Interpreting Graphical Displays - Answers

Below are links to graphical displays in published research or published data analyses. Normally graphical displays can be found in the Results sections of published studies, but they also appear in common new articles, blogs, and similar informational pieces.

(a) Find and review Figure 1 in Smith, Smith, Gilmore, and Jameson (2012).

Smith, J. K., Smith, L. F., Gilmore, A., & Jameson, M. (2012). Students' self-perception of reading ability, enjoyment of reading and reading achievement. *Learning and individual differences*, *22*(2), 202-206.

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/2012-Smith-Reading-Ability.pdf

1. Which has the higher Reading Achievement score, the 75th percentile for year 4 students, or the median for year 8 students?

Year 4 75th percentile reading achievement score is about 59,
Year 8 50th percentile (median) reading achievement score is about 63,
so the Year 8 50th percentile is higher

2. What do the dots below the box plot for Year 8 represent?

Those are typically individual scores that are judged to be outliers and below what is typical. There appears to be 5 or more outliers for Year 8 student Reading Achievement scores, and all appear to be below a score of 40.

3. The middle 50% of Year 4 scores lie between the 25th and 75th percentiles. What are the Reading Achievement scores that correspond to the 25th and 75th percentiles for Year 4 students?

The 25th percentile appears to correspond to a Reading Achievement score of 39 and the 75th percentile appears to have a Reading Achievement score of about 59.

4. What is the range of Reading Achievement scores for Year 4 students?

The maximum and minimum scores appear to be 80 and 10 for Year 4 students, so the range is 80 - 10 = 70 points.

(b) Locate Figure 1 in Blascovich, Spencer, Quinn, and Steele (2001).

Blascovich, J., Spencer, S. J., Quinn, D., & Steele, C. (2001). African Americans and high blood pressure: The role of stereotype threat. *Psychological science*, *12*(3), 225-229.

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/2001-Blascovich-Blood-Pressure.pdf

5. Which and how many variables are presented in Figure 1?

Four variables:
- **Mean Blood Pressure**
- **Time in Minutes**
- **Race (AA vs EA)**
- **Stereotype Threat (Low vs High)**

6. Under what conditions do clear differences in blood pressure emerge for these data?

Blood pressure is higher when
- **Minutes = 13 or higher**
- **Race is African American**
- **Stereotype Threat = High**

The data show that after minute 13, African-American participants with high stereotype threat had higher blood pressure than African-Americans with low stereotype threat or European-Americans with low or high stereotype threat.

(c) Study Figure 1 in Mattox,Hancock, and Queen (2005).

Mattox, K., Hancock, D. R., & Queen, J. A. (2005). The effect of block scheduling on middle school students' mathematics achievement. *NASSP Bulletin*, *89*(642), 3-13.

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/2005-Mattox-Block-Scheduling-a.pdf

7. Which and how many variables are presented in Figure 1?

Four variables:
- **Achievement**
- **Academic Year**
- **Scheduling Condition (non-block vs block)**
- **School (A through E)**

8. Examine the achievement scores as plotted. What pattern emerges for the achievement data over time?

Achievement appears to increase over time across all schools and for each school.

