Lecture 3: Bar Graphs

February 2, 2026

Course Administration

1. Tutorial quiz 2

Course Administration

1. Tutorial quiz 2
2. Hopefully your policy brief proposal is in
   - I will give feedback by next week
   - Happy to discuss issues in office hours
3. Make sure you're checking Piazza

Course Administration

1. Tutorial quiz 2
2. Hopefully your policy brief proposal is in
   - I will give feedback by next week
   - Happy to discuss issues in office hours
3. Make sure you're checking Piazza
4. Graded tutorial quiz 1
5. How to treat Chang reading
6. Anything else?

Next Week's Good Bad and Ugly

Post by Wednesday noon by linking on google sheet. Earlier is ok.

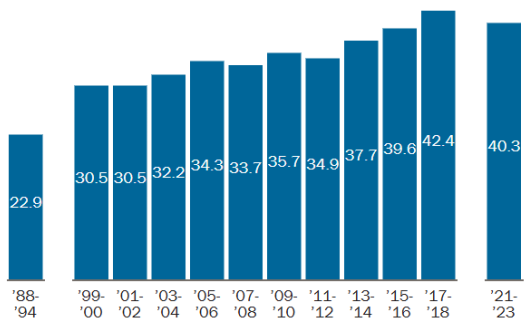
Finder	Commenter
Chase	Sawyer
Samanta	Kibin

For next week, choose a bar graph!

Samantha on Sawyer's Choice

Share of U.S. adults considered obese down slightly in recent years

% of U.S. adults ages 20 and older whose body mass index classifies them as obese



"Six facts about obesity and weight loss drugs in the U.S." Pew Research Center, Jan. 23, 2026, [link].

Plan for Today

Few Chaps. 6 (p. 87-95), 9 and 10 (p. 210-217)

1. General graph design
2. What do bars do and where do they come from?
3. Bits of bars
4. Variations: grouped, stacked, and lollipops
5. Giant numbers from WSJ
6. Example: Mediocre to better bar
7. Examine a mistaken bar

Plan for Today

Few Chaps. 6 (p. 87-95), 9 and 10 (p. 210-217)

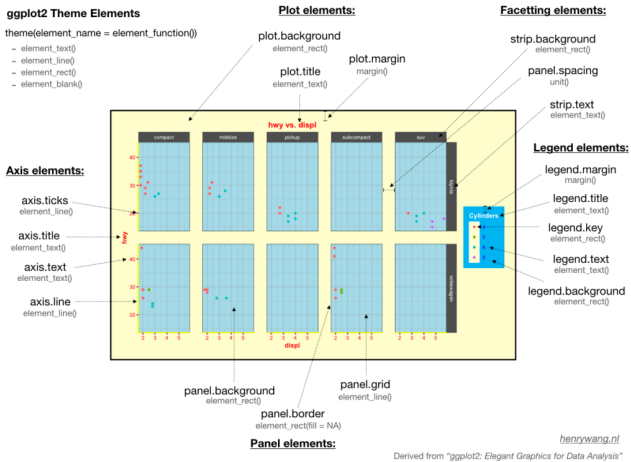
1. General graph design
2. What do bars do and where do they come from?
3. Bits of bars
4. Variations: grouped, stacked, and lollipops
5. Giant numbers from WSJ
6. Example: Mediocre to better bar
7. Examine a mistaken bar

R

1. Graphing in R via `ggplot`
2. Parts of `ggplot`
3. Bars via `ggplot`
4. Titles and axis scaling
5. Factor re-ordering
6. Summary statistics
7. Date variables

General Graph Design

All of the Elements that Create a Chart



Thank you Henry [Wang].

