

## Sample Size and Experimental Principles

We'll start today by continuing with sample size ideas. Start by reviewing with your group what the significance level ( $\alpha$ ) and power ( $1 - \beta$ ) are.

---

---

---

---

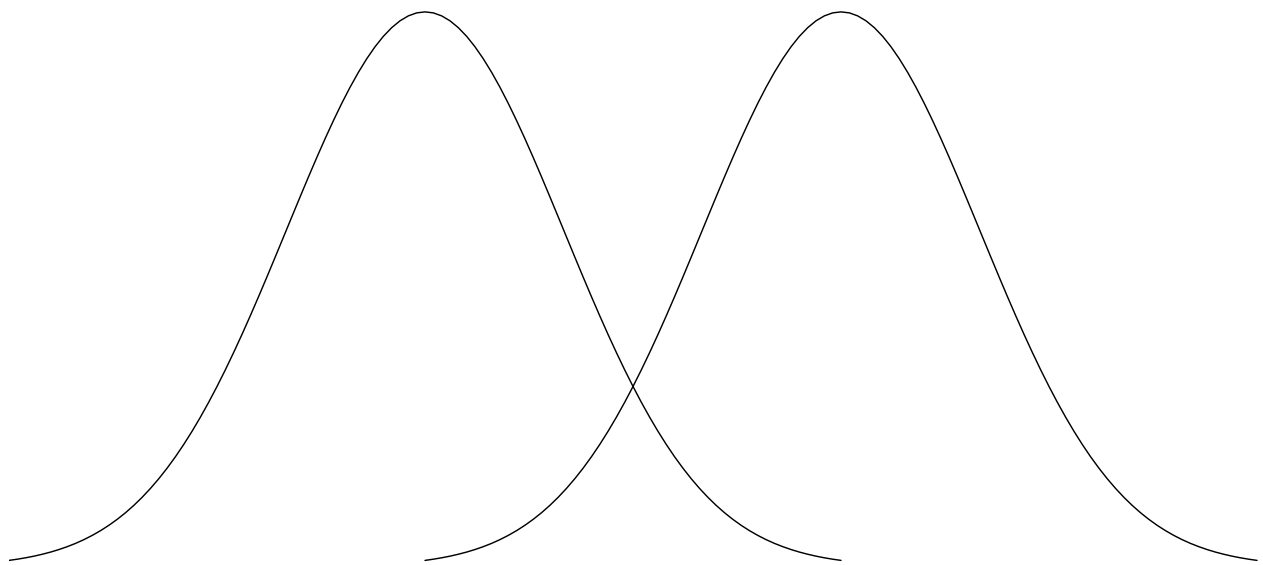
Now, with your definition of power in mind, can you describe what  $d$  ( $\mu_1 - \mu_0$ ) is using ordinary language?

---

---

---

The five pieces of information involved in calculating the sample size for a one sample t-test are  $N$ ,  $\sigma$ ,  $d$  ( $\mu_1 - \mu_0$ ),  $\alpha$ , and  $\beta$ . Label the plot below with them. (Also, can you label the axes?)



How does the calculation change if it's a two-sample  $t$ -test?

---

---

---

Suppose that instead of asking how large the sample size should be, your client says they have enough money for 30, and asks if that's enough. How do you respond?

---

---

---

Say you ask what  $\sigma$  is and  $d$  should be and the investigator tells you, "I don't know, you're the statistician; you tell me." How do you respond?

---

---

---

## Principles of Experimentation

What's the difference between random sampling and random assignment? Why do we prefer when these can be done? How must our conclusions change when they are not? Can you think of examples of each situation?

---

---

---

---

---

What about stratified sampling and stratified assignment? Why might we choose to do each? [additional term to know: blocking]

---

---

---

---

---

What's a control group, and why is it an important feature of an experiment? Do you know (or can you guess) what a "positive control" and a "negative control" are?

---

---

---

---

---

What's the difference between an experimental unit and an observational unit? Consider a situation where there are 30 subjects, half of which get treatment A, and half of which get treatment B. Each are then followed for five months, with one measurement taken each month. What are the experimental and observation units? Why is this distinction important? [additional terms to know: replication vs. repetition]

---

---

---

---

---

## Ending a Meeting

- Note that meeting time that was agreed on is getting close.
- Summarize what was accomplished in the meeting, and what was not.
- Agree on next steps, and specifically who does what and by when
- How will you next communicate or meet?

Today you should have

- understood how to compute sample size, and how to explain what you need to compute it to a client
- reviewed the principles of randomization, blocking, control groups, and replication
- learned how to end a meeting

Name: \_\_\_\_\_

Which principle of experimentation are you still most confused by?  
Explain, as best you can, what you don't understand.

---

---

---

---

---

---

Please leave this sheet, your nametag, and your playing card on the tables by the door.  
The other handouts are for you to keep; this sheet will not be returned except by request.