9. Examine the achievement scores as plotted. What appears to be the cause for the pattern of achievement observed?
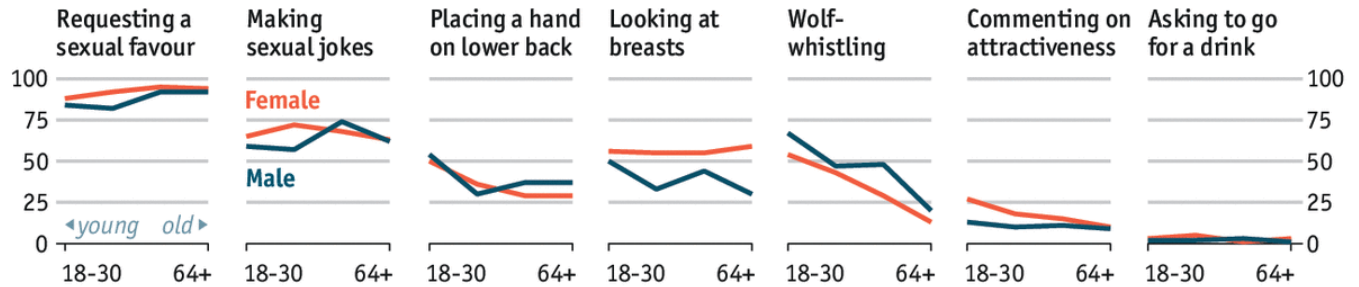
Time or scheduling, but scheduling appears to be the primary cause for increase in achievement. Isolate and examine the achievement data from 94-95 to 96-97; there is no clear growth except for School C. Now add the achievement data for 97-98 to 99-00; note that all schools show increases from the 94-95 to 96-97 baseline data. The change in block scheduling occurred between the 96-97 and 97-98 years, the same year a pattern of growth emerges. This suggest block scheduling resulted in better achievement on average.
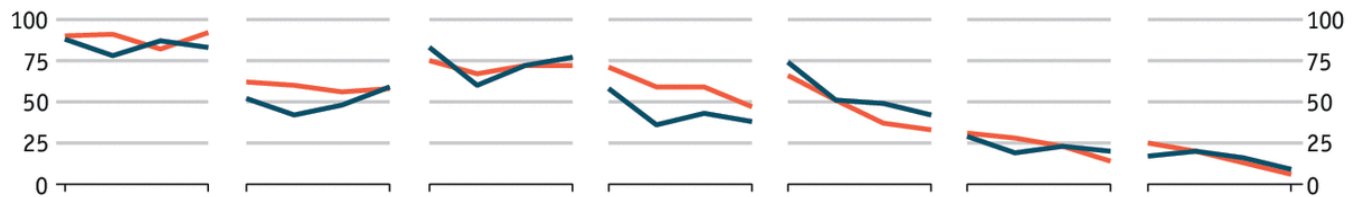
(d) Review the graphic "My eyes are up here."

My eyes are up here

"Would you consider it sexual harassment if a man, who was not a romantic partner, did the following to a woman?"
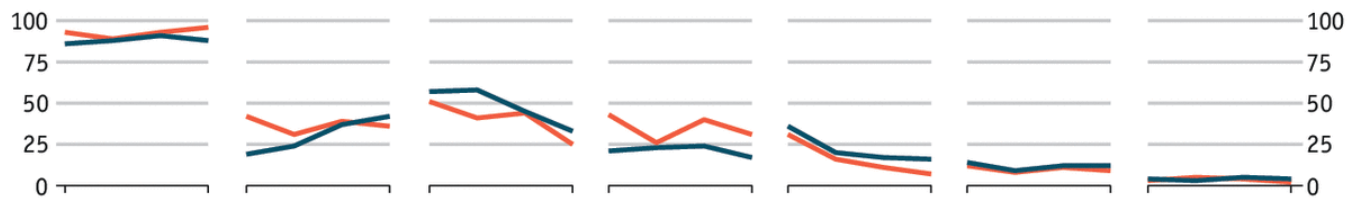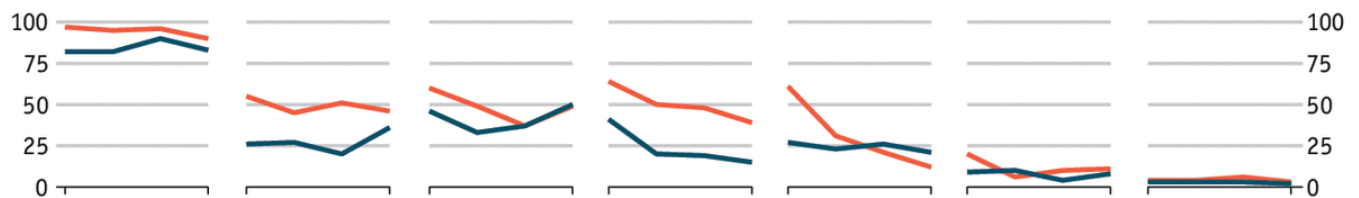Respondents stating "always" or "usually"*, %

