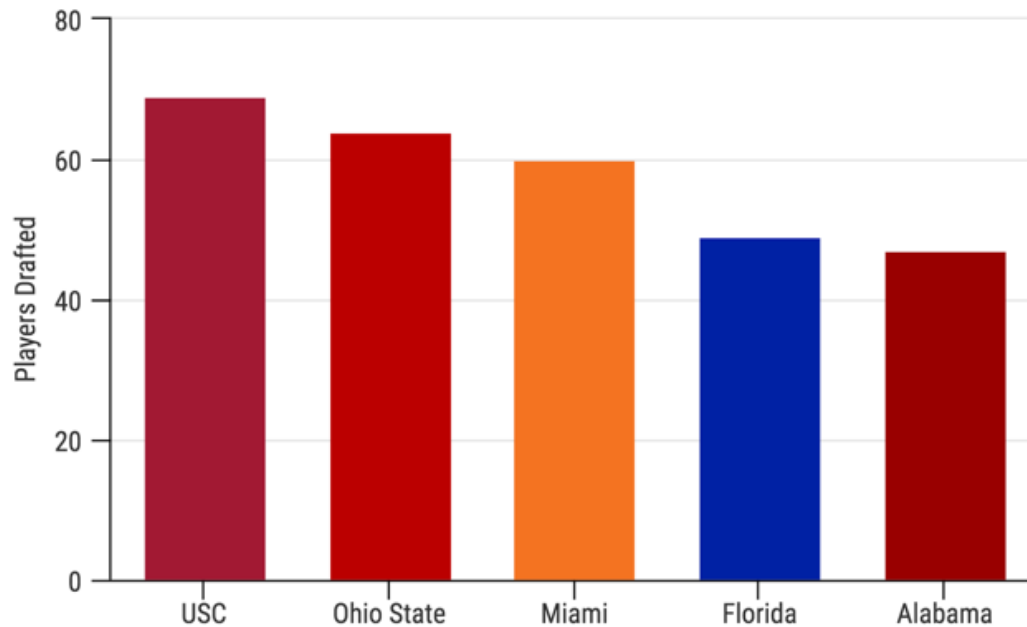
<https://www.economicshelp.org/blog/21618/economics/cherry-picking-of-data/>

