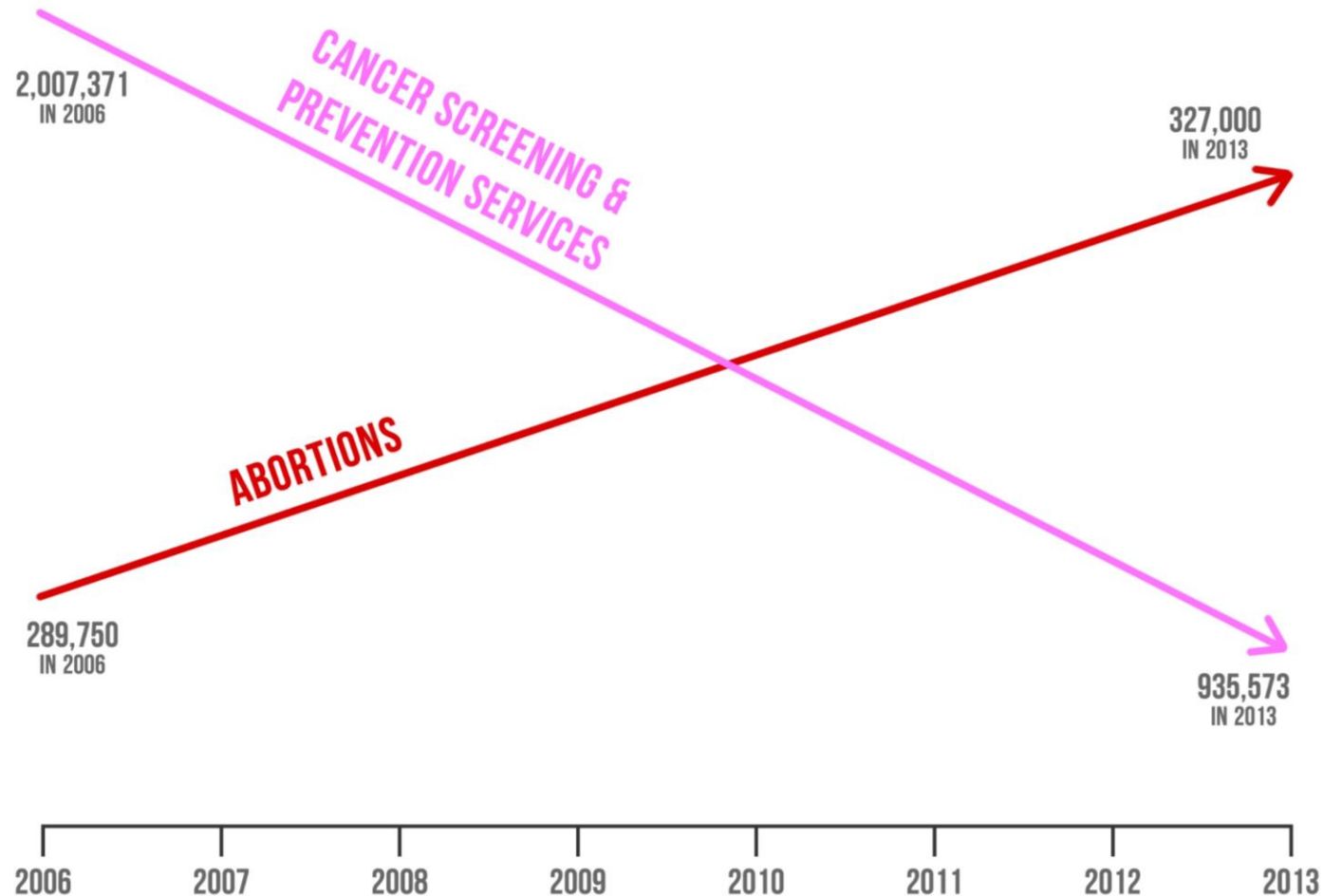


Misleading With Data

- Lesson 1.1 -

PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN



Used by Republican Congressman (Jason Chaffetz) during a congressional hearing.

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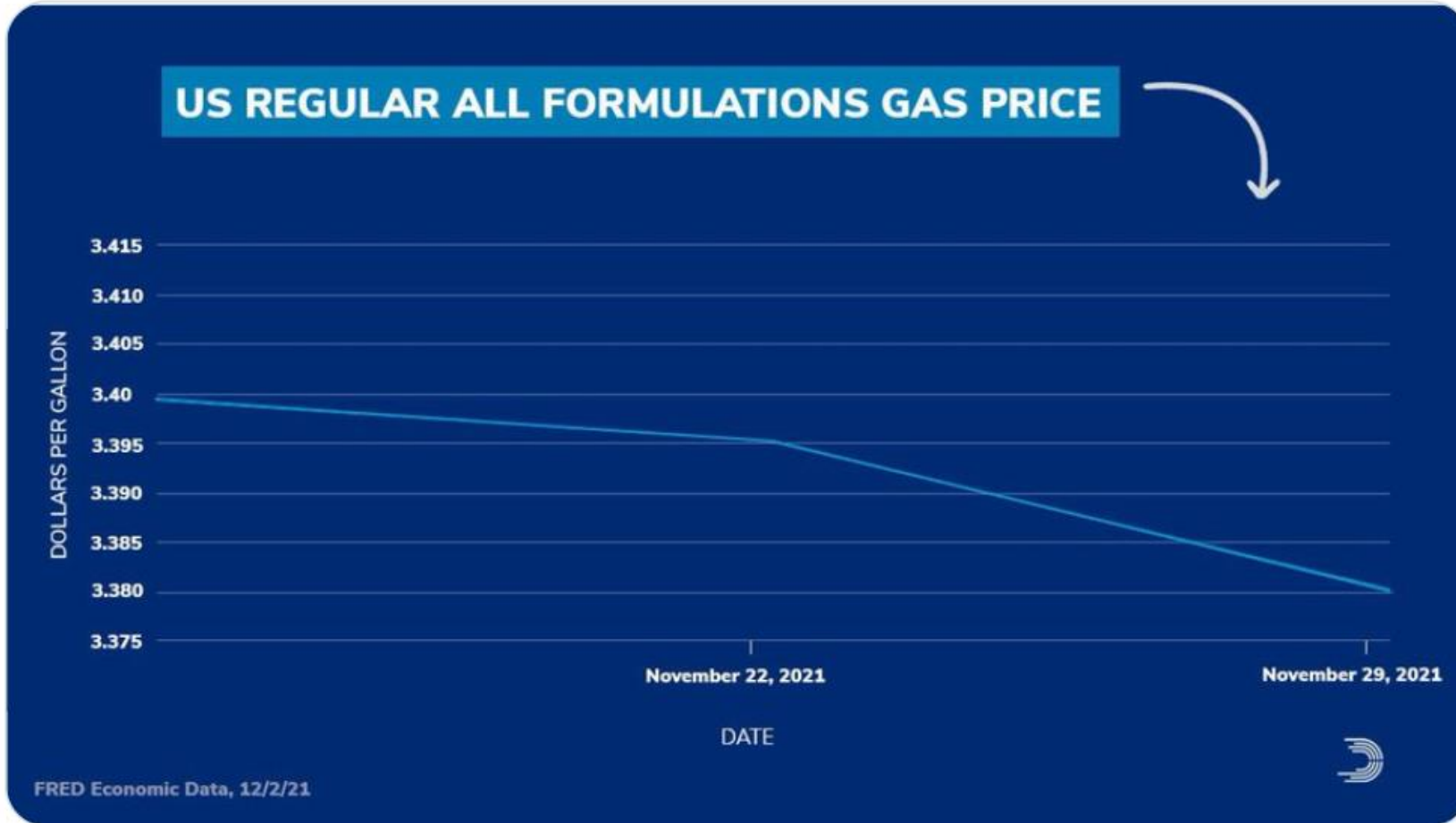
skewthescript.org



DCCC 
@dccc



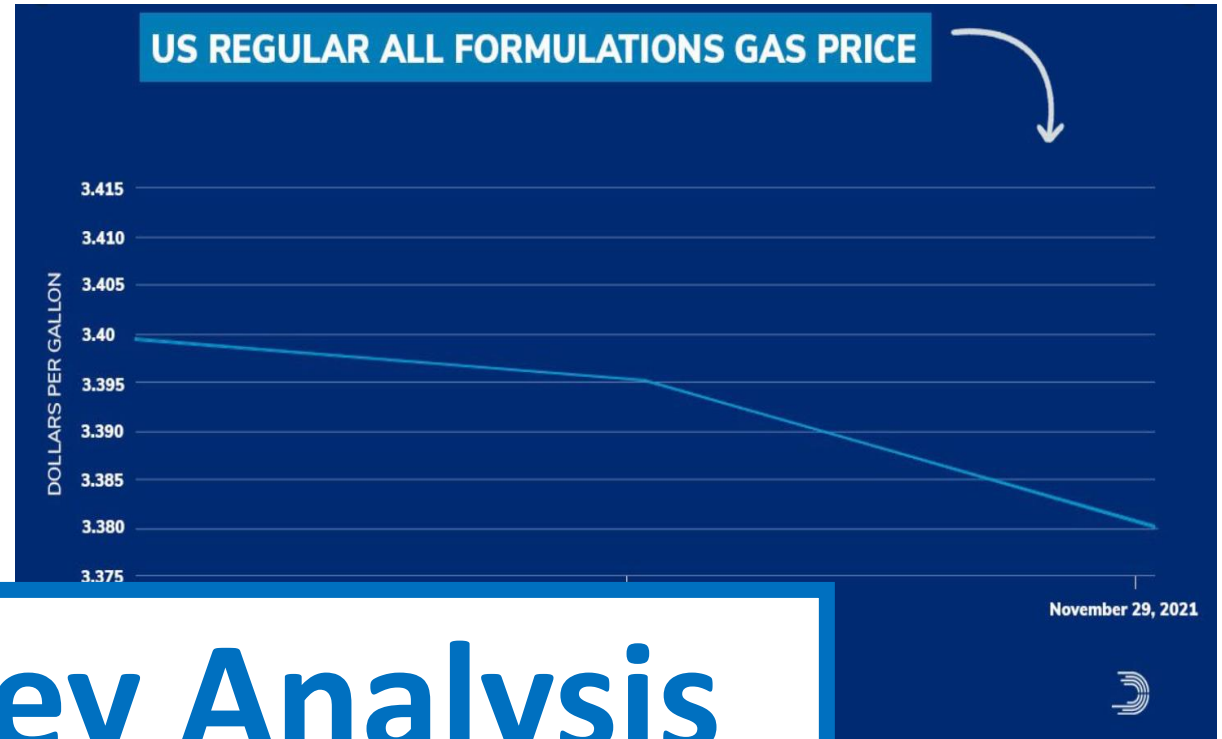
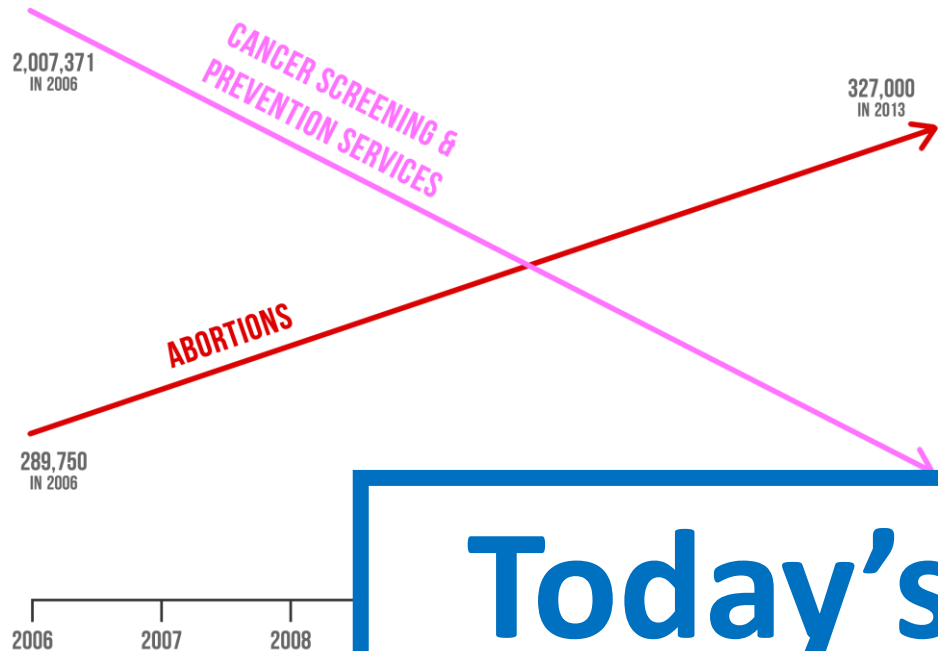
Thanks, @JoeBiden.



Tweeted by a Democratic House political committee (the DCCC).



**PLANNED PARENTHOOD FEDERATION OF AMERICA:
ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN**



Today's Key Analysis
How can we tell if a data visual is misleading?

Lesson 1.1

Guided Notes

Handout: *skewthescript.org/1-1*

Topics

1. Quantitative vs. categorical data
2. Misleading graphs

Topics

1. Quantitative vs. categorical data
2. Misleading graphs

Quantitative data: Data that is **numerical** (think 'quantities'). The values have an inherent **order**.

Examples: # of AP classes, SAT score, blood pressure, income, yards per catch, etc.

Quantitative data: Data that is **numerical** (think 'quantities'). The values have an inherent **order**.

Examples: # of AP classes, SAT score, blood pressure, income, yards per catch, etc.

Tip: Finding the average SAT score **makes sense**

Categorical data: Data where values are categories or group labels, which often **don't have an inherent order.**

Examples: eye color, ethnicity, favorite sports team, relationship status, etc.

Categorical data: Data where values are categories or group labels, which often **don't have an inherent order.**

Examples: eye color, ethnicity, favorite sports team, relationship status, etc.

Tip: Finding the average relationship status **doesn't makes sense**

Classifying variables

Student	Height (in)	Dominant Hand	Final Exam Score	Home Zip Code
Bill	72	Left	77	68494
Julius	64	Right	83	68492
Yesenia	67	Right	91	68490

Classifying variables

Student	Height (in)	Dominant Hand	Final Exam Score	Home Zip Code
Bill	72	Left	77	68494
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Quantitative

- Has inherent order
- Average makes sense

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Categorical

- No inherent order
- Average doesn't make sense

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????

- Do zip codes have a clear order?
- The 'average' zip code?

Classifying variables

Student	Height (in)	Dominant Hand	Final Exam Score	Home Zip Code
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Categorical

- No inherent order
- Average is meaningless

Topics

1. Quantitative vs. categorical data
2. **Misleading graphs**

BS

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BS

(Bad Statistics)

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How to spot a misleading graphic:

1. It may not have axis labels or **scale**.
2. It may **cut off** the x or y axis, or start at a weird place.
3. It may use **pictures** for bar graphs (called a 'pictograph').