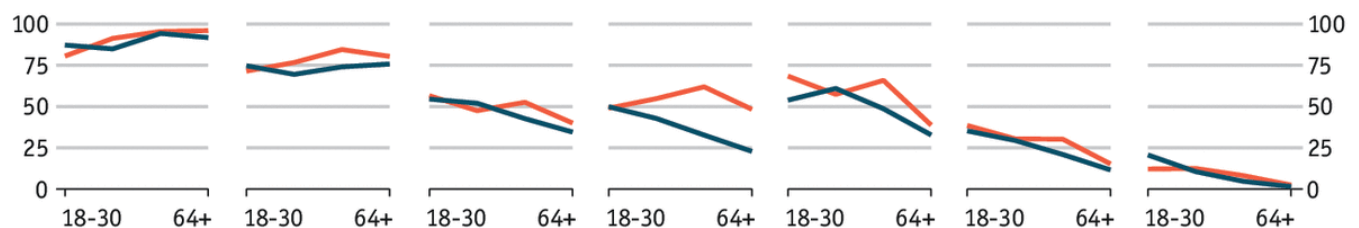Sources: YouGov; *The Economist*

*Surveyed Oct-Nov 2017

Economist.com

Source: https://www.economist.com/graphic-detail/2017/11/17/over-friendly-or-sexual-harassment-it-depends-partly-on-whom-you-ask

10. Which and how many variables are presented in figure "My eyes are up here"?

Five variables:
- **Country (Britain, France, Germany, Sweden, United States)**
- **Respondent sex (female vs male)**
- **Respondent age (18 to 64+)**
- **Percentage agreement with each activity (0% to 100%)**
- **Activity**
  - **Requesting a sexual favour**
  - **Make sexual jokes**
  - **Placing a hand on lower back**
  - **Looking at breasts**
  - **Wolf-whistling**
  - **Commenting on attractiveness**
  - **Asking to go for a drink**

11. For which countries does a man asking a woman to go have a drink appear to more likely be interpreted as sexual harassment?

France and the United States

12. For which age group in the two countries identified above does a man asking a woman to go have a drink appear to be interpreted more strongly as sexual harassment?

Younger participants were more likely to see this activity as sexual harassment.

13. Across all five countries, which activity are females consistently more likely to rate as sexual harassment when compared to men?

Looking at breasts - females almost uniformly rater higher than men, across all five countries, that this is a form of sexual harassment.

14. Which activity is mostly likely to be considered sexual harassment by both females and males and across all countries?

Requesting a sexual favour has consistently the highest agreement to be a form of sexual harassment.

15. Carefully review each activity type and levels of agreement across all countries. Which country seems to be the most tolerant of these activities (i.e., least likely to rate activities as sexual harassment)? For this item, omit the activity "Requesting a sexual favour" since it has high agreement for all countries.

Germany consistently has lower agreement levels that each activity is a form of sexual harassment.

16. What is the only activity in which males may have higher agreement than females that it is a form of sexual harassment?

Wolf-whistling - see agreement levels for Britain, France, and Germany.

(f) Review the "Age vs. Salary" scatterplot below.