Few: Three Primary Ways to Convey Information

1. Form
2. Color
3. Spatial Position

Leading to Two Key Rules for All Graphics

1. Avoid 3D

Leading to Two Key Rules for All Graphics

1. Avoid 3D
2. Maintain visual correspondence to quantity

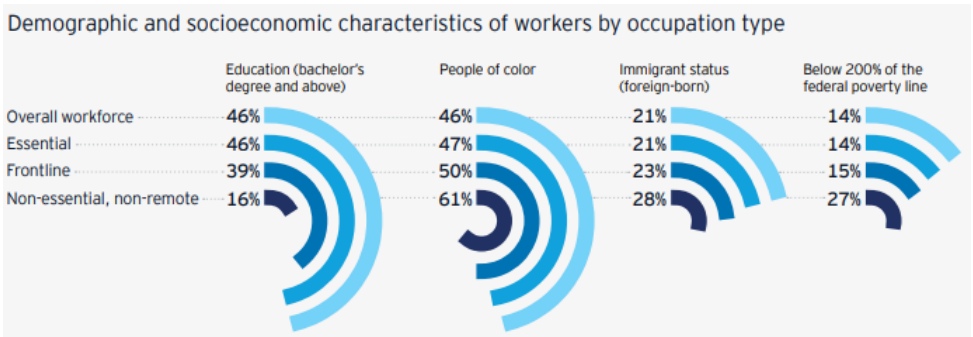
Leading to Two Key Rules for All Graphics

1. Avoid 3D
2. Maintain visual correspondence to quantity – how do we see quantity?

Leading to Two Key Rules for All Graphics

1. Avoid 3D
2. Maintain visual correspondence to quantity – how do we see quantity?
   - length
   - 2-d spatial position

When You Don't Maintain Visual Correspondence to Quantity



Remote Work in the Capital Region, 2021, Greater Washington Partnership.

Bar Charts

Bars Outline

Big idea: relative size

1. What do bars do and where do they come from?
2. General principles for bar charts
3. Variations: grouped, stacked, and lollipops
4. Giant numbers from WSJ
5. Example: Mediocre to better bar
6. A bar mistake

1. What Does a Bar Chart Do?

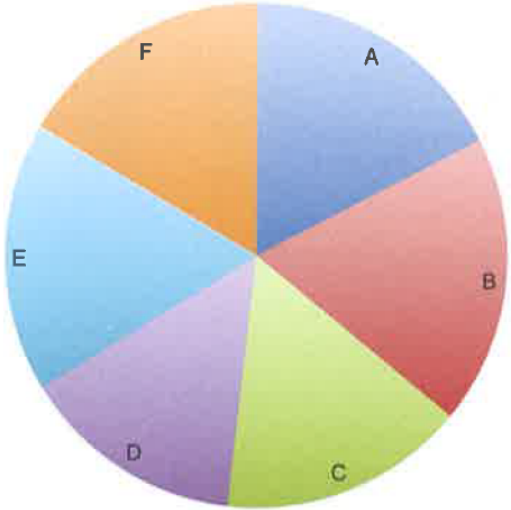
Bars compare quantities across categories

1. What Does a Bar Chart Do?

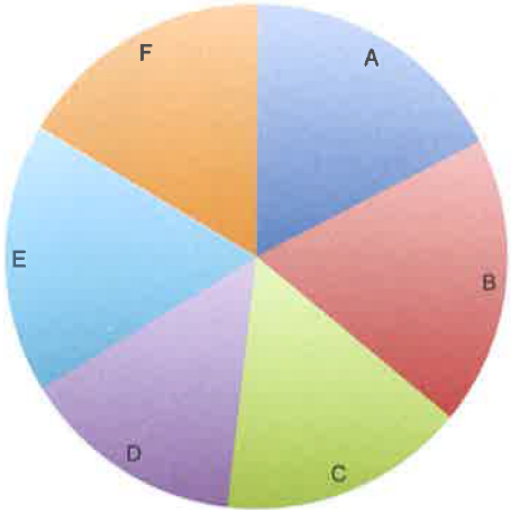
Bars compare quantities across categories