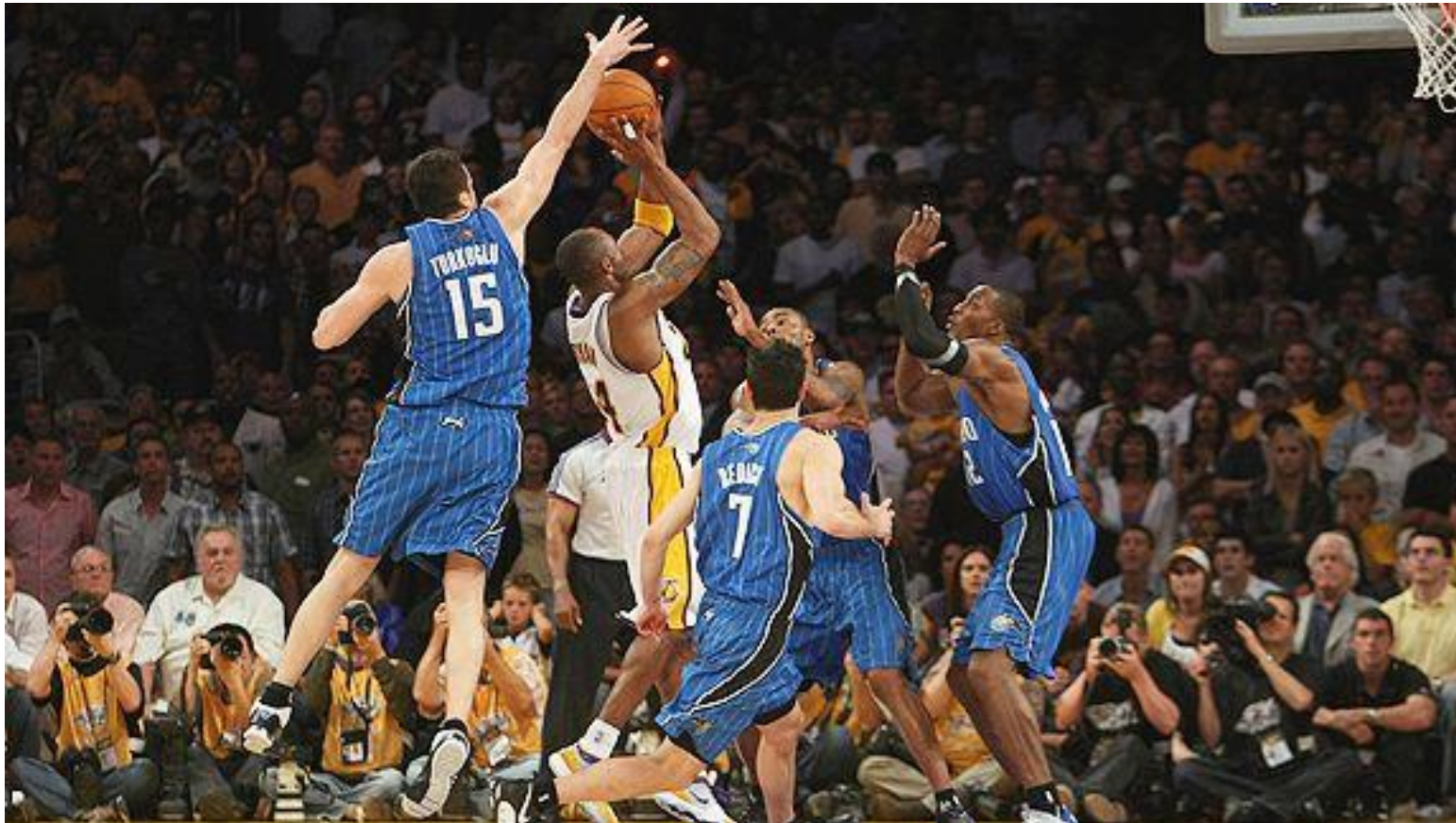
Was Kobe a ball hog?

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Was Kobe a ball hog?



Credit: Stephen Dunn

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Was Kobe a ball hog?

In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.

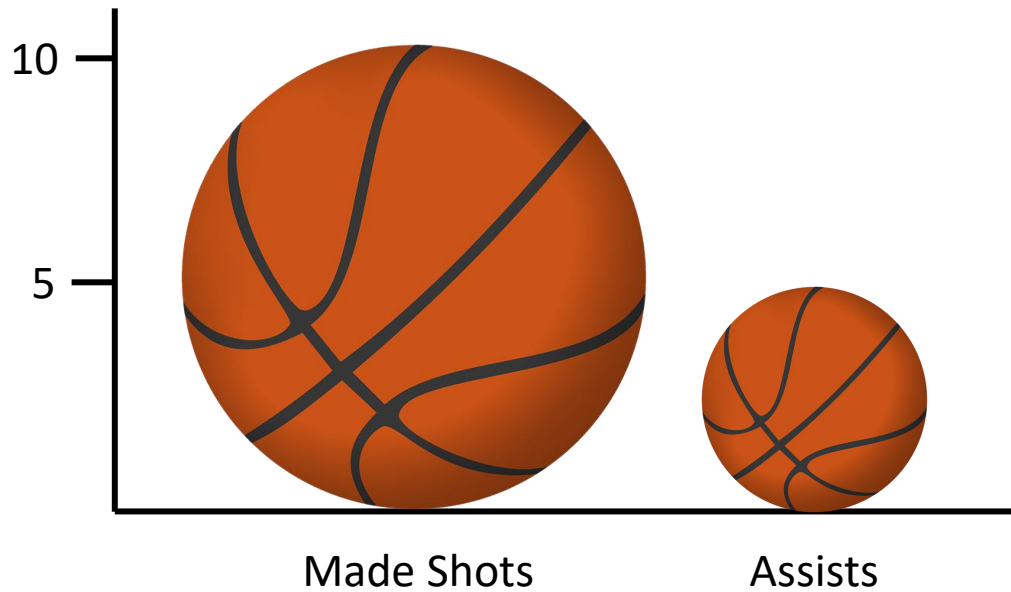
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Was Kobe a ball hog?

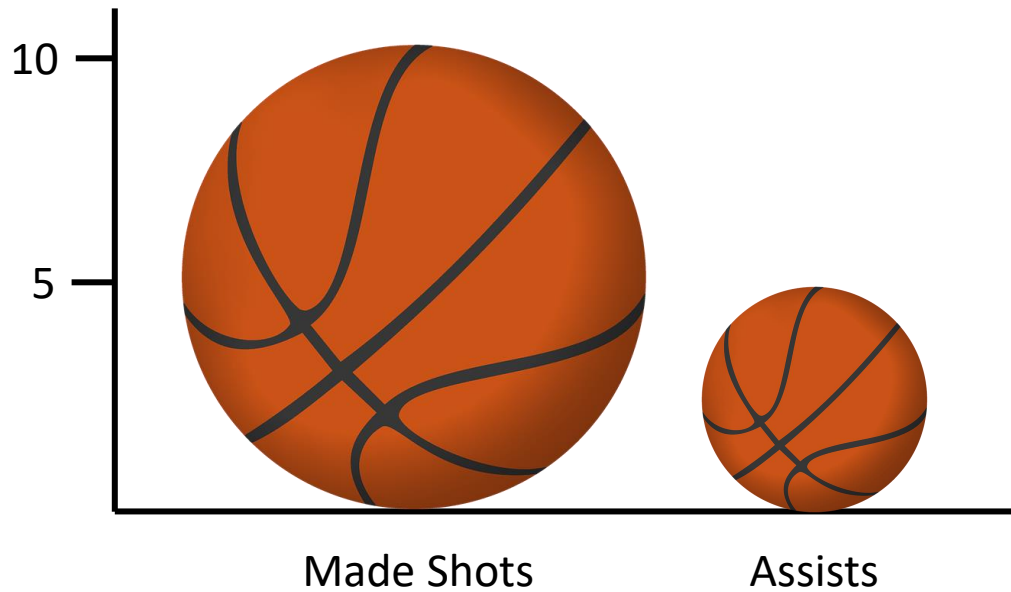
In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.





Was Kobe a ball hog?

In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.



“Ball hog!”



Was Kobe a ball hog?

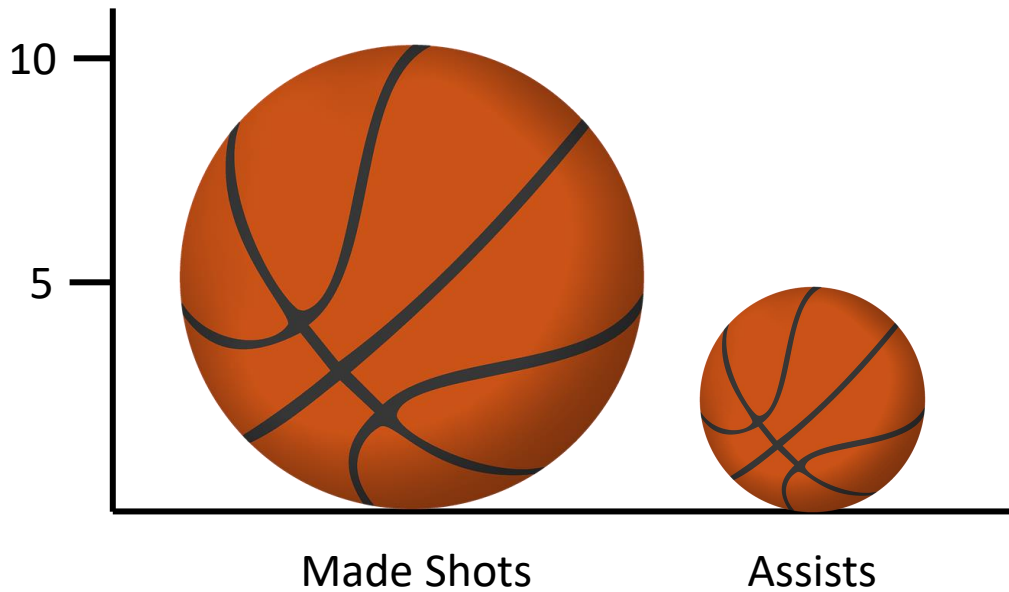
In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.2 assists per game, on average.





Was Kobe a ball hog?

In the 2009-2010 season, Kobe **made 9.8 shots** per game and had **5.0 assists** per game, on average.

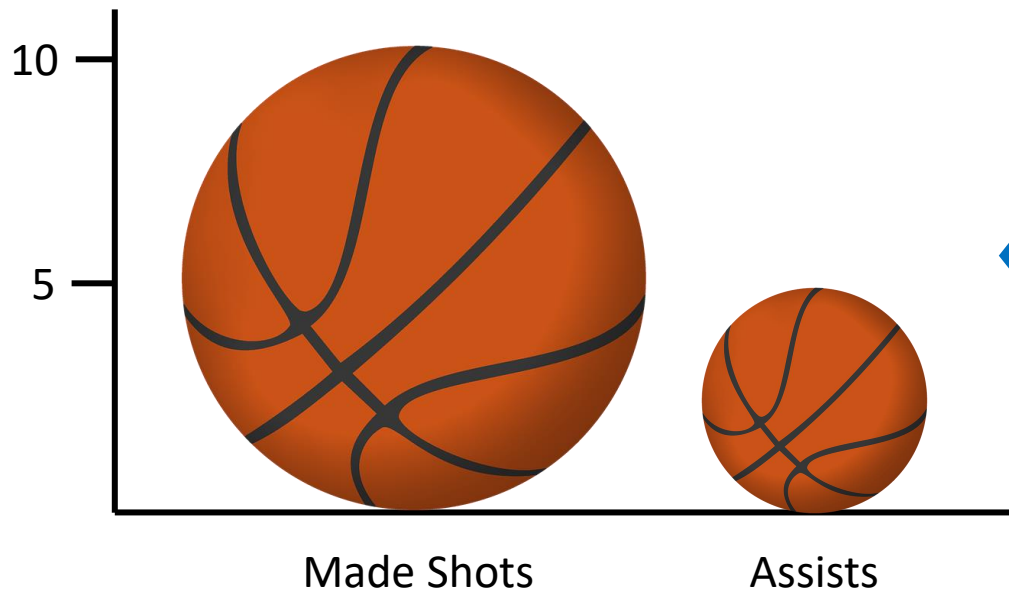


The number of “made shots” is **double** the “assists” per game.



Was Kobe a ball hog?

In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.

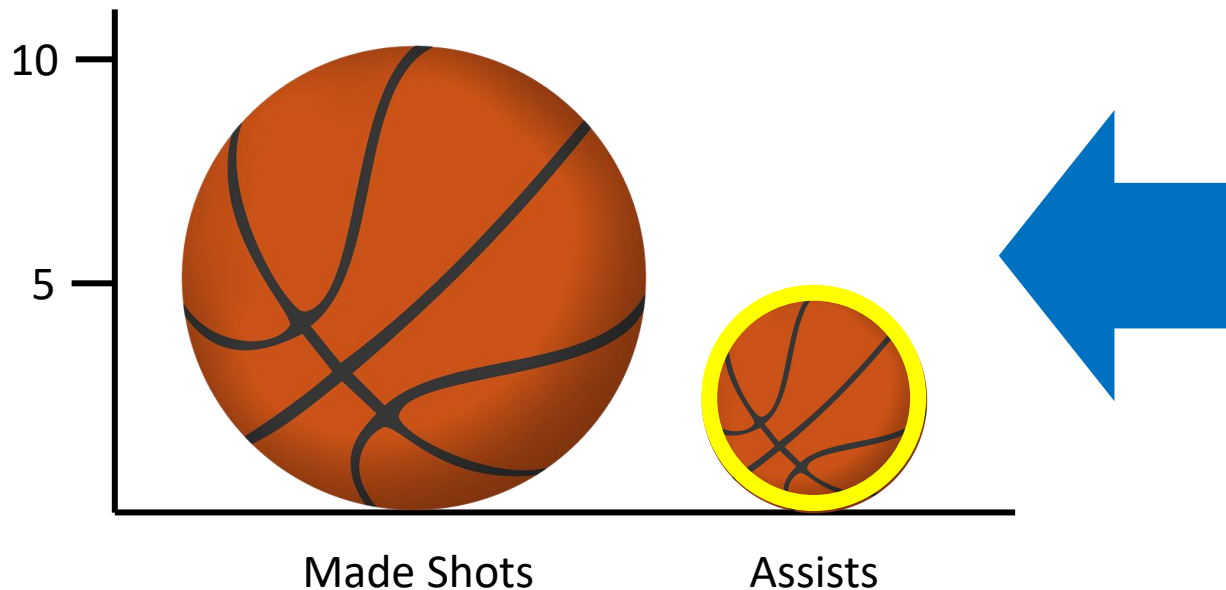


The **two-dimensional** ball figure in the pictograph makes the “made shots” appear **several times** bigger.



Was Kobe a ball hog?

In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.