Source: https://www.datarevelations.com/marginal-histograms.html
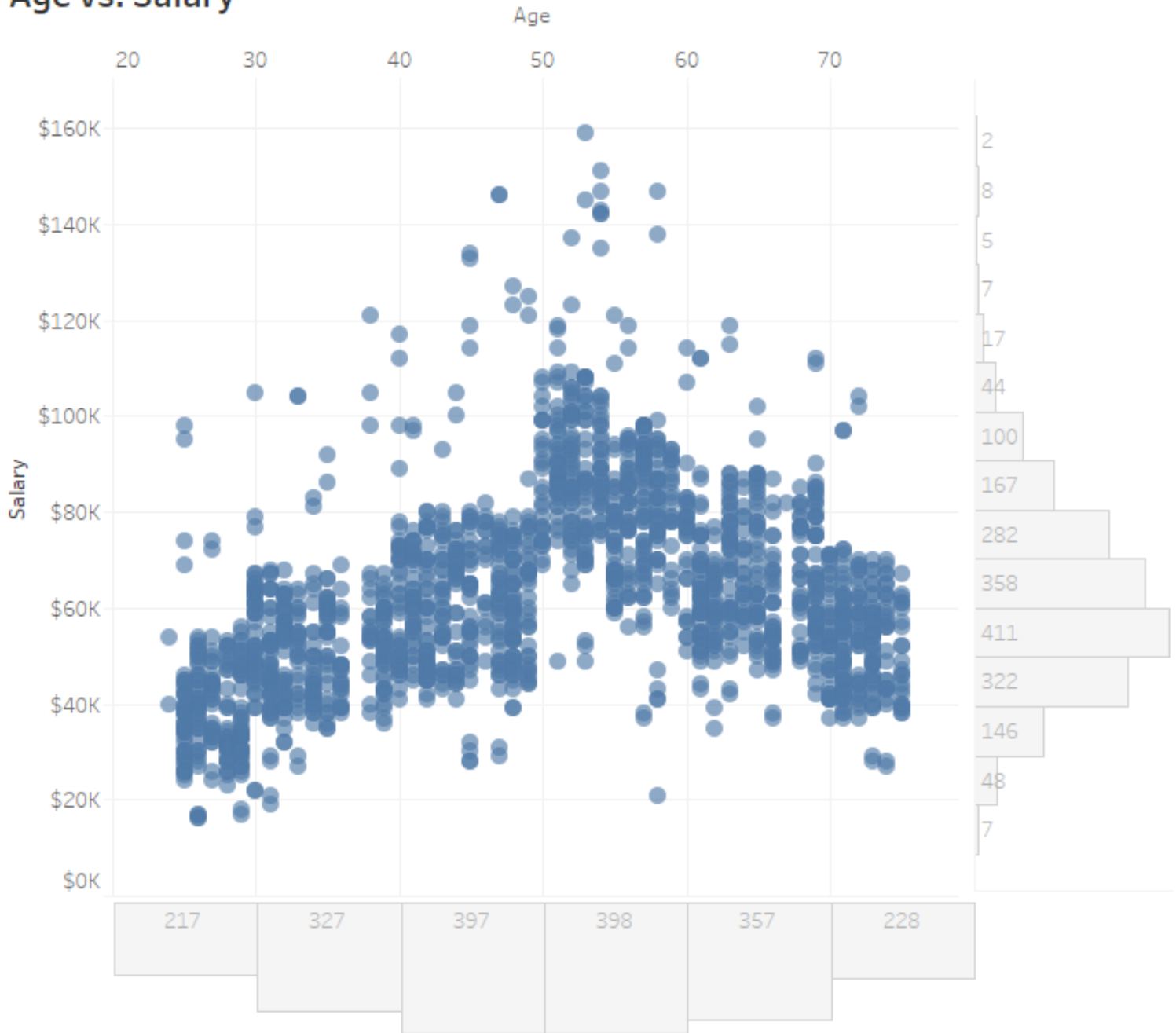
17. How would you describe the relationship depicted in the "Age vs. Salary" scatterplot?

The scatterplot shows a curvilinear relationship. For early ages there is a positive relationship between age and salary - as age increases so too does salary to about age 50 to 54; then as age progresses, salary begins to decline so the relationship becomes negative.

18. What is the modal age?

The frequency for those in the range 50 to 60 was 398, the highest count for any 10-year period.