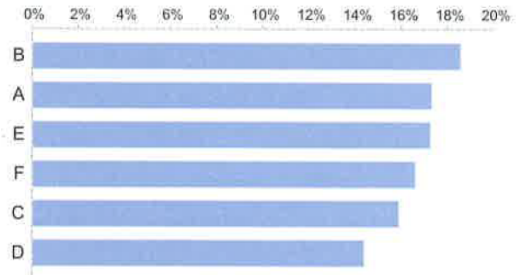
- Quantities can be shares or levels
- Design can emphasize rank order
- Highlight one level relative to others

When Shape Doesn't Do What You'd Hoped



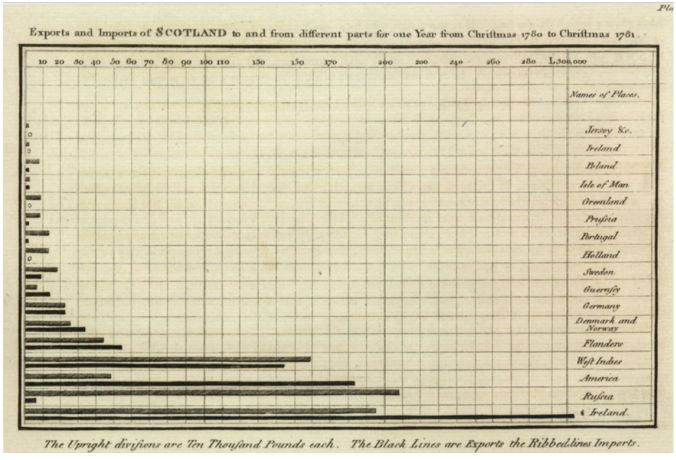
When Shape Doesn't Do What You'd Hoped





Few 6.11 and 6.12

The First Bar Chart



Playfair, William, 1786. *The Commercial and Political Atlas*

An Aside on William Playfair

- 1759-1823
- 5th of 8 children
- Largely educated by his brother who became a famous mathematician
- Apprenticed to inventor of steam engine
- Engaged in multiple successful and then unsuccessful business ventures

- Late 1790s in debtor's prison
- Blackmailer
- May have stormed the Bastille
- Primary inventor of statistical graphics
  - bar chart
  - line chart
  - pie chart (not so great)
- Motivated by Priestly's sensation

See also here.

2. General Principles for Bar Charts

- Orientation
- Proximity
- Fills
- Borders
- Base value

Taken from Few Ch. 10, p. 210

Orientation & Proximity

Orientation: Bars horizontal or vertical?

- Horizontal better to fit in long lables
- Vertical better if axis is time

Orientation & Proximity

Orientation: Bars horizontal or vertical?

- Horizontal better to fit in long lables
- Vertical better if axis is time

Proximity – How close should the bars be?

- You want mostly bars, not mostly white space
- But not touching bars
- Why not touching bars?

Orientation & Proximity

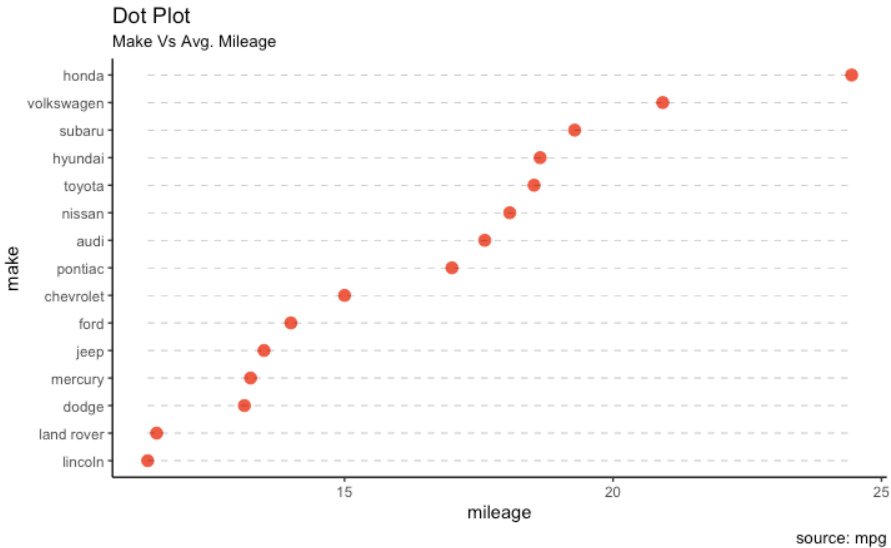
Orientation: Bars horizontal or vertical?

