What is meant by a statistical test?

- A statistical test provides a mechanism for making quantitative decisions about a process or processes. The intent is to determine whether there is enough evidence to "reject" a conjecture or hypothesis about the process. The conjecture is called the null hypothesis. Not rejecting may be a good result if we want to continue to act as if we "believe" the null hypothesis is true. Or it may be a disappointing result, possibly indicating we may not yet have enough data to "prove" something by rejecting the null hypothesis.

Common Statistical Tests

Type of Test:	Use:
Correlational	These tests look for an association between variables
Pearson correlation	Tests for the strength of the association between two continuous variables
Spearman correlation	Tests for the strength of the association between two ordinal variables (does not rely on the assumption of normal distributed data)
Chi-square	Tests for the strength of the association between two categorical variables
Comparison of Means:	look for the difference between the means of variables
Paired T-test	Tests for difference between two related variables
Independent T-test	Tests for difference between two independent variables
ANOVA	Tests the difference between group means after any other variance in the outcome variable is accounted for
Regression:	assess if change in one variable predicts change in another variable
Simple regression	Tests how change in the predictor variable predicts the level of change in the outcome variable
Multiple regression	Tests how change in the combination of two or more predictor variables predict the level of change in the outcome variable
Non-parametric:	are used when the data does not meet assumptions required for parametric tests
Wilcoxon rank-sum test	Tests for difference between two independent variables - takes into account magnitude and direction of difference
Wilcoxon sign-rank test	Tests for difference between two related variables - takes into account magnitude and direction of difference
Sign test	Tests if two related variables are different – ignores magnitude of change, only takes into account direction

Choosing a Statistical Test

- How does a researcher choose the right test based on the research design, variable type, and distribution?
- The chart below provides a summary of the questions that need to be answered before the right test can be chosen .

What are you comparing?	Comparing within **one group**
	Comparing between **two**
How many data collection time points do you have?	1 2 3 4 → Retrospective Pre/Post-test / Pre-test, Post-test / Pre-test, Test 1, Test 2, Post-test
How many observations do you have?	More than 25
	Less than 25
What kind of data do you have?	Categorical → Binary / Nominal / Ordinal
	Continuous → Interval / Ratio
What does your data look like?	Normal distribution
	Non-normal