19. What is the modal salary?

Frequency of 411 for the $50k to $60k range.

(e) Find Figure 4 in Jahromi et al. (2016).

Jahromi, S. A. F., Forouzan, A., & Gholaminejad, R. (2016). Computer anxiety and computer self-efficacy as predictors of Iranian EFL learners' performance on the reading section of the TOEFL iBT. *Higher Education of Social Science*, *11*(6), 55-65.

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/2016-Jahromi-Computer-Anxiety.pdf

20. What level of correlation, Pearson r, from the list below do you think best describes the scatterplot in Figure 4? Explain why.

r = -0.80
r = -0.40
r = 0.00
r = 0.40
r = 0.80

If you don't recall reviewing correlation coefficients with scatterplots, read this:

http://www.bwgriffin.com/gsu/courses/edur7130/content/correlation_coefficients.htm

r = 0.00 is most likely because there is no consistent, discernable positive or negative relationship displayed by the scatterplot.

(f) Find and review Table III in Steinkamp and Maehr (1983).

Steinkamp, M. W., & Maehr, M. L. (1983). Affect, ability, and science achievement: A quantitative synthesis of correlational research. *Review of Educational Research*, *53*(3), 369-396.

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/1983-Steinkamp-Achievement.pdf

Steinkamp and Maehr (1983) conducted a meta-analysis of science achievement. A meta-analysis is the synthesis of results from many studies to show, overall, the strength of relationships found across studies. Steinkamp and Maehr wanted to learn whether **science achievement** (i.e., measured comprehension of science, physics, chemistry, biology, etc.) correlated with **cognitive ability** (i.e., brain-based skills or ability of process thoughts to learn and problem solve) and **science affect** (i.e., one's emotions, values, or feelings toward science; attitude toward science, physics, chemistry, etc.).

Steinkamp and Maehr's (1983) Table III shows stem-and-leaf displays of the Pearson correlation between

- science achievement and cognitive ability,
- science achievement and science affect, and
- cognitive ability and science affect.

Recall the Pearson correlation is a statistical measure to determine who strongly two quantitative variables relate. The maximum value is 1.00 (a perfect positive correlation) or -1.00 (a perfect negative correlation) and the minimum value is 0.00 (no evidence of a linear relation).

If you don't recall reviewing correlation coefficients with scatterplots, read this:

http://www.bwgriffin.com/gsu/courses/edur7130/content/correlation_coefficients.htm

21. Examine, in Table III, the correlations between science achievement and cognitive ability. Note that Table III reports the correlations Steinkamp and Maehr (1983) found in studies they reviewed.

21a. What is the strongest correlation presented for achievement and cognitive ability?

.74 for boys

21b. What is the weakest correlation presented for achievement and cognitive ability?

.02 for boys, note that -.14 for girls is not weaker, while it is negative, it is still a stronger correlation (remember, correlation ranges from -1 to 1, and the closer to 0.00 the weaker while the closer to 1 or -1 the stronger the correlation).

21c. What are the modal correlations (i.e., the most frequent) reported for achievement and cognitive ability?

.51 (3 times) for boys
.47 (3 times) for boys
.36 (3 times) for boys
.39 (3 times) for boys
There were no girls' correlations that occurred 3 or more times.

21d. What is the average (mean) correlation between achievement and cognitive ability for girls?

unweighted mean = .32
weighted mean = .39

21e. What is the average (mean) correlation between achievement and cognitive ability for boys?

unweighted mean = .36
weighted mean = .39

21f. How many negative correlations were reported for achievement and cognitive ability?

Only one, -.14 for girls

22. Examine, in Table III, the correlations between cognitive ability and science affect.

22a. How many correlations are reported in the stem-and-leaf for cognitive ability and affect?

8 correlations, four for girls and four for boys

22b. What is the weakest correlation reported for cognitive ability and affect?

.09 for boys

22c. What is the strongest correlation reported for cognitive ability and affect?