- Horizontal better to fit in long lables
- Vertical better if axis is time

Proximity – How close should the bars be?

- You want mostly bars, not mostly white space
- But not touching bars
- Why not touching bars?
- **Rank when you want to highlight ordering**

Ranked Almost-Bars



Fills

Do Not

- Use color as decoration
- Use hashed or lined fills

Do

- As much as possible, put legend directly on the graph
- Highlight with color

Fills

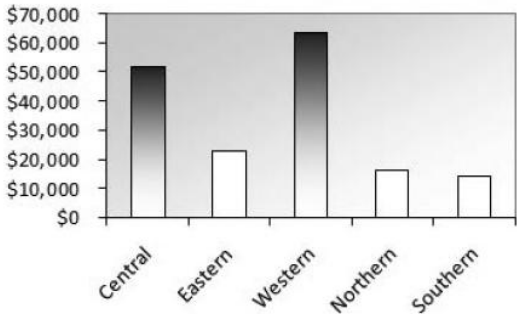
Do Not

- Use color as decoration
- Use hashed or lined fills

Do

- As much as possible, put legend directly on the graph
- Highlight with color

An Uninspiring Example



Fill source is Excel 2007

Borders and Base Value

Borders

- Use sparingly to highlight
- Colors are better for highlighting

Borders and Base Value

Borders

- Use sparingly to highlight
- Colors are better for highlighting

Base Value

Bars Must Start at Zero!

Borders and Base Value

Borders

- Use sparingly to highlight
- Colors are better for highlighting

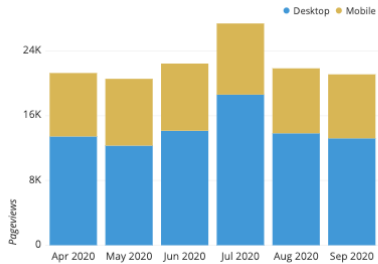
Base Value

Bars Must Start at Zero!

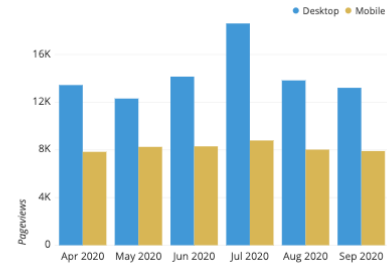
Why?

3. Bar Variations

Stacked bars



Grouped bars



Thank you Atlassian.