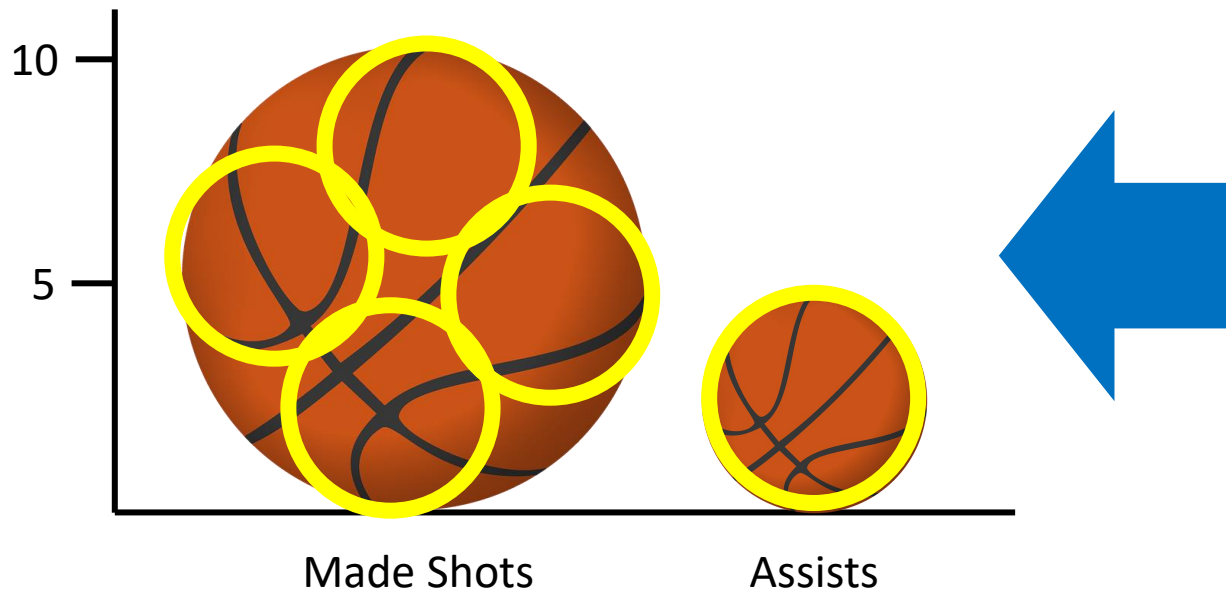


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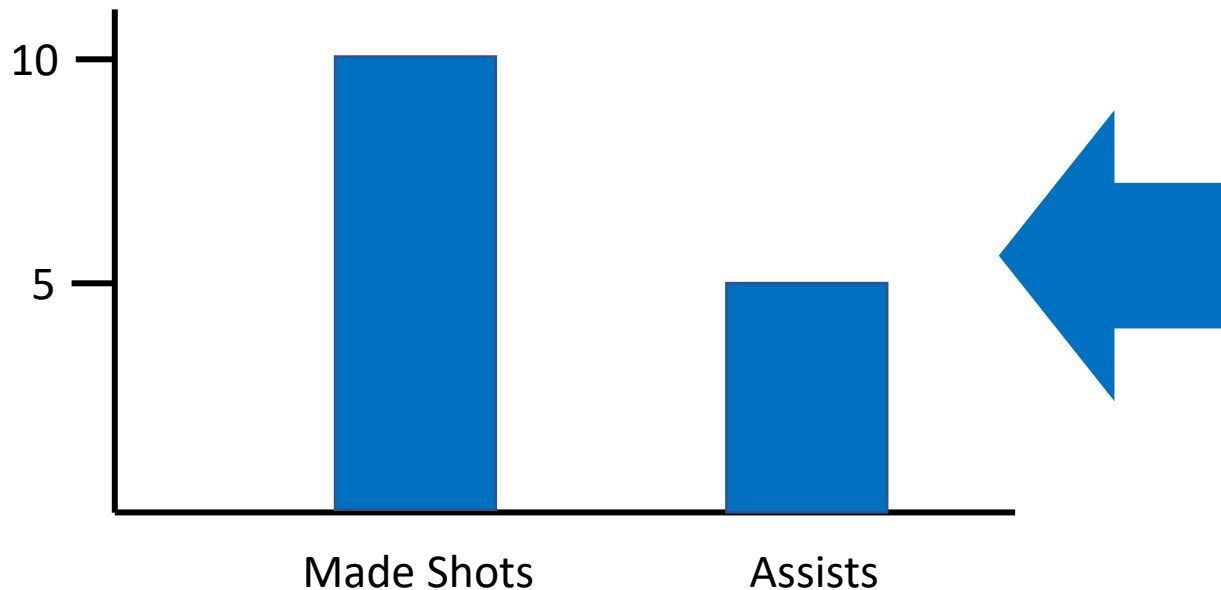


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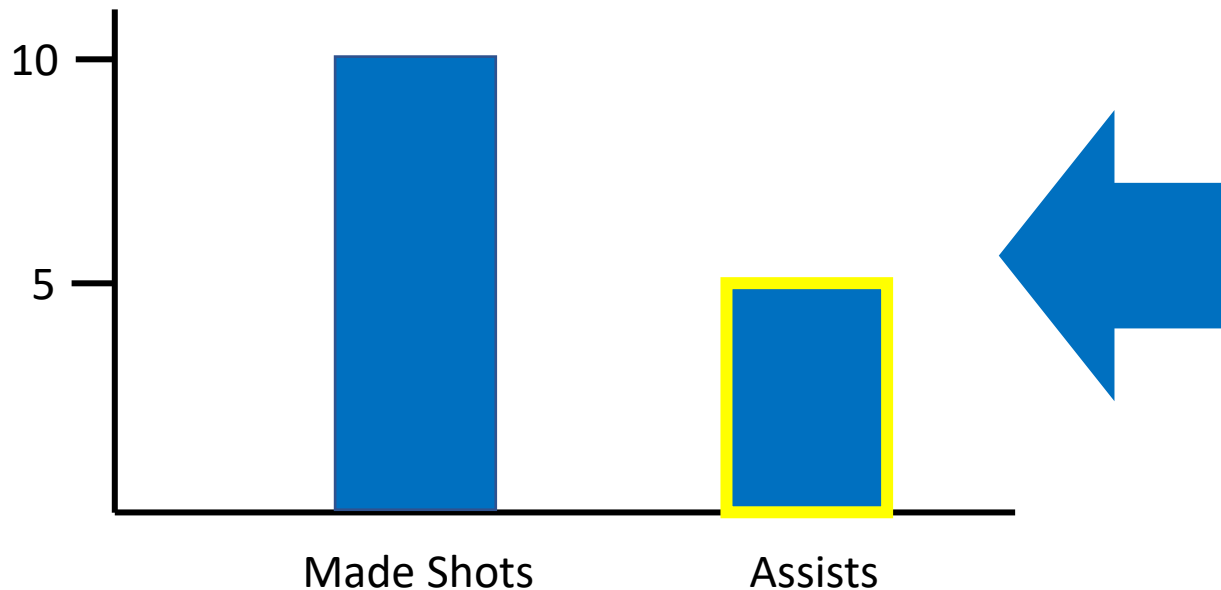


A regular bar plot shows the difference using **height only**. Now, the “made shots” is double the area of the “assists” bar.



Was Kobe a ball hog?

In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.



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Was Kobe a ball hog?

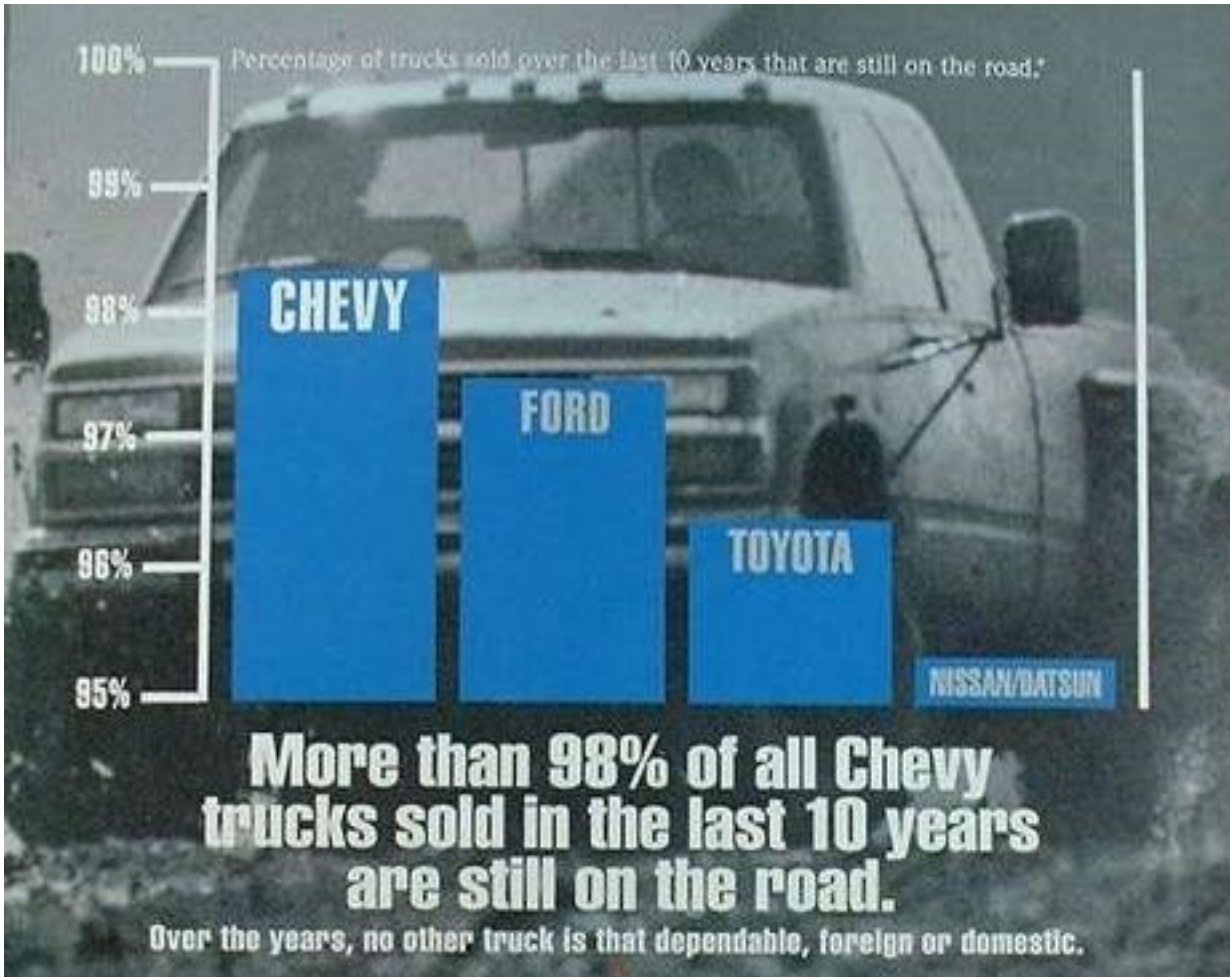
In the 2009-2010 season, Kobe made 9.8 shots per game and had 5.0 assists per game, on average.



A regular bar plot shows the difference using **height only**. Now, the “made shots” is double the area of the “assists” bar.

For the reasons shown,
pictographs are often misleading.

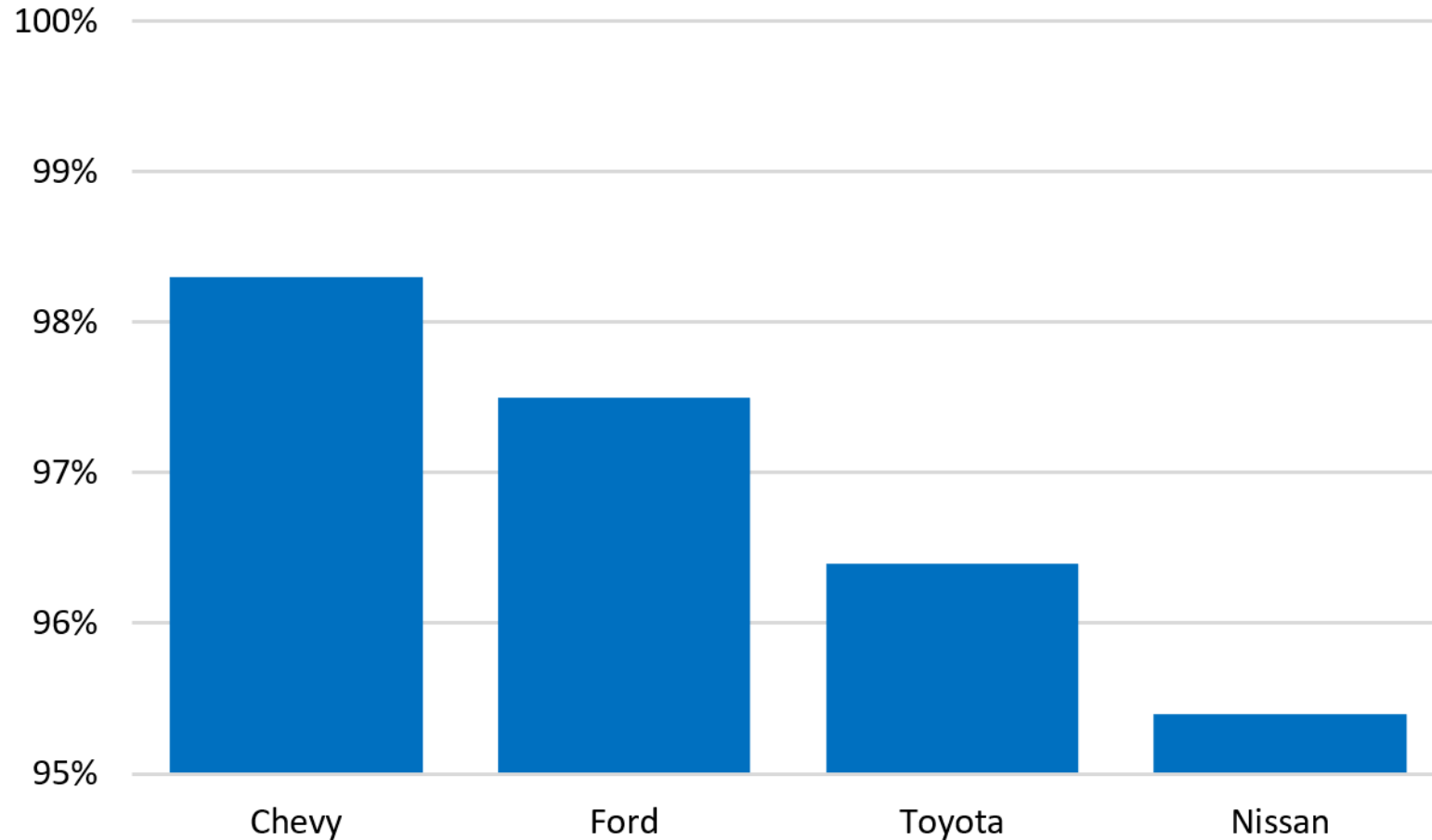
However, **standard bar graphs** can
mislead too!



