Sampling Distributions and Sampling Variance, Part 2

Brady T. West

Why is Sampling Variance Important?

- In practice, we only have the resources to select **one sample!**
- Important sampling theory (developed in early 1900s) allows us to **estimate features of sampling distribution** (including variance!) based on **one sample**

"Magic" of probability sampling:
Can select one probability sample and features of that design tell us what we need to know about the expected sampling distribution

Why is Sampling Variance Important?

- **Because we can estimate variance** of sampling distribution based only one sample, **we can make inferential statements** about where most estimates based on a particular sample design will fall

  → **Can make statements about likely values of population parameters** that account for variability in sampling errors that arises from random probability sampling

What's Next?

- Work with a **Web App** to **visualize sampling distributions** when selecting random samples from a population with certain features:

  https://markkurzejaumich.shinyapps.io/multiple_population_bias/

- See how **random sampling** generally produces sampling distributions with means close to true population quantity of interest,
  and how larger samples produce sampling distributions with less variance
- See how **biased, non-representative samples** can produce sampling distributions that paint **misleading** pictures of the larger population