3. Why Choose a Particular Bar Variation?

Stacked bars

3. Why Choose a Particular Bar Variation?

Stacked bars

- Shows parts of whole
- Emphasizes comparison of totals

3. Why Choose a Particular Bar Variation?

Stacked bars

- Shows parts of whole
- Emphasizes comparison of totals

Grouped bars

3. Why Choose a Particular Bar Variation?

Stacked bars

- Shows parts of whole
- Emphasizes comparison of totals

Grouped bars

- Compares within group
- Emphasizes comparison of parts

3. Why Choose a Particular Bar Variation?

Stacked bars

- Shows parts of whole
- Emphasizes comparison of totals

Grouped bars

- Compares within group
- Emphasizes comparison of parts

Lollipops

3. Why Choose a Particular Bar Variation?

Stacked bars

- Shows parts of whole
- Emphasizes comparison of totals

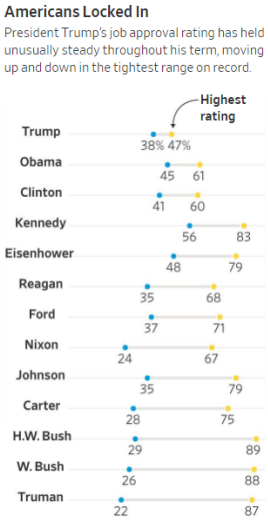
Grouped bars

- Compares within group
- Emphasizes comparison of parts

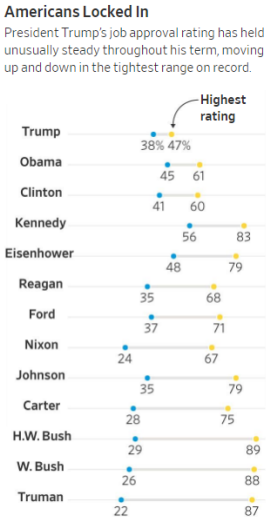
Lollipops

- Can work like a bar
- Can also show within-group differences

The Power of Lollipops

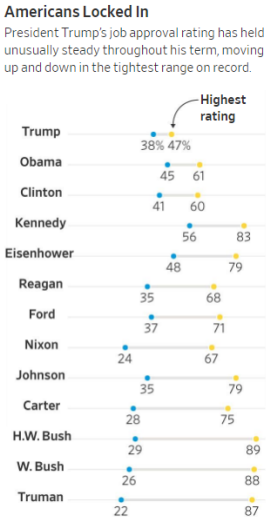


The Power of Lollipops



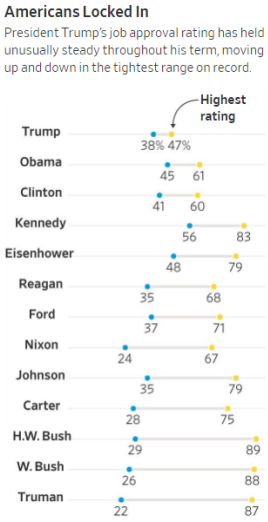
What is the point?

The Power of Lollipops



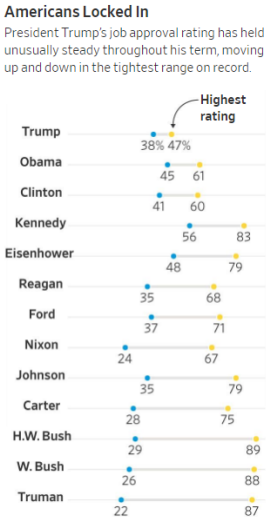
What is the point?
What is this doing that a bar cannot?

The Power of Lollipops



What is the point?
What is this doing that a bar cannot?
What info does this convey?