-.43 for girls (yes, -.43 is stronger than the .29 for boys)

23. Compare the three stem-and-leaf displays in Table III for achievement/cognitive, achievement/affect, and cognitive/affect.

23a. Which tends to show the strongest correlations - achievement/cognitive, achievement/affect, or cognitive/affect?

achievement/cognitive – the number of correlations in the .20 to .50 range is dense compared to correlations for achievement/affect and cognitive/affect

23b. Which tends to show the weakest correlations - achievement/cognitive, achievement/affect, or cognitive/affect?

cognitive/affect – most of these correlations are in the .10 to .30 range

(g) Find Figure 1 in Braun et al. (2006).

Braun, H. I., Wang, A., Jenkins, F., & Weinbaum, E. (2006). The Black-White achievement gap: Do state policies matter? Education Policy Analysis Archives, 14(8).

http://www.bwgriffin.com/gsu/courses/edur7130/readingstudies/2006-Braun-Black-White-Gap.pdf

Braun et al. (2006) studied 8th grade student achievement, for the years 1992 and 2000, in 10 states. Achievement was measured by the National Assessment of Educational Progress (NAEP), a standardized test that allows for comparisons of student performance across states. Using demographic information in the NAEP data file, Braun et al. separated school performance within each state into two strata – lower poverty (S1) and higher poverty (S2). This was an attempt to help isolate and show poverty effects on student achievement.

Figure 1 shows mean NAEP achievement scores by year (1992/2000) and poverty stratum (S1/S2).

24. What was the highest NAEP mean score reported in Figure 1 in 1992?

277 (7| 27* reported in the lower poverty stratum)

25. What was the lowest NAEP mean score reported in Figure 1 in 1992?

229 (9| 22* reported in the higher poverty stratum)

26. What was the highest NAEP mean score reported in Figure 1 in 2000?

288 (28* |8 reported in the lower poverty stratum)

27. What was the lowest NAEP mean score reported in Figure 1 in 2000?

238 (23* |8 reported in the higher poverty stratum)

28. For the lower poverty stratum, did the means tend to decline, stay about the same, or increase from 1992 to 2000?

Means show an increase from 1992 to 2000 – in 1992 most means in 260 to 280 range, for 2000 most means in the 270 to 290 range.

29. For the higher poverty stratum, did the means tend to decline, stay about the same, or increase from 1992 to 2000?

Means show an increase from 1992 to 2000 – in 1992 most means in 230 to 250 range, for 2000 most means in the 250 to 270 range.

30. Which, on average, performed better on NAEP, lower or higher poverty students?

Lower poverty students, most of their means were in the 260 to 290 range while for the higher poverty students, their means were mostly in the 230 to 260 range.

