

Activity – answer these questions:

- What is the difference between a null and an alternative hypothesis?
- What is the role of sample size in statistical inference?
- How does this apply to your role as an analyst in any industry?

Example Scenario: Given I work in education, improving attendance is a major challenge. So, let's consider this scenario - you want to boost student attendance (which earns them reward points if they hit at least 95%) by sending a new reminder email with better graphics and an inspirational message. After sending it, you see attendance go from 92% to 95% in one week. Do you conclude the email "worked," or should you look at attendance over the whole term?

1. Null vs. Alternative Hypothesis

- **Ho ("no real effect"):** The new email does not change students' true attendance rate—any change you see (e.g. +3% this week) is just random fluctuation.
- **Ha ("it works"):** The new email raises the true attendance rate (e.g. by at least 3%).
If attendance jumps from 92% to 95% in that week, you ask, "Could random ups and downs produce a 3% bump even if the email did nothing?" If it's very unlikely under Ho, you reject Ho and say the email probably helped; if not, you fail to reject Ho (meaning "we can't be sure the email caused the bump").

2. Role of sample size (or time frame)

- **One-week data (small sample):** A single week's attendance can swing by a few percent just by chance (say a flu outbreak week). With only a few days, a 3% bump might be random.
- **Whole-term data (larger sample):** Looking at 12 weeks of attendance smooths out weekly ups and downs. If the new email appears in Week 3 and the term's average attendance jumps from 92% to 95% overall, you're more confident the change isn't just random noise.
In short, small samples (one week) have wide "wobble room"—you need a bigger sample (the entire term) to tell if a 3% rise is a true effect or just luck.

3. Application as an analyst

- **State Ho vs. Ha clearly:** Decide before you send emails that Ho is "attendance stays at 92%" and Ha is "attendance rises to 95% or more."
- **Gather enough data:** If you only check one week, you might chase a false positive. Plan to collect full-term attendance or at least several weeks after sending the email so random ups/downs average out.
- **Interpret results in context:**
 - If attendance is 95% for one week but falls back to 92% weeks later, the one-week bump likely was noise, so you "fail to reject" Ho.

- If attendance stays near 95% for the rest of the term, then—even after accounting for seasonal changes or events—you have strong evidence to reject H_0 and conclude the email genuinely improved attendance.

In any industry—whether testing a marketing email, a software feature, or a new training programme—the same logic applies: define “no change” vs. “real change,” collect enough observations and then decide if the intervention truly worked or if you just got lucky.