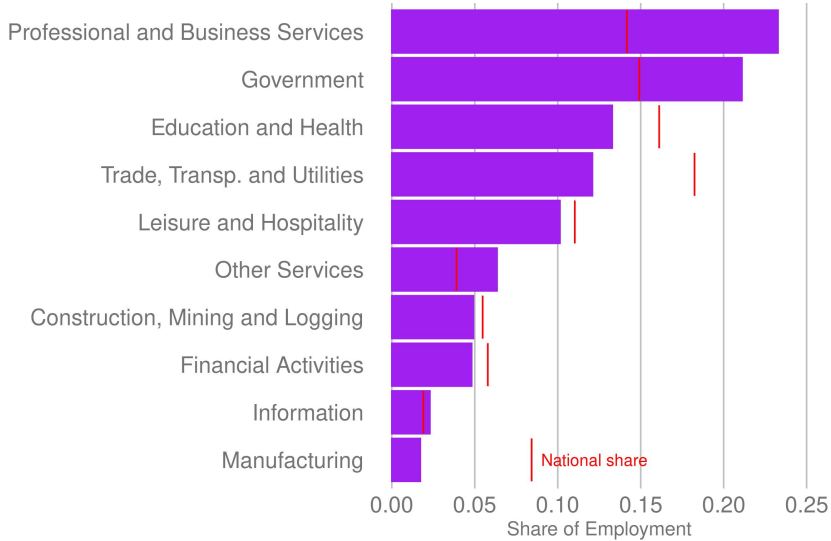
The Power of Lollipops



What is the point?
What is this doing that a bar cannot?
What info does this convey?

- max and min
- approximately the variance
- by administration
- so a trend in variance!
- note the point in the title

Showing More than One Number Per Bar



When the Number is Too Big for a Bar

People really have trouble with big numbers

- is $2 billion a large part of a $4 trillion budget?

When the Number is Too Big for a Bar

People really have trouble with big numbers

- is $2 billion a large part of a $4 trillion budget?

Microsoft plan for conveying big numbers, from *WSJ*

- attribute
- scaling factor
- reference

When the Number is Too Big for a Bar

People really have trouble with big numbers

- is $2 billion a large part of a $4 trillion budget?

Microsoft plan for conveying big numbers, from *WSJ*

- attribute
- scaling factor
- reference

"a conservation group that reclaimed about 100 million acres of land across the Earth. ... How big do you think that is?"

When the Number is Too Big for a Bar

People really have trouble with big numbers

- is $2 billion a large part of a $4 trillion budget?

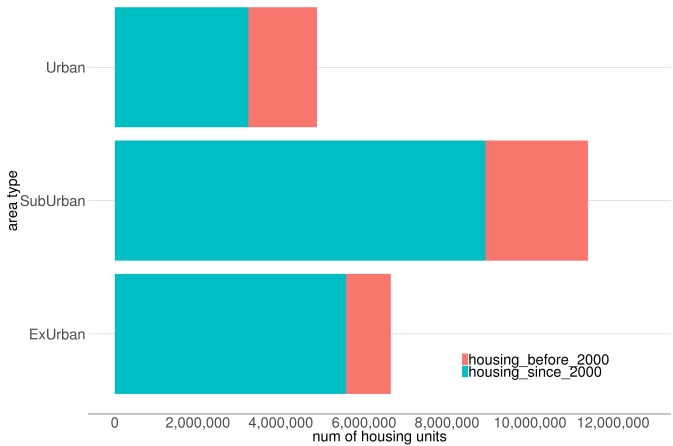
Microsoft plan for conveying big numbers, from *WSJ*

- attribute
- scaling factor
- reference

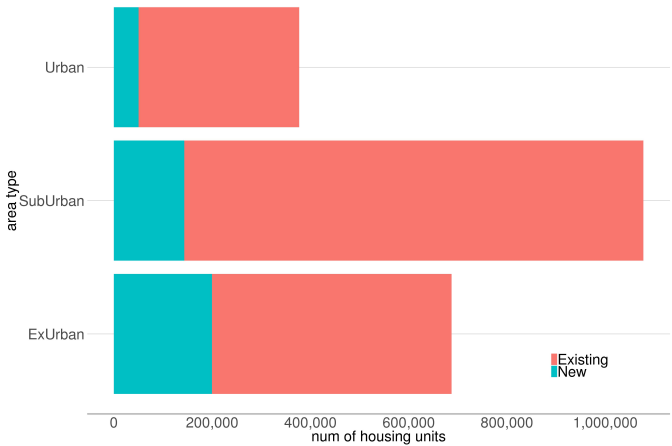
"a conservation group that reclaimed about 100 million acres of land across the Earth. ... How big do you think that is?"