31. Using all the means presented, what are the modes for these mean scores?

Several means occurred twice:
284
268
266
259
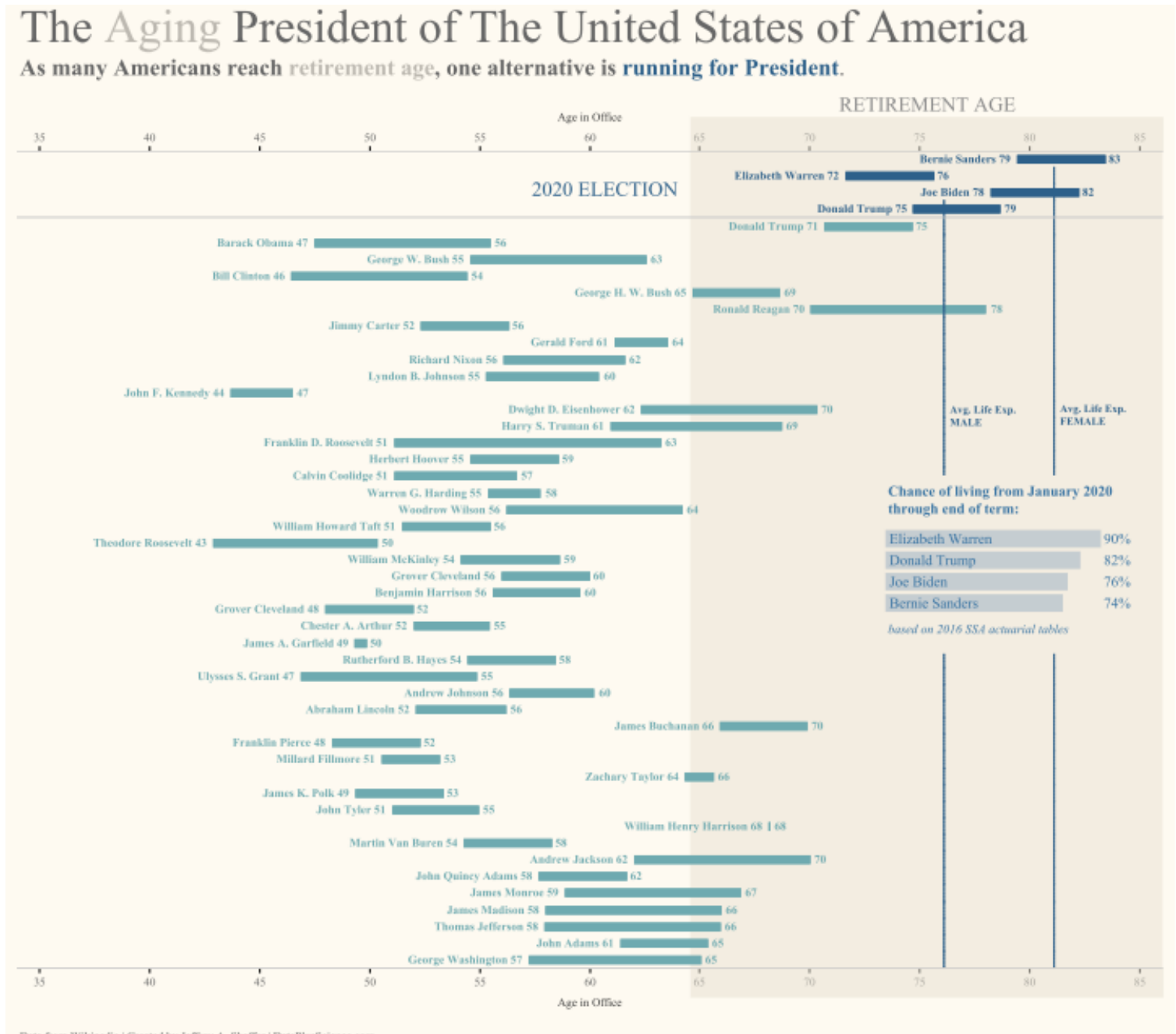**242**

Additional graphs, no questions developed yet.

A. Source: https://public.tableau.com/en-us/gallery/aging-president-united-states

Salary Comparison Unit Histogram Dashboard
Comparing respondent 81 with all others (bin size of $2,500)

C. Source: https://public.tableau.com/profile/jenna.devries#!/vizhome/shared/KG2DQYWZ6

Racial Minorities in U.S. **Technology** Companies

In **2018**, what percentage of each company's workforce was...