Advertisement
for Chevy truck
“dependability”

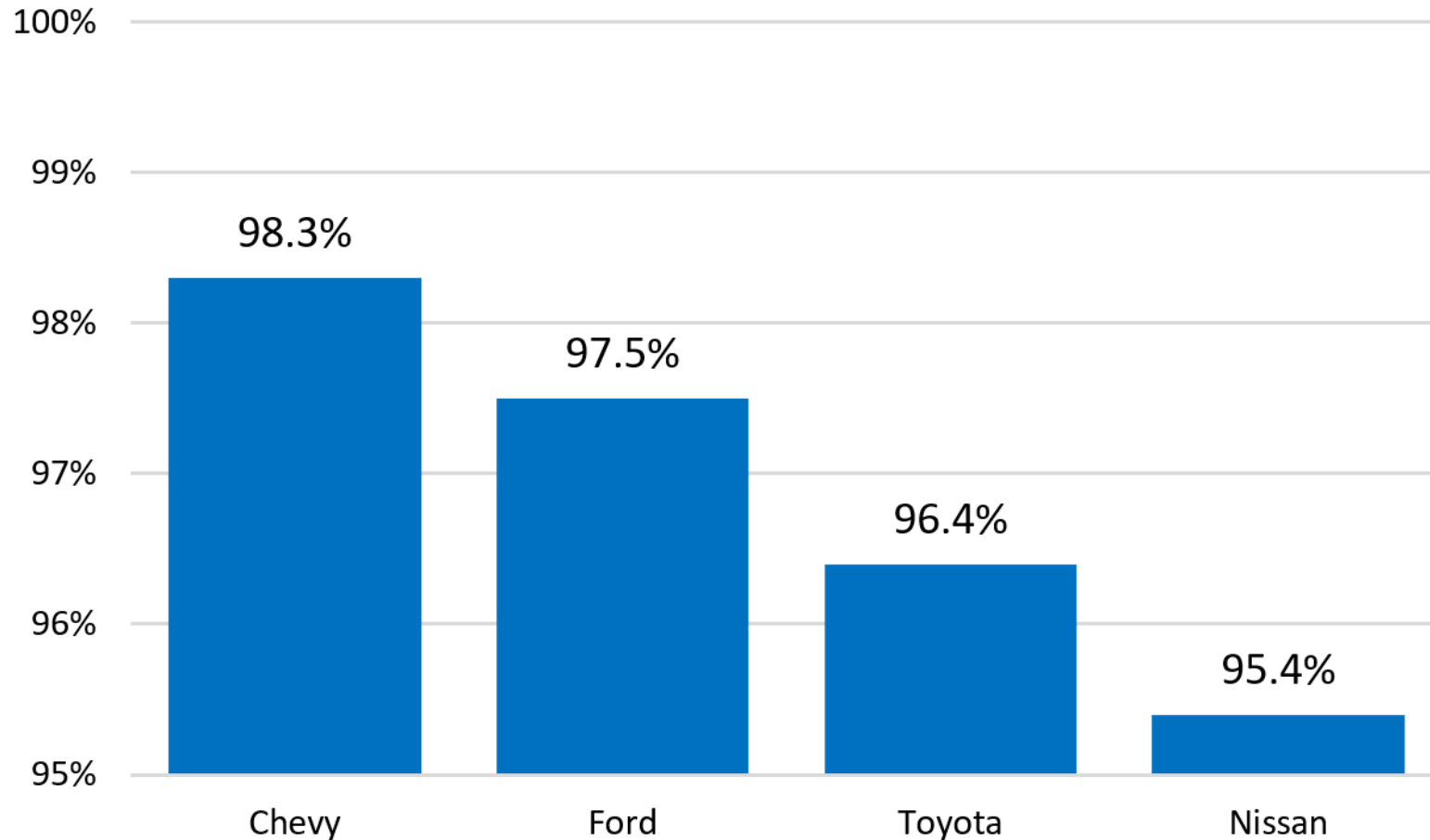
Example from TED-Ed: [“How to spot a misleading graph”](#)

Percent of trucks sold in last 10 years still on road



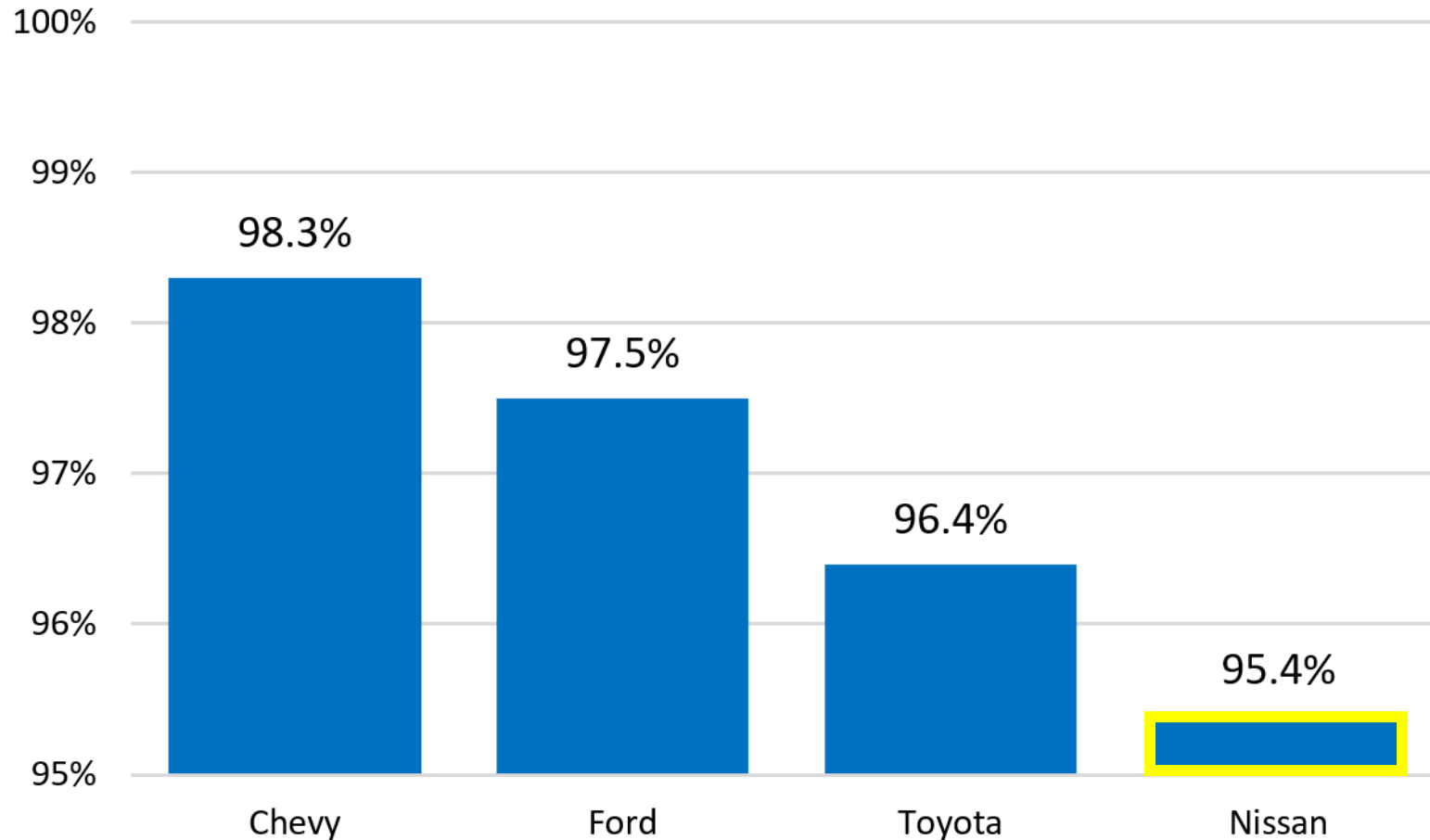
Example from TED-Ed: [“How to spot a misleading graph”](#)

Percent of trucks sold in last 10 years still on road



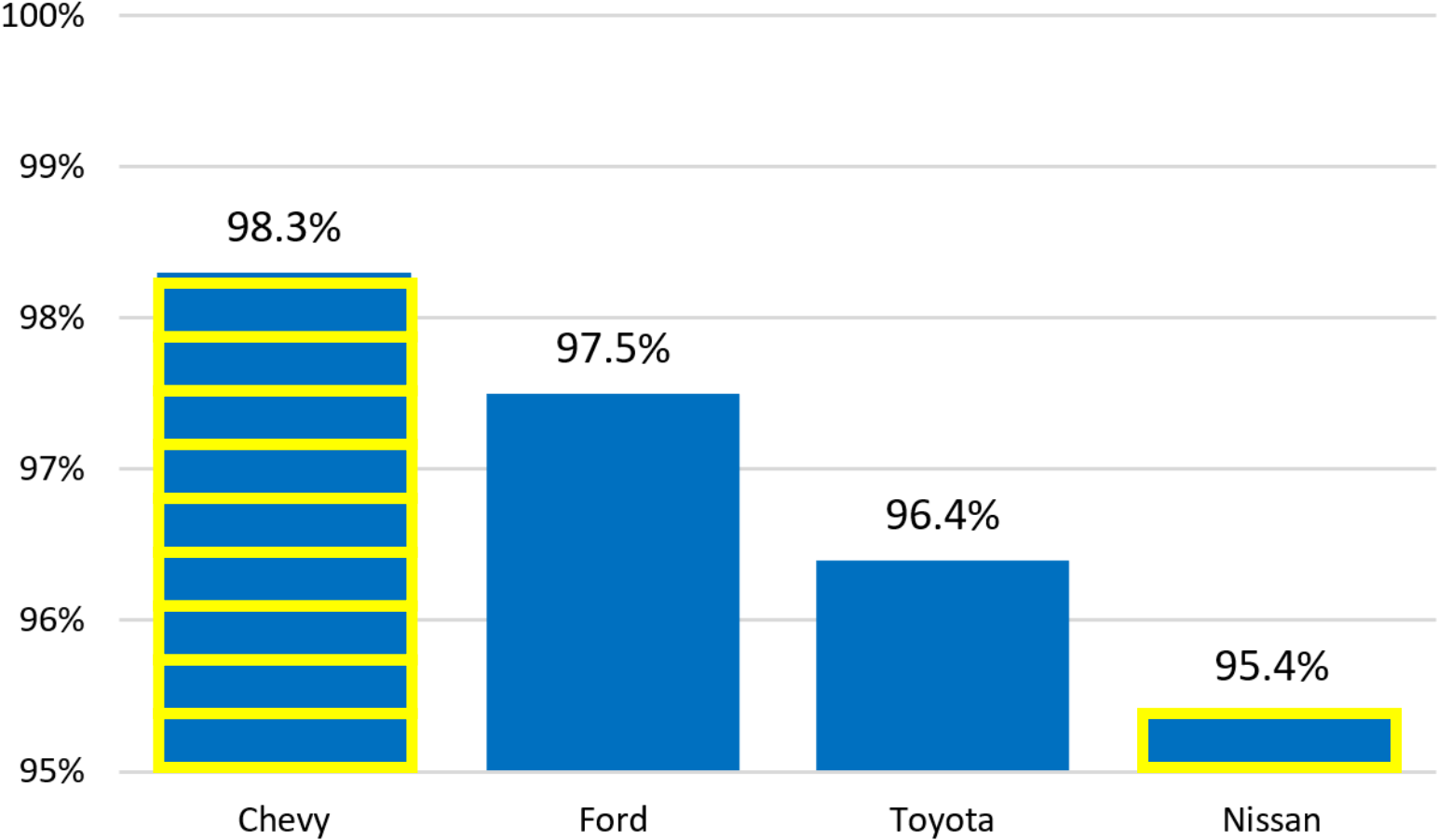
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Percent of trucks sold in last 10 years still on road



Example from TED-Ed: [“How to spot a misleading graph”](#)

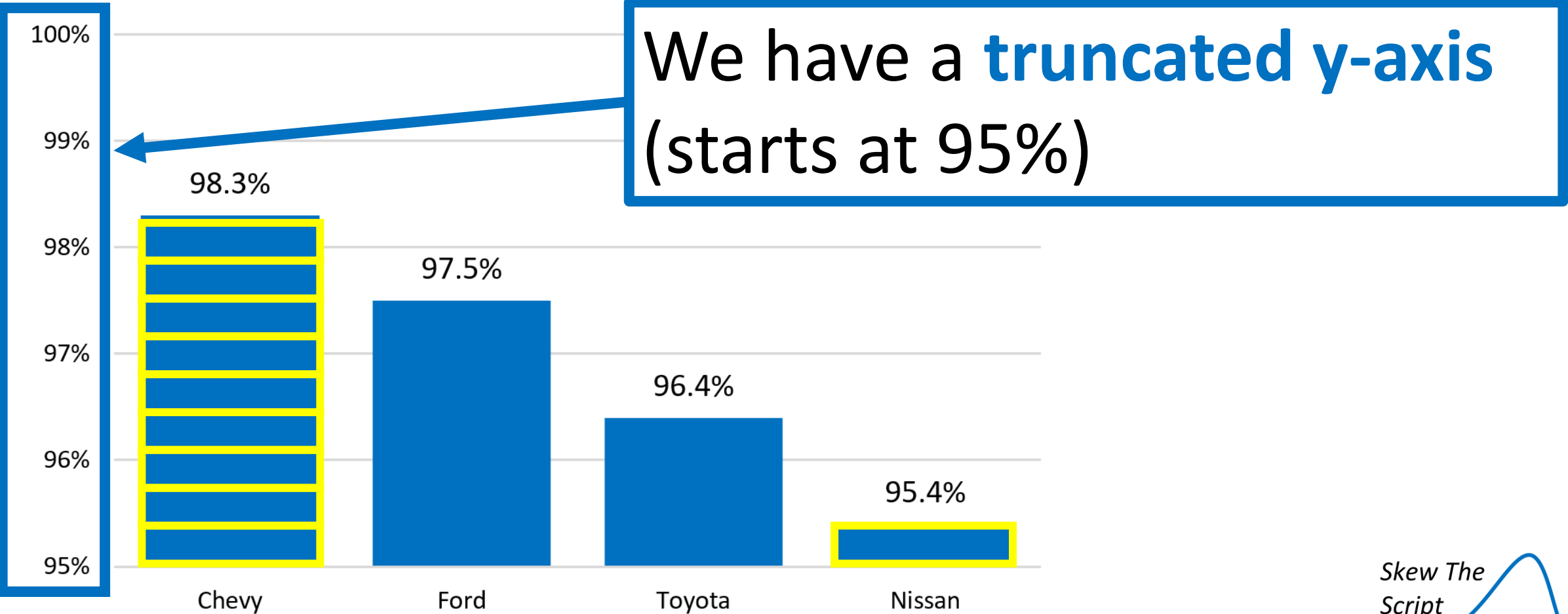
Percent of trucks sold in last 10 years still on road



Why does 98.3% appear **several times greater** than 95.4%?

