

EPSY 5261 : Introductory Statistical Methods

Day 6
Estimating Uncertainty

Learning Goals

- At the end of this lesson, you should be able to...
 - Define sampling variability
 - Explain how we can estimate uncertainty
 - Calculate an estimate for uncertainty using R Studio

Mini Activity

- Get your pulse rate (beats per minute)
 - Find your pulse
 - I will time 1 minute on the clock
 - Write down your pulse for that minute

Mini Activity

- GOAL: Find the average class pulse rate
- We don't have time for you all to get everyone's pulse
- Collect a sample of 5 classmates pulse rates
- Calculate the average

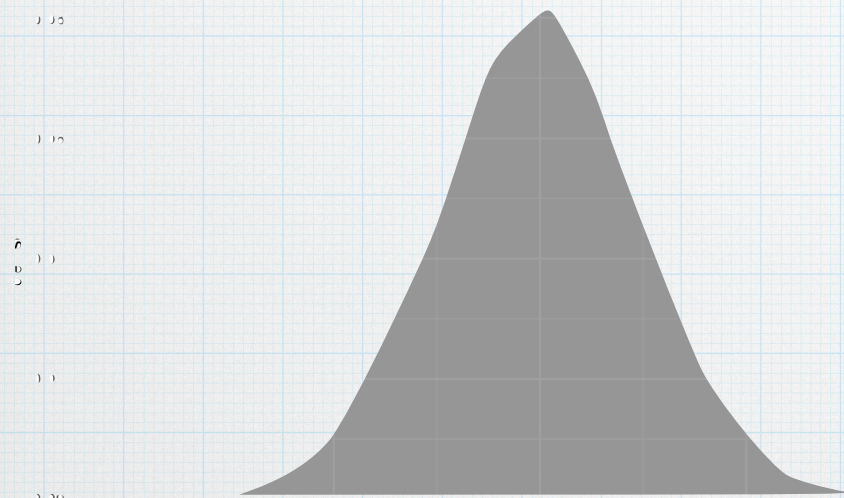
Did we all get the same mean?

- NO!
- Why not?
- Sampling Variability!
 - Our mean pulse rate will vary from sample to sample

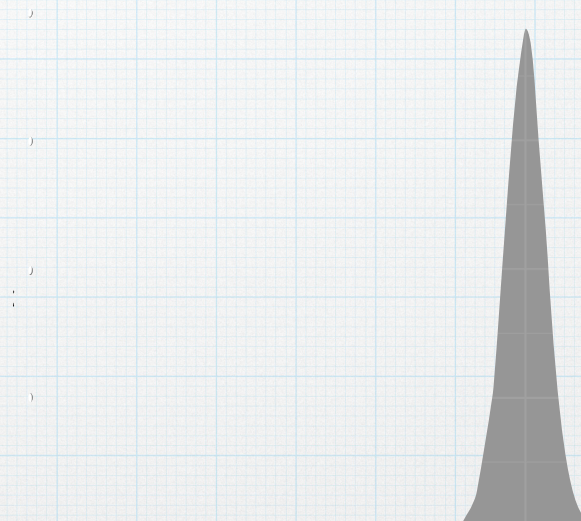
How “different” are these estimates?

- Because of sampling variability we have uncertainty in our estimates
- But how much uncertainty?
 - How different are these estimates?

Maybe they look like one of these?



Average pulse



Average pulse

Estimating Uncertainty

- One way to estimate the uncertainty is with the *standard error*
- We will explore that in the activity today

Estimating Uncertainty Activity

Key Points

- We can estimate sampling variability using the standard error.
- What can we use this for?

Consider a scenario

- The data we are working with is from 2017
- You are curious if the average pulse for U.S. adults has changed since then
- You conduct your own study and get an average pulse of 74 beats per minute
- But how can you determine if this is a difference due to sampling variability or a true difference?
- We will explore that next class via hypothesis testing!

Summary

- Sampling variability is the idea that sample estimates vary from sample to sample
- We can estimate the uncertainty by calculating the standard error