	Asian	Black	Latino	% of Workforce that is Asian, Black or Latino from **2014** to **2018**
	U.S. Population 5.7%	U.S. Population 13.3%	U.S. Population 17.8%	U.S. Population 36.8%
AirBnB				
Amazon				
Apple				
Dell				
eBay				
Etsy				
Google				
Groupon				
HP				
Indiegogo				
Ingram Micro				
Intel				
Microsoft				
Netflix				
Nvidia				
Pandora				
Salesforce				
Slack				
Uber				
Yahoo!				
Yelp				
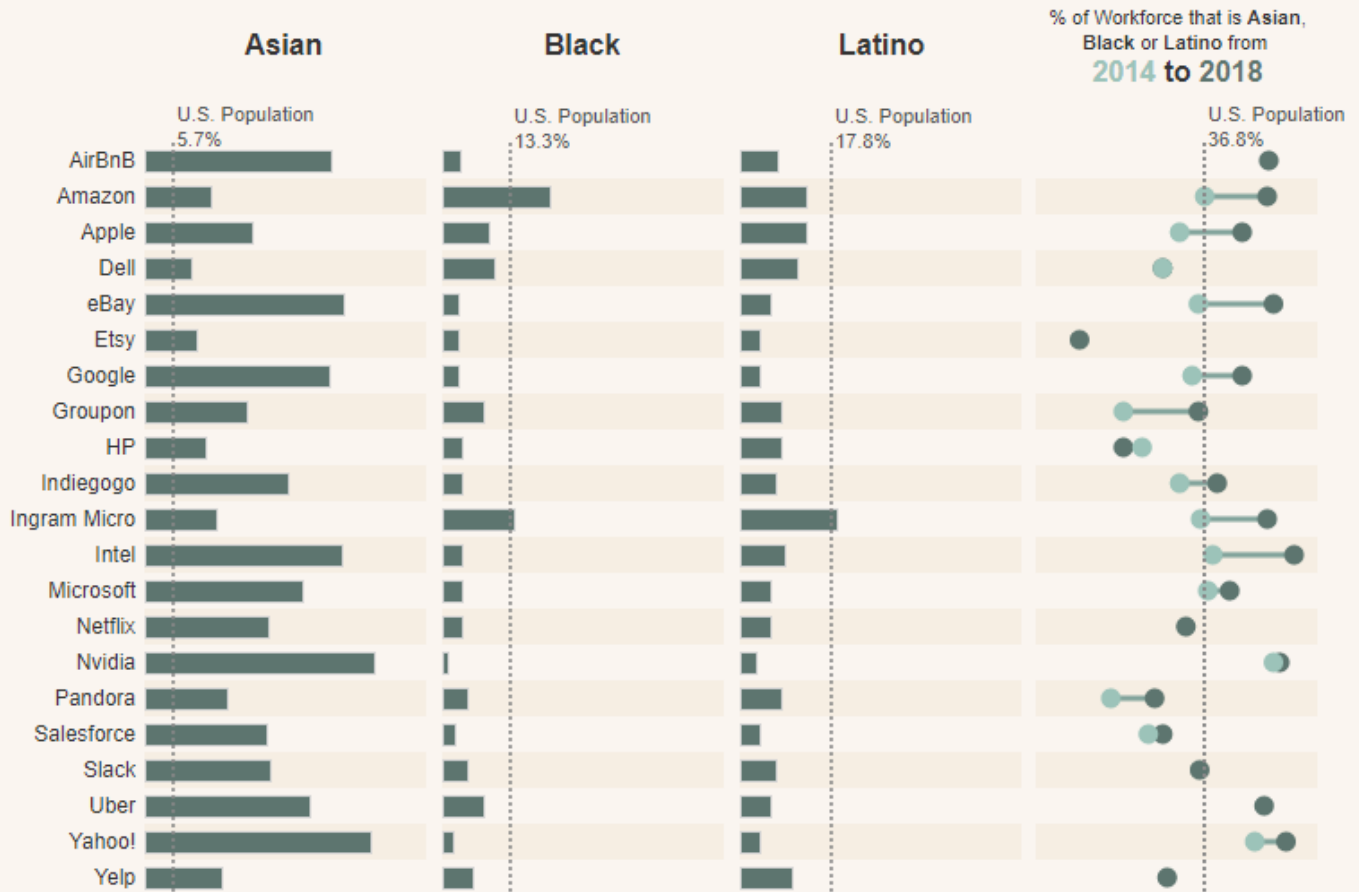
Source: Information Is Beautiful
Design: Jenna DeVries | Twitter: @jennaldevries

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