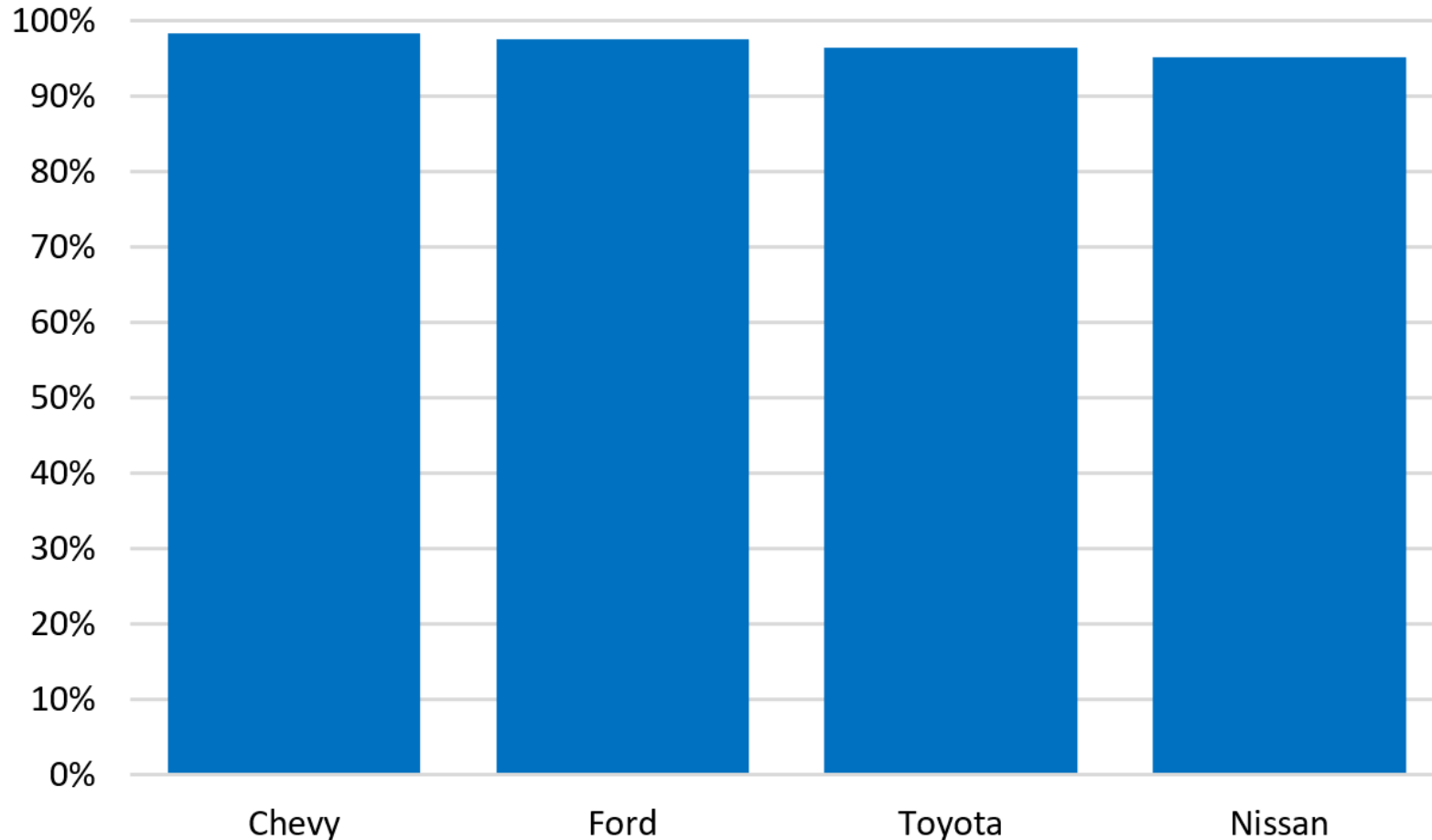
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Percent of trucks sold in last 10 years still on road



Example from TED-Ed: [“How to spot a misleading graph”](#)

Percent of trucks sold in last 10 years still on road



Full y-axis
(0-100)

Example from TED-Ed: [“How to spot a misleading graph”](#)

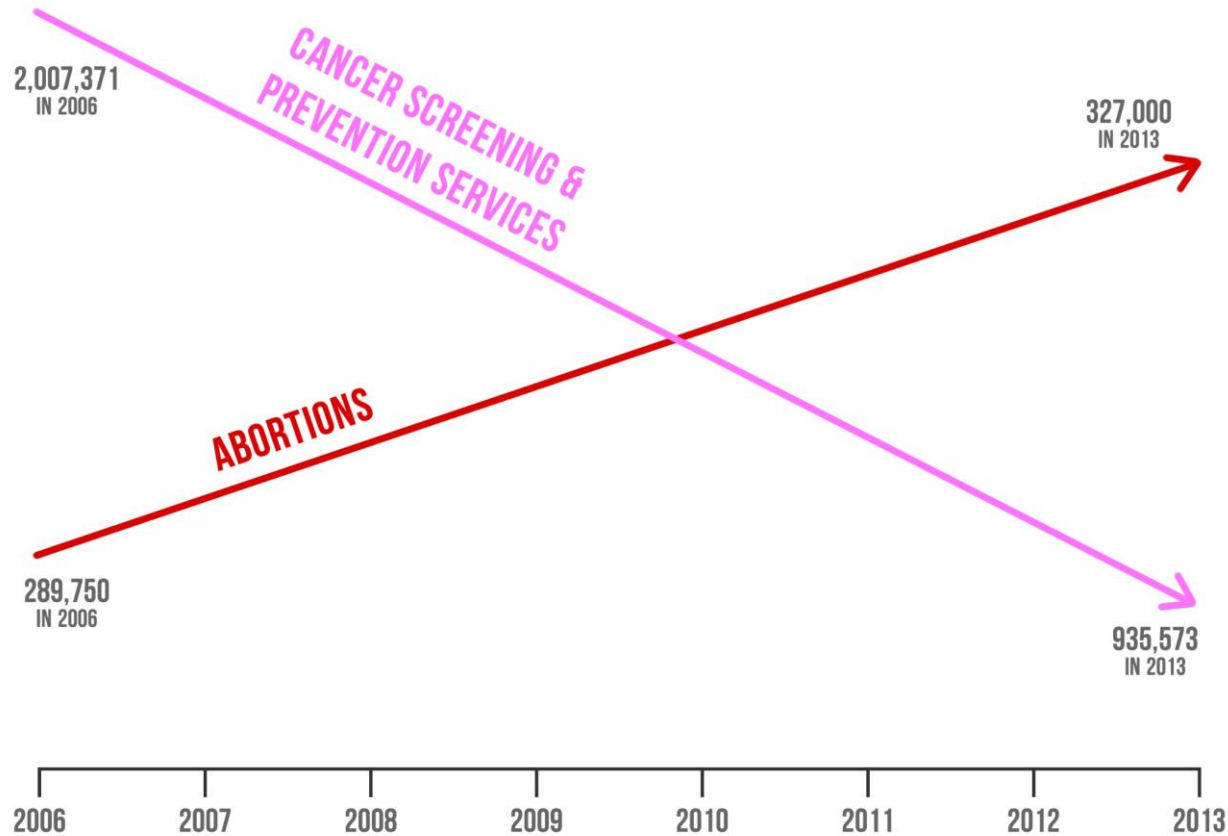
A place where you'll find
many misleading graphs:

Congress

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SOURCE: PLANNED PARENTHOOD'S ANNUAL REPORTS

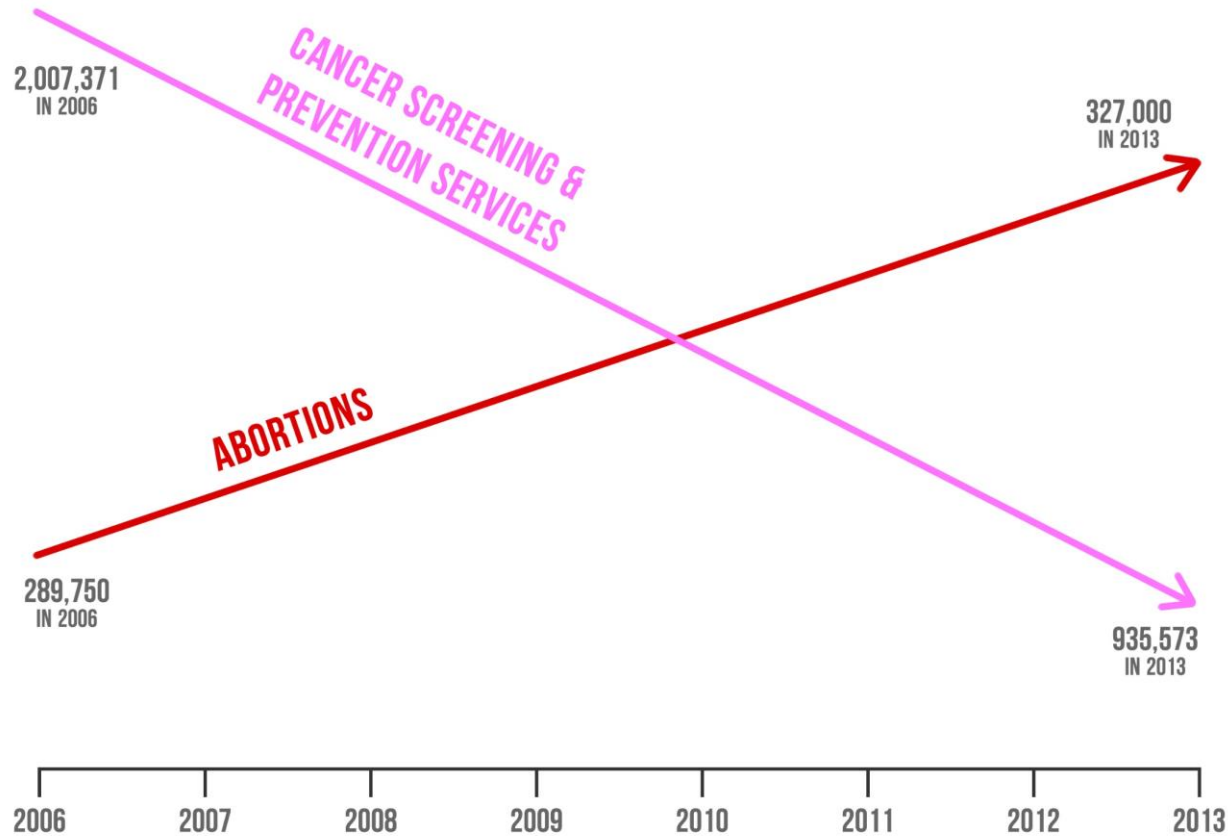
Originally prepared by *Americans United for Life*. Used by Rep. Jason Chaffetz during a Planned Parenthood congressional hearing.



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PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN



SOURCE: PLANNED PARENTHOOD'S ANNUAL REPORTS

Originally prepared by *Americans United for Life*. Used by Rep. Jason Chaffetz during a Planned Parenthood congressional hearing.



“That’s the reduction in the breast exams and the red is the increase in the abortions. That’s what is going on in your organization.”

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US REGULAR ALL FORMULATIONS GAS PRICE



FRED Economic Data, 12/2/21



Tweeted by the DCCC, a Democratic House political committee, on Dec. 2nd 2021.

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Script*

skewthescript.org

US REGULAR ALL FORMULATIONS GAS PRICE



FRED Economic Data, 12/2/21



DCCC

@dccc

Thanks, @JoeBiden.

Tweeted by the DCCC, a Democratic House political committee, on Dec. 2nd 2021.

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Script

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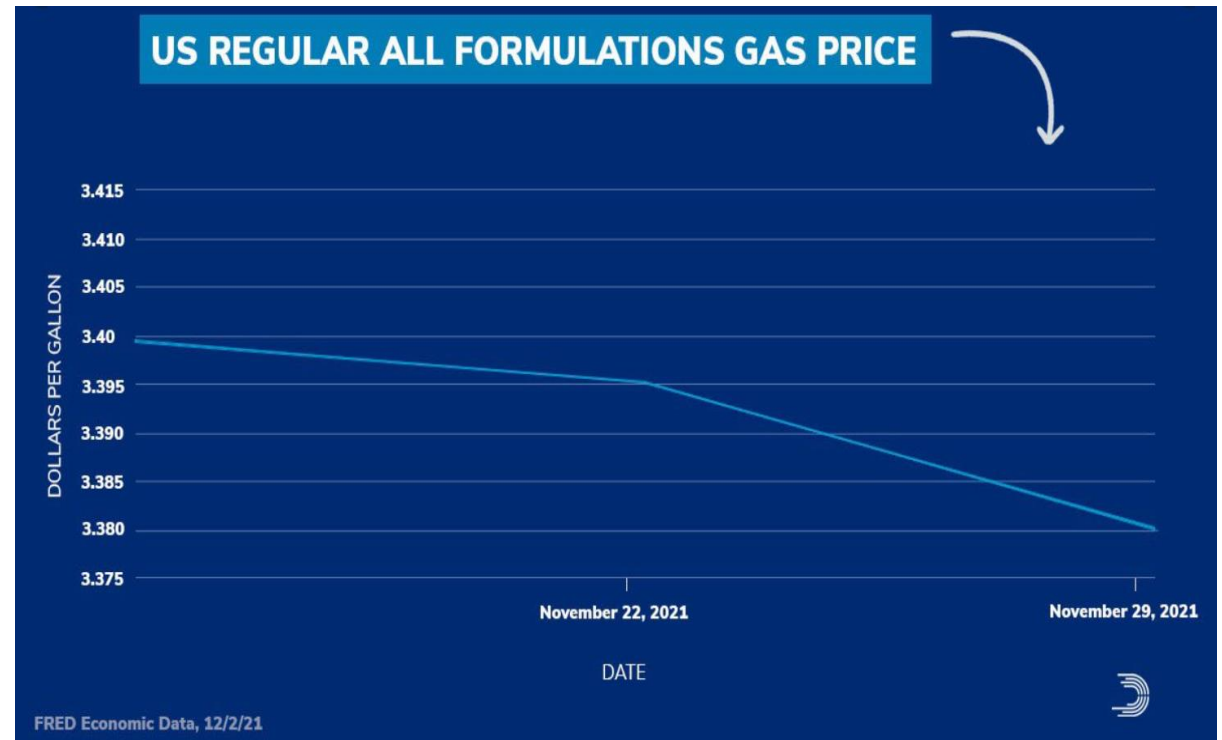
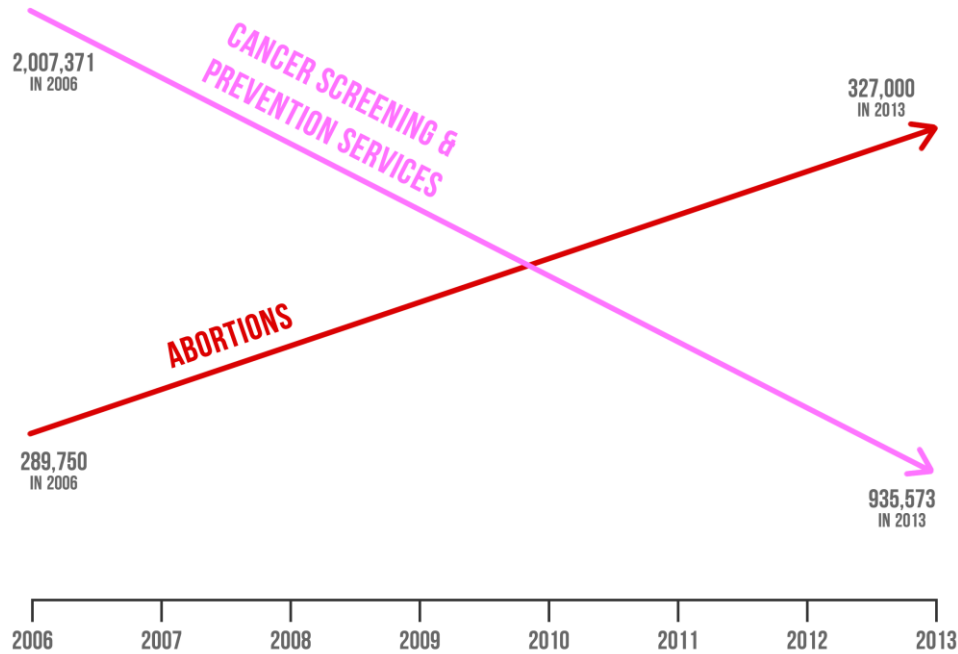
Lesson 1.1

