Power Analysis / Statistical Power

What is Power? → Probability of rejecting H_0 when it is false.

Possible Statistical Conclusions :

		Null hypothesis (H_0) is : False	Null hypothesis (H_0) is : True.
Judgement of Null (Statistical Result)	False. Rejecting H_0 ($P<0.05$)	Correct Inference. True Positive ($1-\beta$)	Type 1 error False Positive (α)
	True Fail to reject H_0. ($P>0.05$)	Type II error False Negative β	Correct Inference True Negative

So if power = 80%. this means 80% power means you have an 80% chance of getting a significant result when the effect is real.

Example – Men are tend to be taller than women. And the power = 80%.
So we can say that if we take 100 sample, then 80% will show prove that result.

Why it is important?

→ Power tells you how likely you are to detect a real effect.

→ 80% of power means we'll miss a real effect approximately 20% of time.

→ Want to find an initial effect and a replication given 80% power. We will find this 64% of the time. Because when we have two condition, we multiply = (Inital effect) × (Replication effect) = $(0.8) \times (0.8) = 0.64 = 64\%$