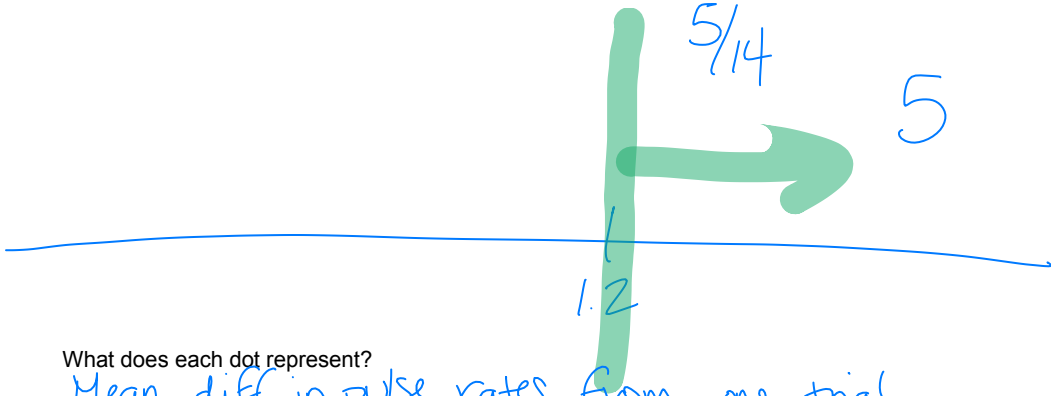


5 for 5

(there are 2 today)

- Find the mean change for each group in your simulation and subtract the means (Caffeine – No caffeine).
- Add your difference in means to the dotplot on the board. Sketch the dotplot below.



What does each dot represent?

Mean diff in pulse rates from one trial
if caffeine has no effect

- What percentage of the dots are greater than or equal to the difference in means of 1.2 found in Mrs. Gallas' experiment?

$$5/14 = 0.36 \rightarrow 36\%$$

Interpret this percentage:

Assuming that caffeine has no effect, there is a 36% probability of getting a difference of 1.2 OR higher purely by chance.

- Do you think the difference in means we found from our experiment is due to the caffeine or has it occurred purely by chance? Explain.

stat signi. $\left\{ \begin{array}{l} \text{If } \% \leq 5\%, \text{ it is pretty unlikely that it} \\ \text{happens on its own, so probably due to caffeine.} \end{array} \right.$

not stat signi. $\left\{ \begin{array}{l} \text{If } \% > 5\%, \text{ then no it is unlikely it would happen} \\ \text{by coincidence.} \end{array} \right.$

Important Ideas

Statistically Significant

When results from a study are too unusual to happen by chance

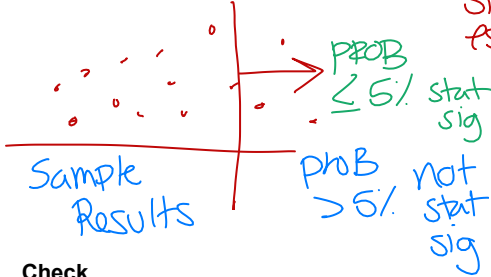
Margin of Error

Create an interval of plausible values

Sample Stat \pm MOE
Est.

Sampling Variability

Different samples yield different estimates.
* Larger samples produce more accurate estimates.



Check

How much do National Football League (NFL) players weigh, on average? In a random sample of 50 NFL players, the average weight is 244.4 pounds.

(a) Do you think that 244.4 pounds is the true average weight of all NFL players? Explain your answer.

No, all samples are different. Since we don't have the entire population, we don't expect the same sample mean.

(b) If another random sample of 50 NFL players was taken, would you expect to have an average weight of exactly 244.4 pounds?

No, every sample is a different group, so the mean may not be the exact same.

(c) Estimates are usually given with a margin of error. The margin of error for the estimate on 244.4 pounds is 14.2 pounds. Based on this, would you be surprised if the true average weight of NFL players was 260 pounds? Explain.

$$244.4 + 14.2 = 258.6$$

Yes, 260 is above the MOE of 258.6 pounds.

(d) Which would be more likely to give an estimate close to the true average weight of all NFL players: a random sample of 50 players or a random sample of 100 players? Explain your answer.

100 \rightarrow The more people in your study, the more spread out variability, more accurate your results.

A television news editor would like to know how local registered voters would respond to the question "Are you in favor of the school bond measure that will be voted on in an upcoming special election?". A television survey is conducted during a break in the evening news by listing two telephone numbers side by side on the screen, one for viewers to call if they approve of the bond measure and the other to call if they disapprove. This survey method could produce biased results for a number of reasons. Which one of the following is the most obvious reason?

- a. It uses a stratified sample rather than a simple random sample
- b. People who feel strongly about the issue are more likely to respond
- c. Viewers should be told about the issues before the survey is conducted
- d. Some registered voters who call might not vote in the election
- e. The wording of the question is biased

In one study subjects were randomly given either 500 or 1000 milligrams of Vitamin C daily and the number of colds they came down with during a winter season was noted. In a second study people responded to a questionnaire asking about the average number of hours they sleep per night and the number of colds they came down with during a winter season.

- a. The first study was an experiment without a control group while the second was an observational study
- b. The first study was an observational study while the second was a controlled experiment
- c. Both studies were controlled experiments
- d. Both studies were observational studies
- e. None of the above is a correct statement

The Literary Digest Magazine, in 1936, predicted that Alf Landon would defeat Franklin Roosevelt in the presidential election that year. The prediction was based on questionnaires mailed to 10 million of its subscribers and to names drawn from other public lists. Those receiving the questionnaires were encouraged to mail back their ballot preference. The prediction was off by 19 percentage points. The magazine received back some 2.3 million ballots from the 10 million sent out. What are some of the things that might have caused the magazine to be so wrong (the same techniques had produced accurate predictions for several previous elections?) (Hint: Think about what was going on in the world in 1936.)

- those who subscribed to magazine at the time had money and they tended to be Republican.
- Voluntary Response - didn't send surveys back underestimate
- In the Great Depression, you want change, so you send back mailer w/ Alf marked, leading to the overestimate of 19%.