Discussion

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PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN

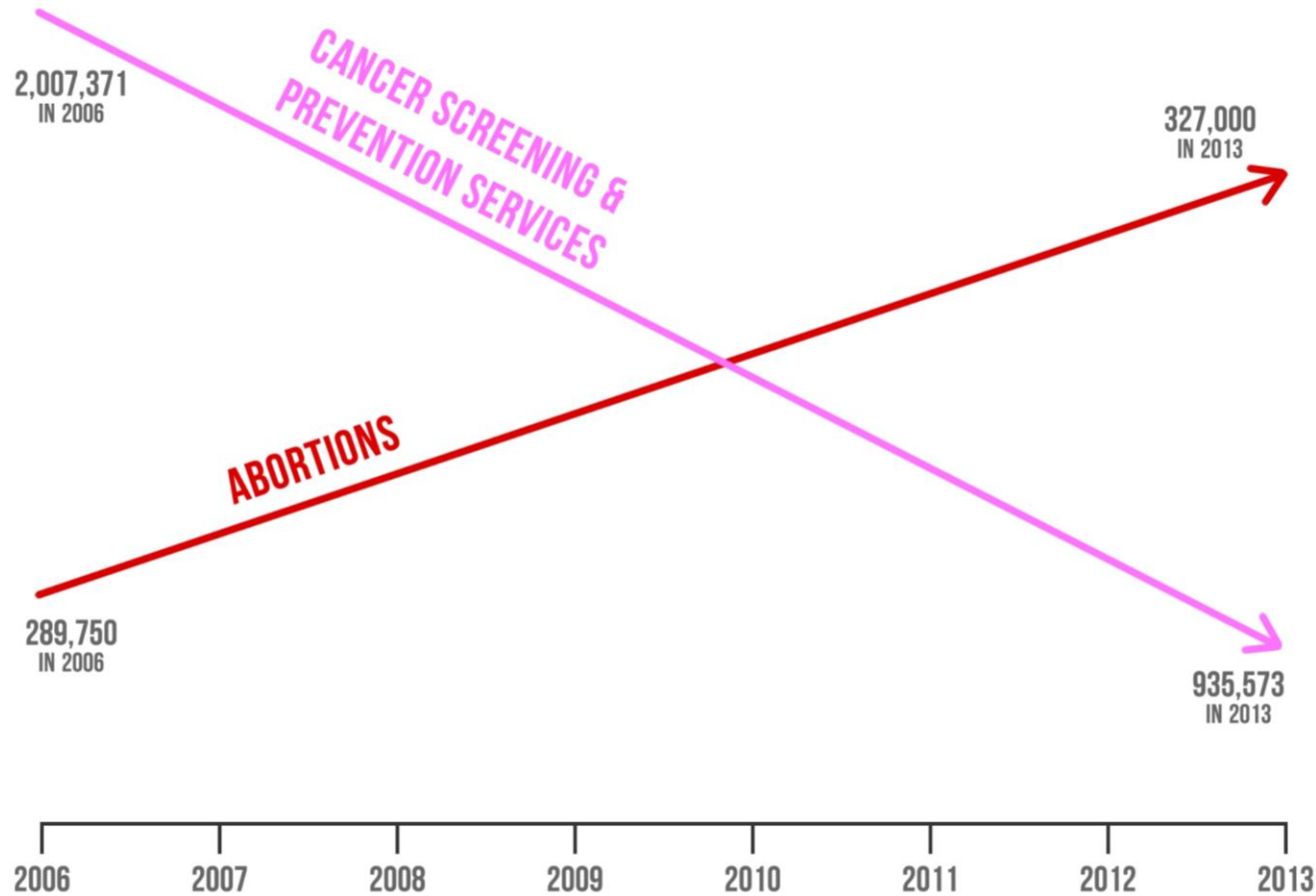


Discussion:

- Why might each graphic be misleading? Explain.



PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP — LIFE-SAVING PROCEDURES DOWN



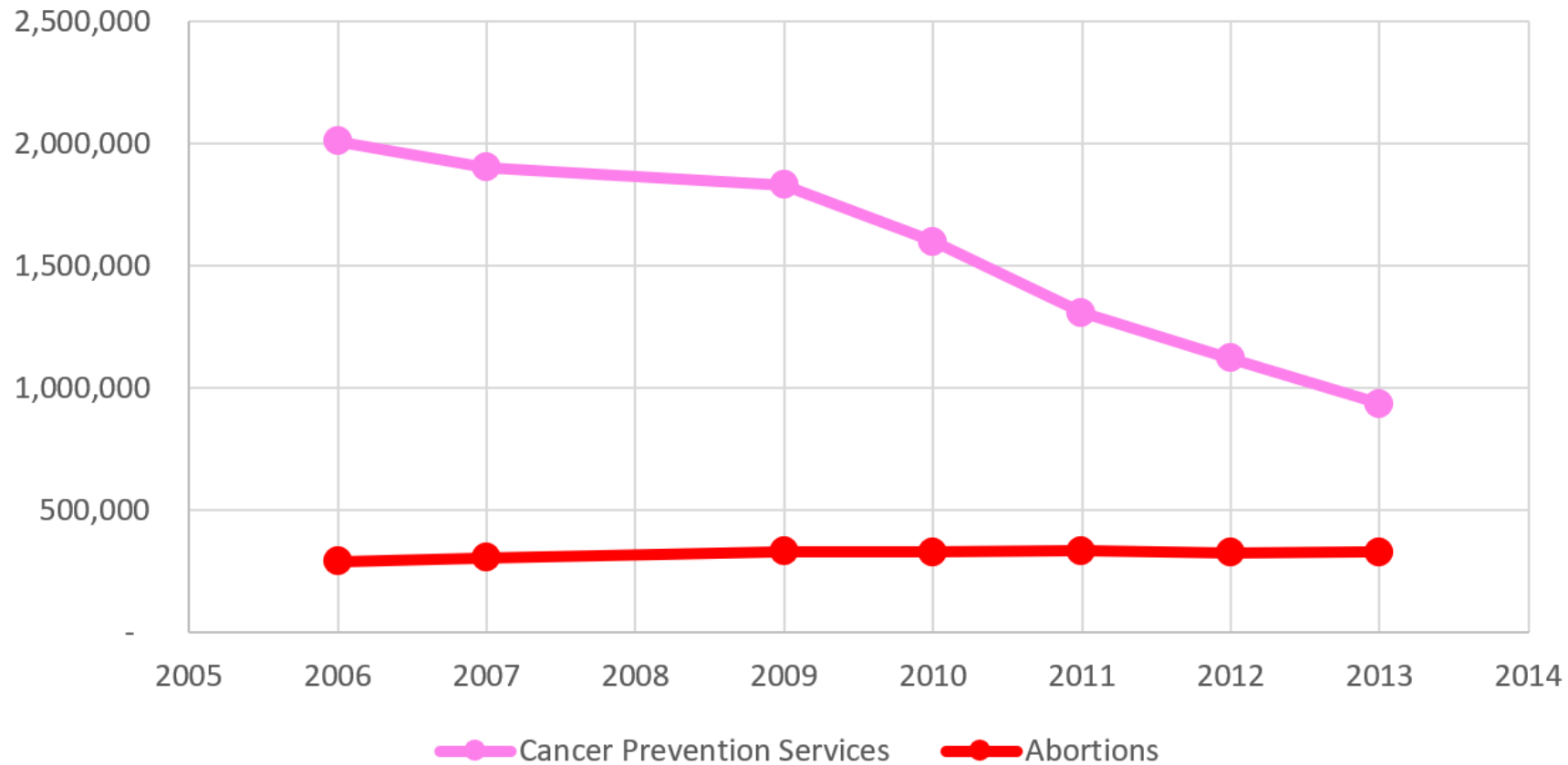
Original

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A

Planned Parenthood Services



Adjusted

Courtesy of Politifact: <https://www.politifact.com/factchecks/2015/oct/01/jason-chaffetz/chart-shown-planned-parenthood-hearing-misleading-/>

B

US REGULAR ALL FORMULATIONS GAS PRICE



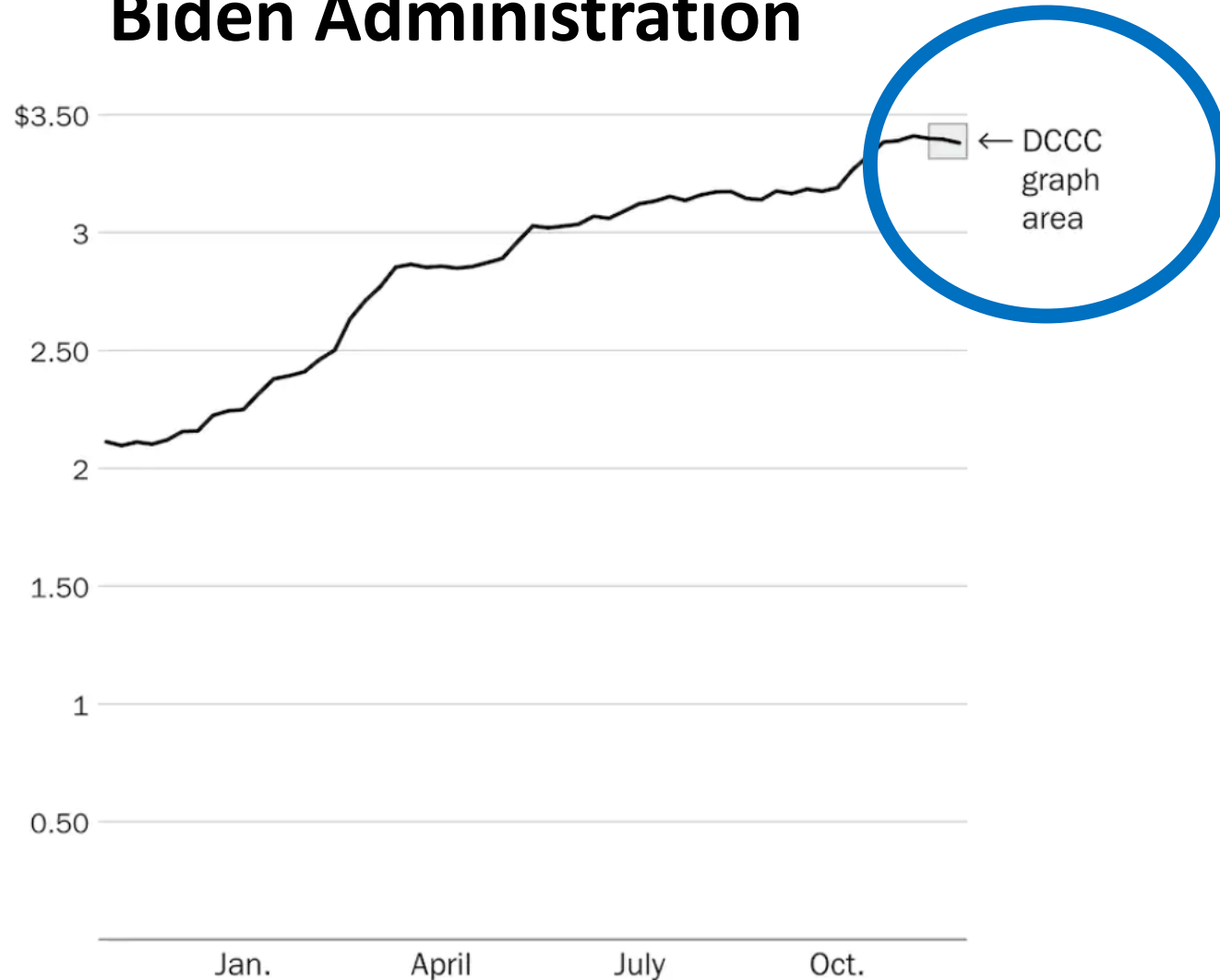
FRED Economic Data, 12/2/21



Original

B

2021 US Weekly Gas Prices, Biden Administration



Note

Adjusted

Source: Energy Information Administration

THE WASHINGTON POST

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Courtesy of Washington Post: <https://www.washingtonpost.com/politics/2021/12/02/qthis-might-be-worst-defense-biden-administration-yet/>

