

HOW HYPOTHESIS TESTING WORKS

A hypothesis test is designed to **DECIDE** the answer to a **YES OR NO** question using **DATA**. One of the answers (yes or no) is called the “null hypothesis”. *It is the answer that corresponds to no relationship, or to a population number being a specific value.*

The p-value can be thought of as a measure of how consistent your data is with this hypothesis, so a lower p-value is stronger evidence that the null hypothesis is false.

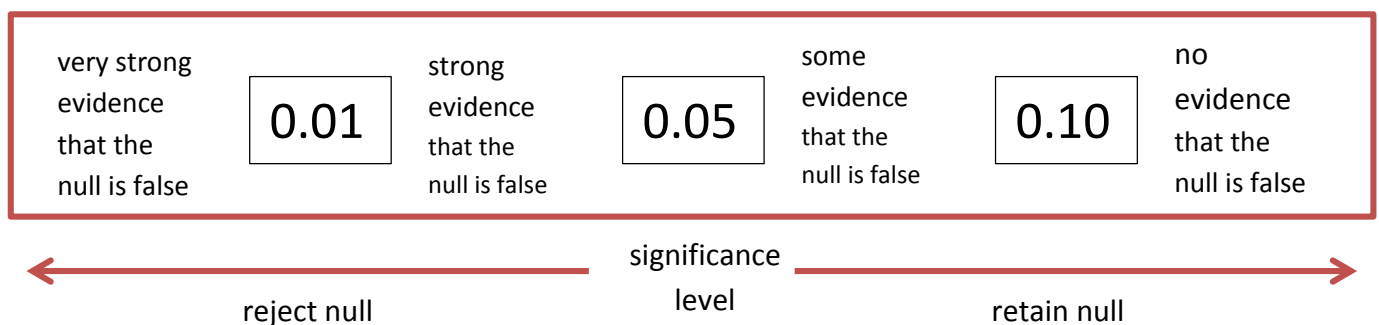
The significance level is the cut-off for the p-value where you decide the answer is yes or no – this is called rejecting or retaining the null hypothesis.

This is how to do a hypothesis test:

- Have a yes-or-no question. (One answer is the null hypothesis)
- Collect data.
- Calculate a test statistic.
- Figure out what the distribution would be if you suppose the null hypothesis is true.
- Calculate a p-value.
- Decide the answer based on the p-value.

This is what a hypothesis test means:

- A low p-value means your data is *not very consistent* with the null hypothesis and you *don't believe* you're in that situation.
- A high p-value means your data is consistent with the null hypothesis and you do believe you could possibly be in that situation.



HOW CONFIDENCE INTERVALS WORK

A confidence interval is designed to give a **RANGE** of possible answers for a “**WHAT’S THE NUMBER?**” question, using **DATA** from a sample.

It gives a range of possible values for what the number in the population could be.

It describes all the numbers that seem mathematically consistent with the data you have, for a given level of “consistent”.

This is how to find a confidence interval:

- Have a “what’s the number?” question.
- Collect data.
- Choose a matching hypothesis test.
- Work backwards to calculate two ends.
- The confidence interval is between these two values.

This is what a confidence interval means:

- The values in the CI would be retained with a matching hypothesis test asking, “Is the number equal to this value?”
- The values in the CI have a high chance of producing data like yours.
- The values in the CI appear to be consistent your data.

OUTSIDE NOT CONSISTENT WITH DATA	INSIDE APPEARS CONSISTENT WITH DATA	OUTSIDE NOT CONSISTENT WITH DATA
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