About as big as (1.15x = scaling factor) California (reference)

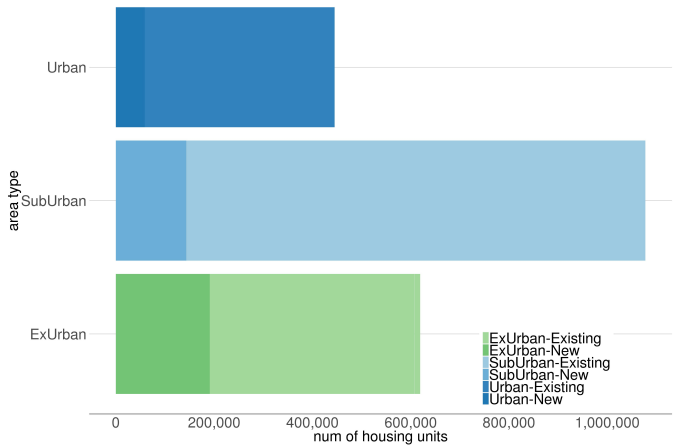
Going From a Bad Bar Chart to a Decent One



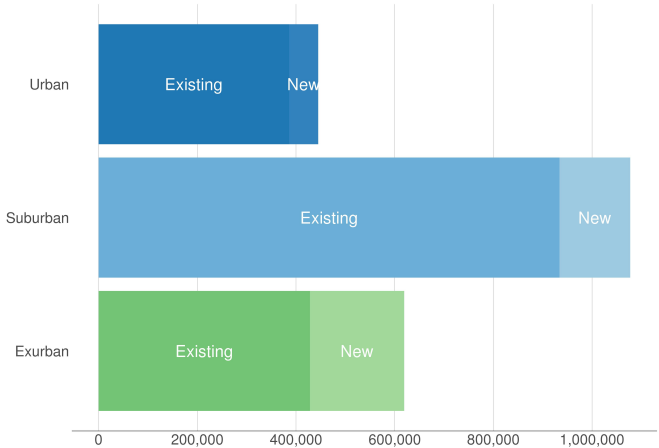
Going From a Bad Bar Chart to a Decent One



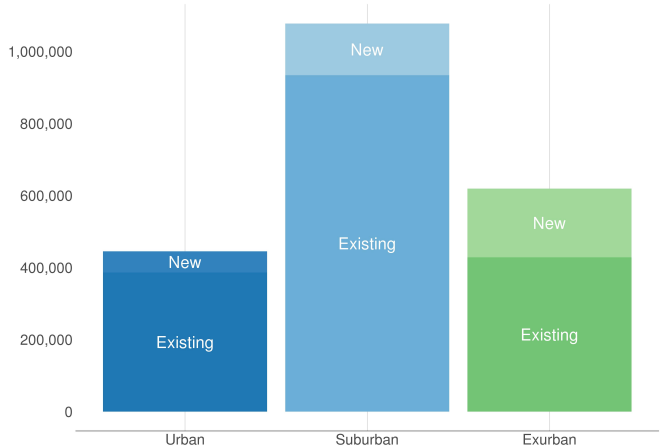
Going From a Bad Bar Chart to a Decent One



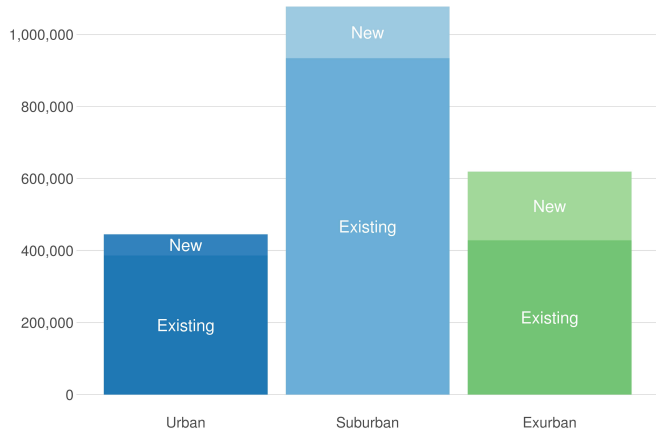
Going From a Bad Bar Chart to a Decent One