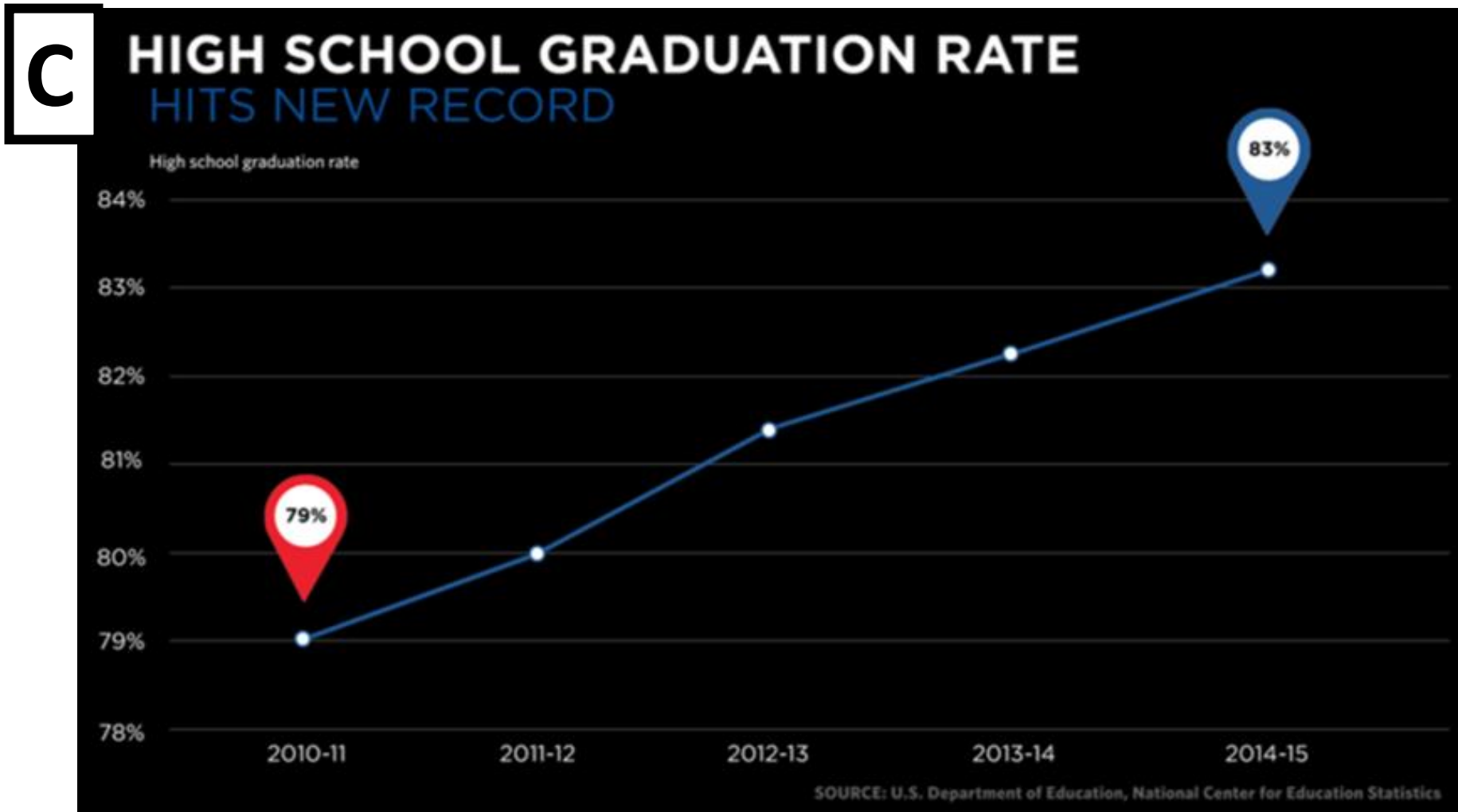
Lesson 1.1

Practice

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Original

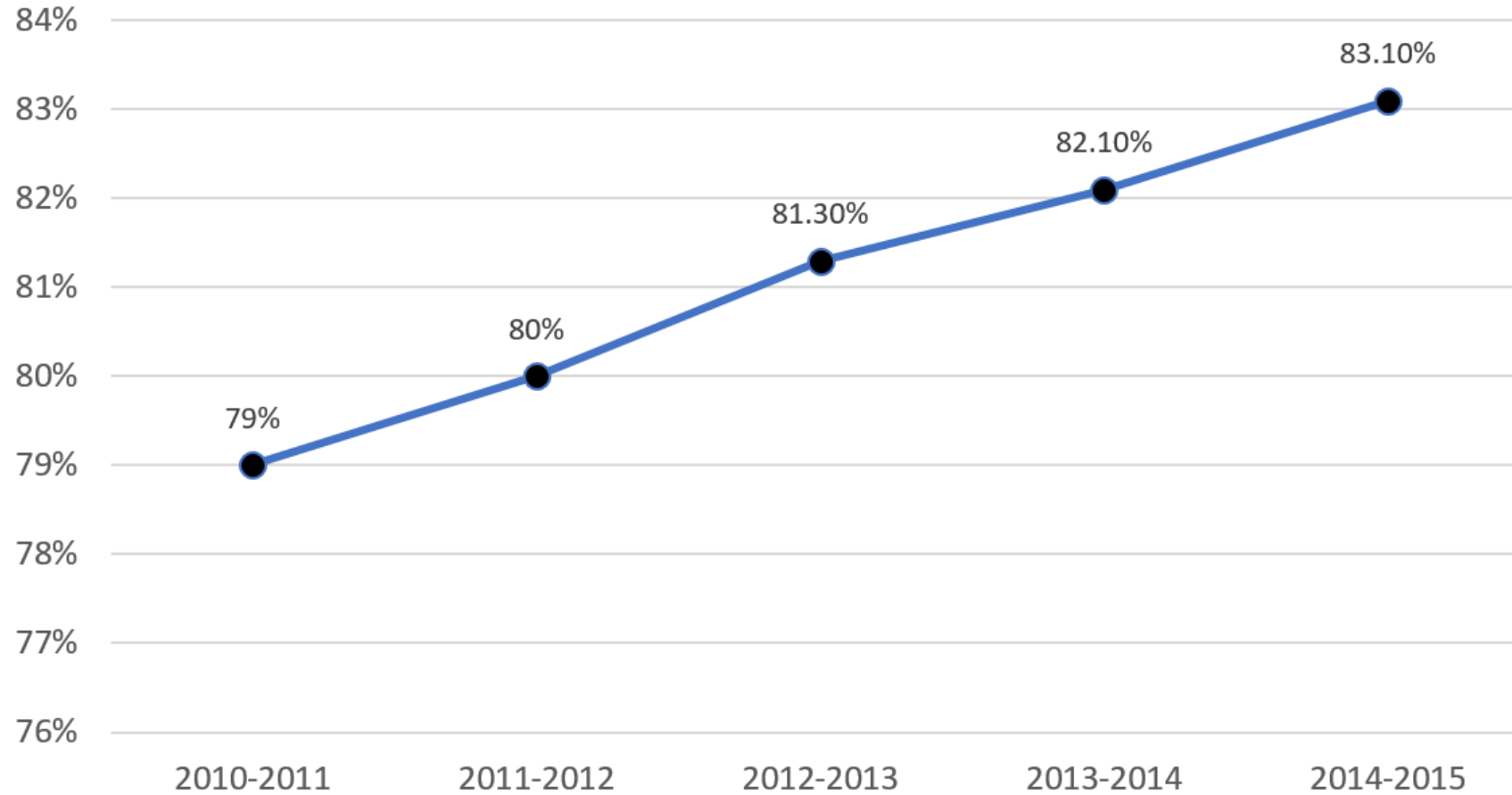


Source link: <https://obamawhitehouse.archives.gov/blog/2016/10/17/graduation-rate-reaches-new-high-one-student-shares-his-story>