Picking the Wrong Representation



Via: <https://venngage.com/blog/misleading-graphs/>

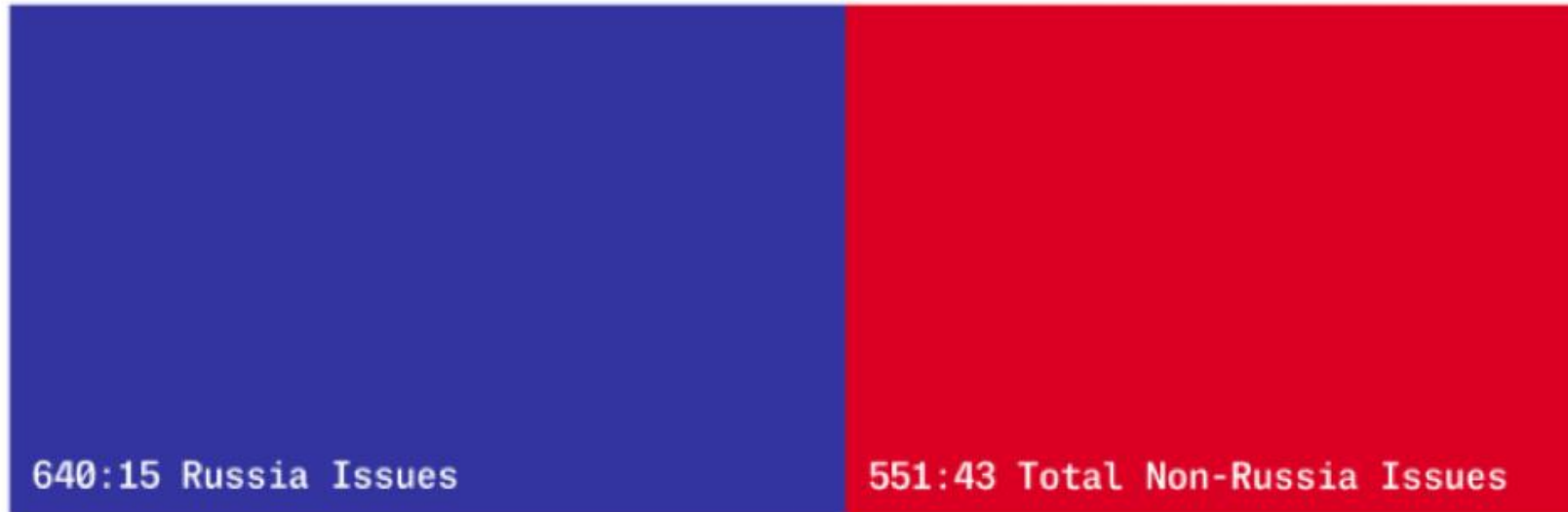
Most Players Drafted In The First Round



RUSSIA ISSUES VS. NON-RUSSIA ISSUES

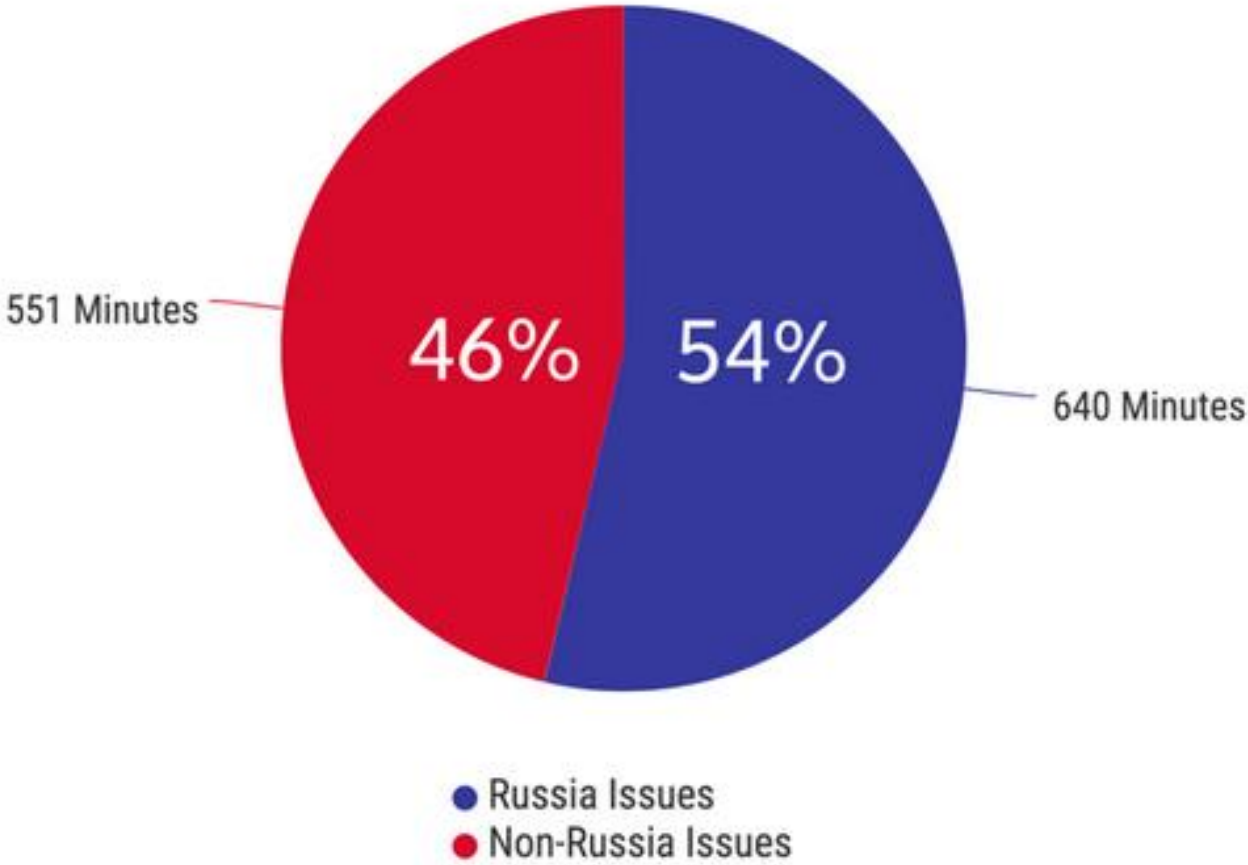
February 20–March 31, 2017

1191:58 (min:sec) Total Show Minutes



Russia issues vs. Non-Russia issues. Chart: The Intercept

Russia Issues Vs Non-Russia Issues



Many more useful guidelines!