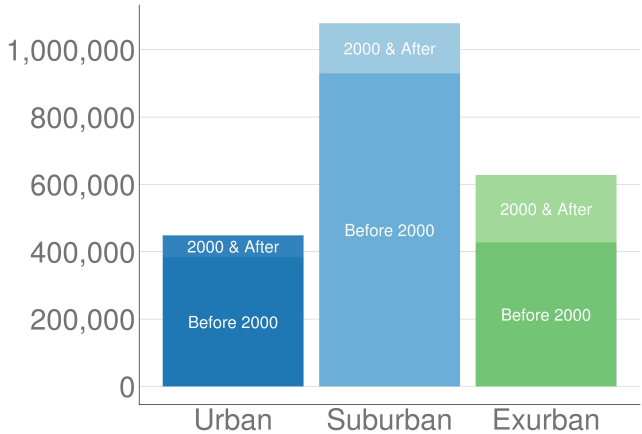
Going From a Bad Bar Chart to a Decent One



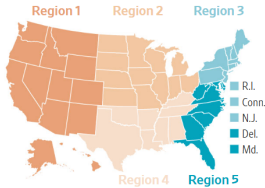
Going From a Bad Bar Chart to a Decent One



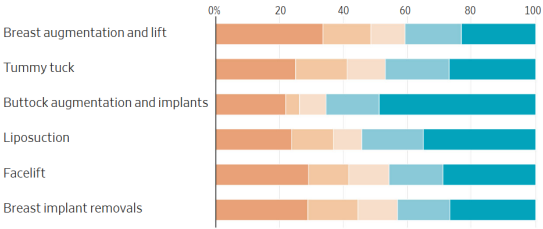
Going From a Bad Bar Chart to a Decent One



A Bar Mistake



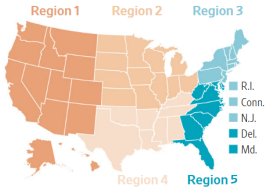
Share of plastic surgery procedures by type, 2024

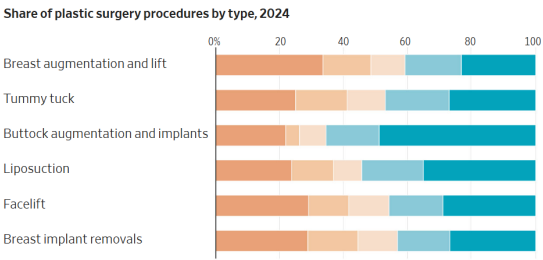


Goal of article: show different plastic surgery types by region

Why does this graph fail at this?

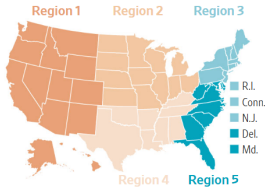
Potential Solutions

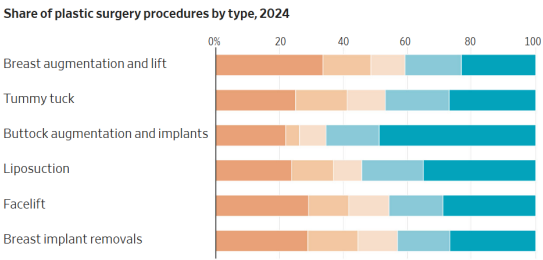




Solutions?

Potential Solutions





Solutions?

- Bars are region: share by type
- Report per capita surgery by region
- Report surgery relative to one region by type

R: Finally, Graphs!

Next Class

- I'm here till 5:20 for questions on anything
- Quiz on Tutorial 3
- Few, Chapter 6, pages 117-127
- Chang, Chapter 6 (through 6.5)