Original - scale

C

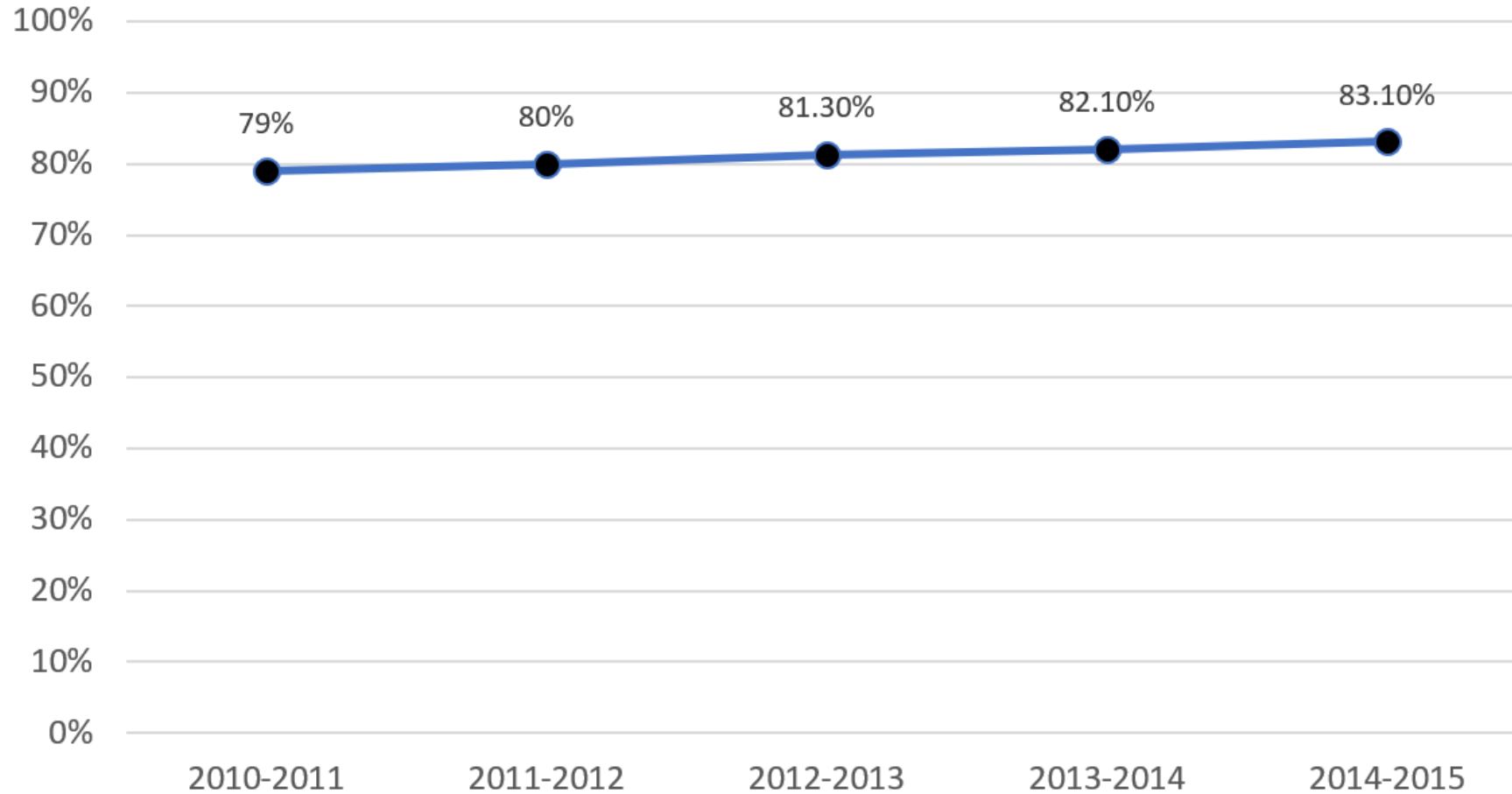
U.S. High School Graduation Rates



Adjusted

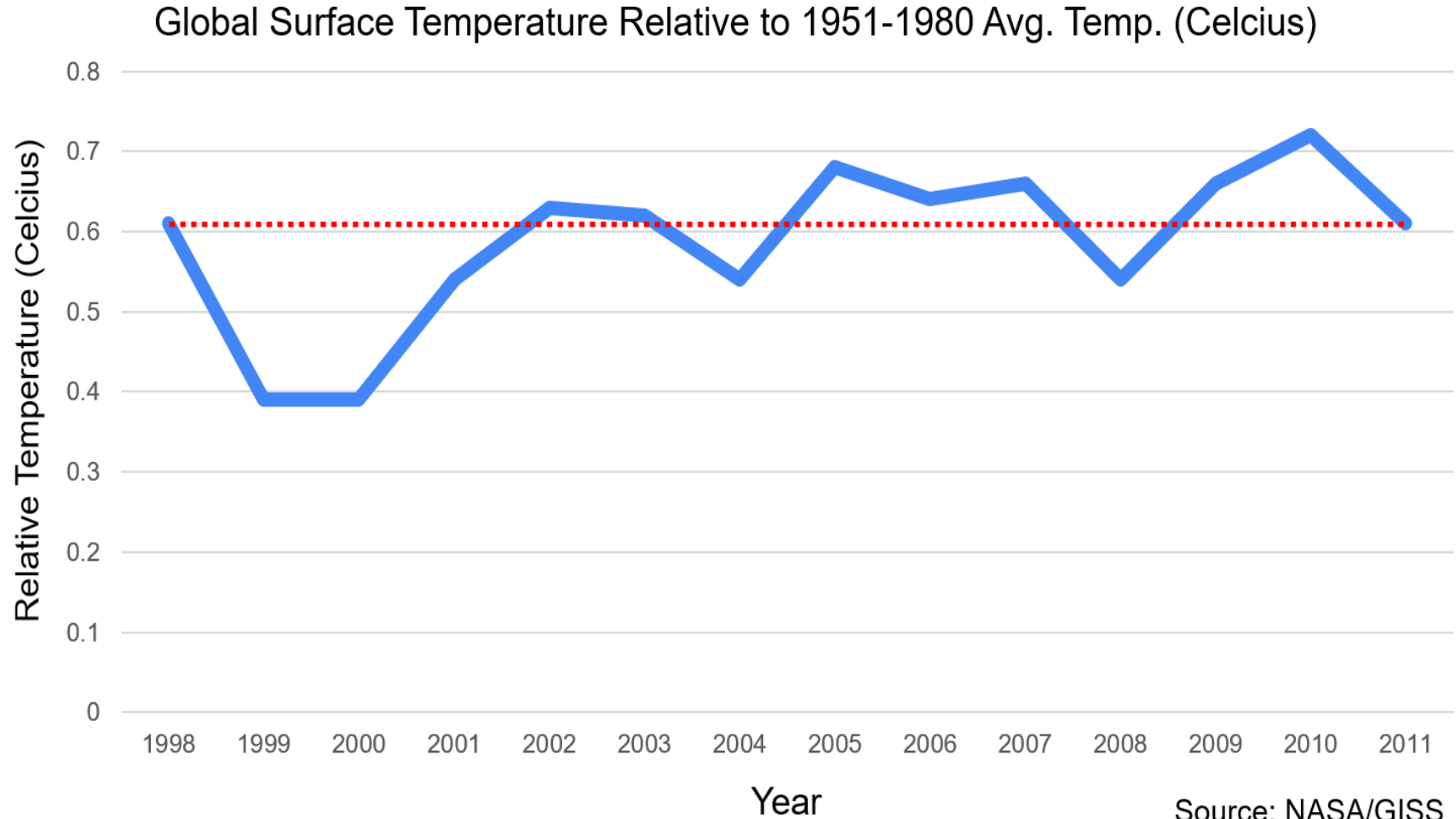
C

U.S. High School Graduation Rates



Original

D

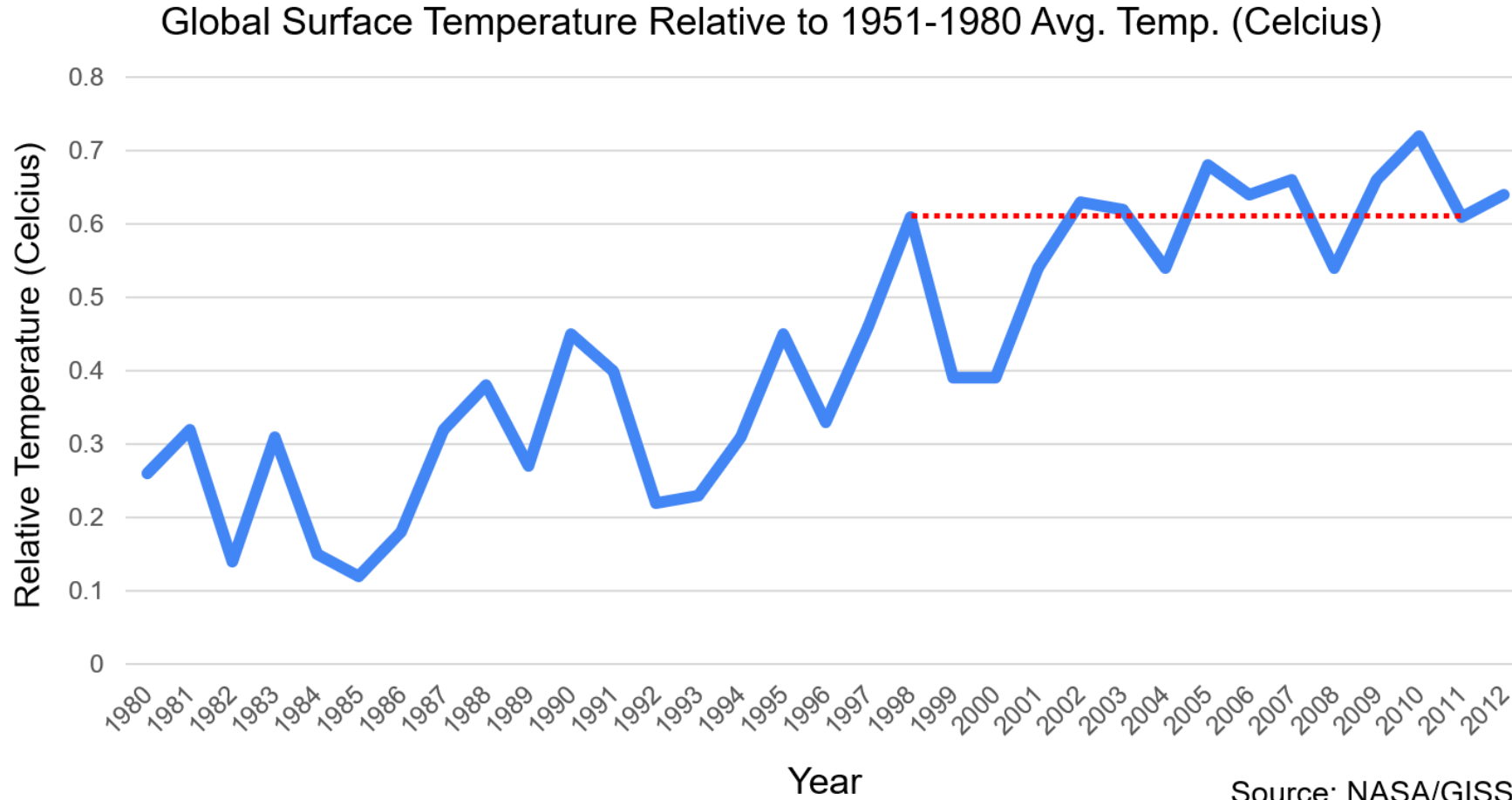


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Adjusted

D



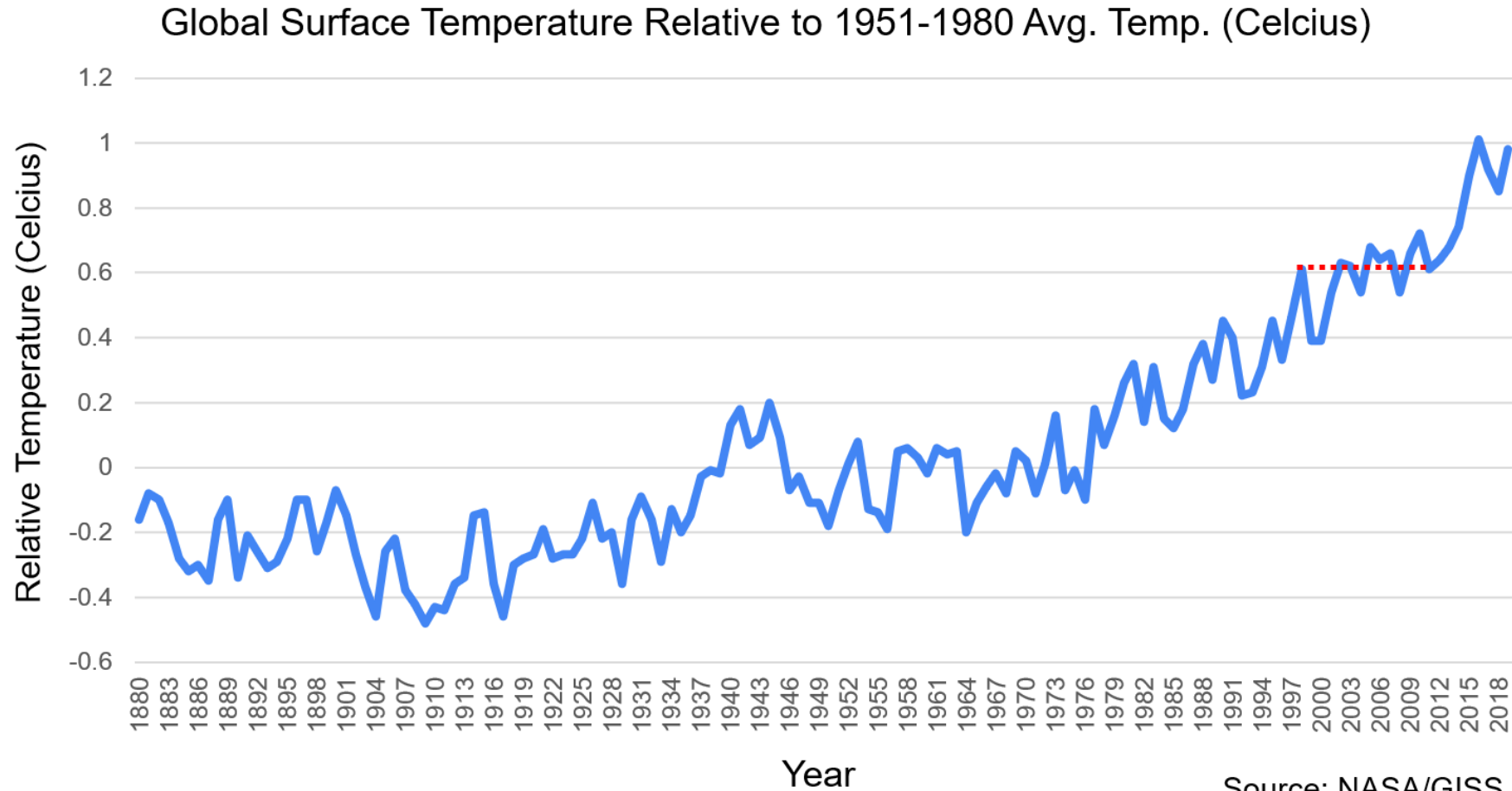
Source: NASA/GISS

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Script*

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Adjusted

D

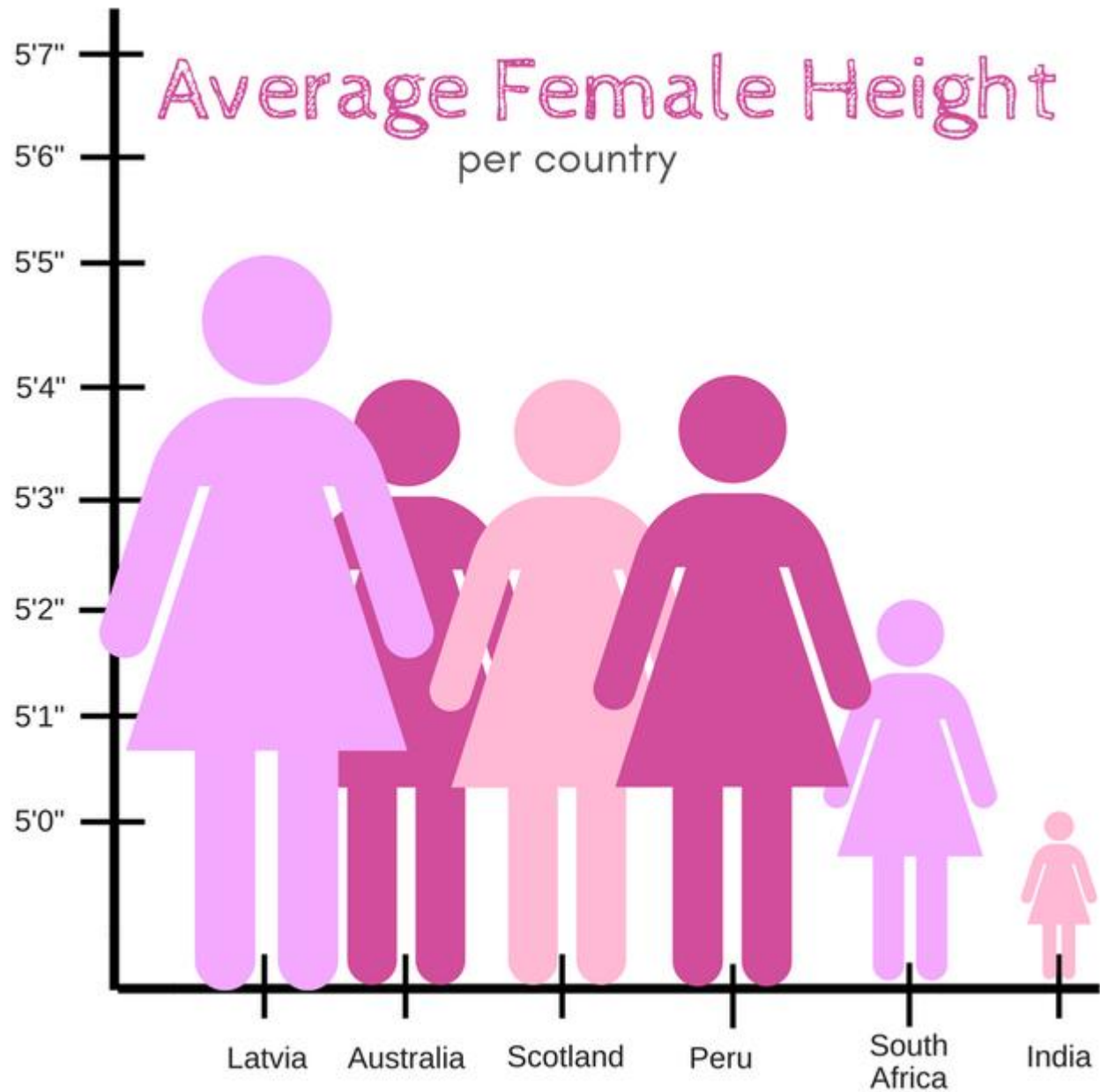


Source: NASA/GISS

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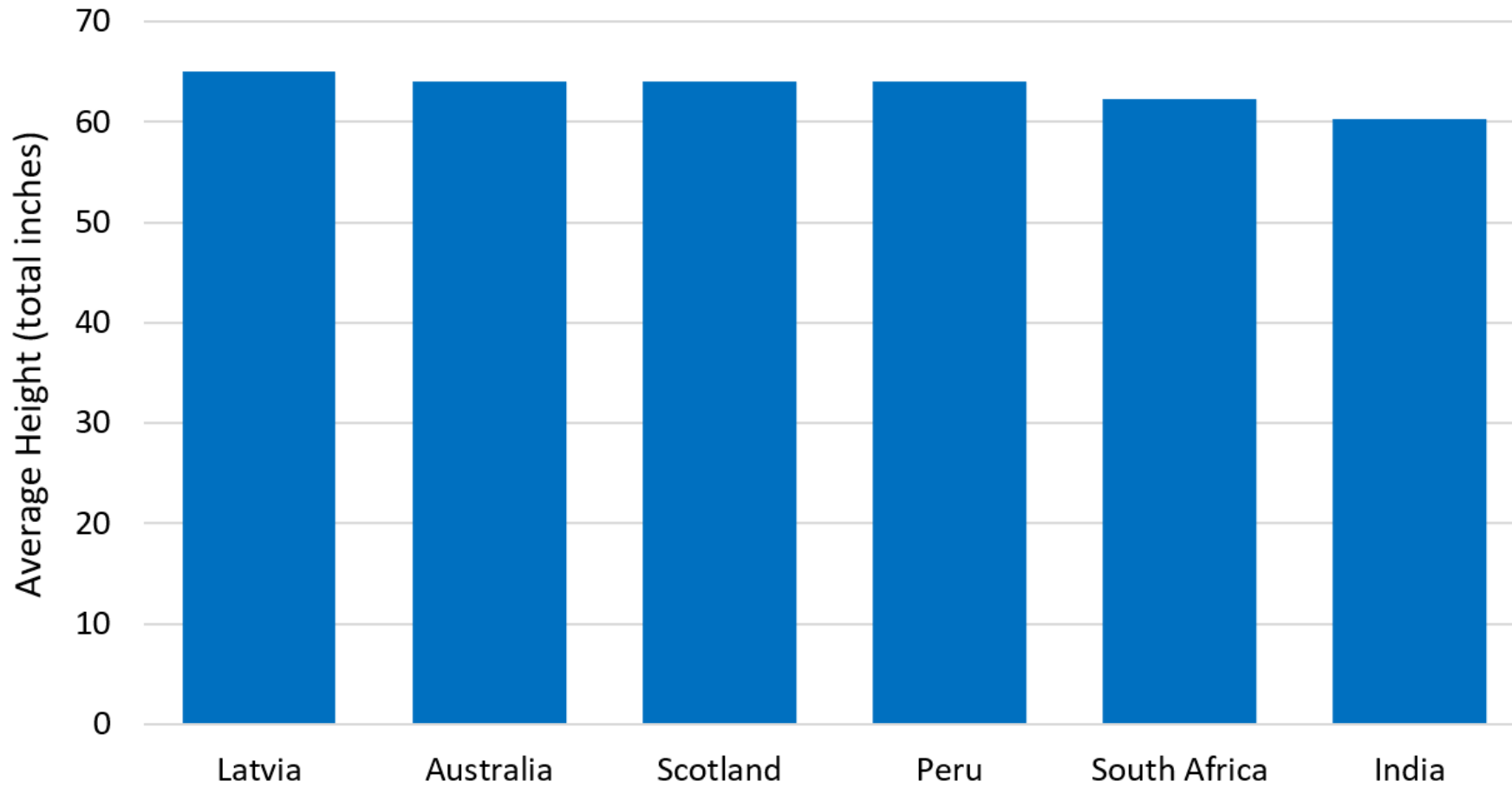
E



Original



Average Height Among Women in Different Countries



Adjusted

*Skew The
Script*

skewthescript.org