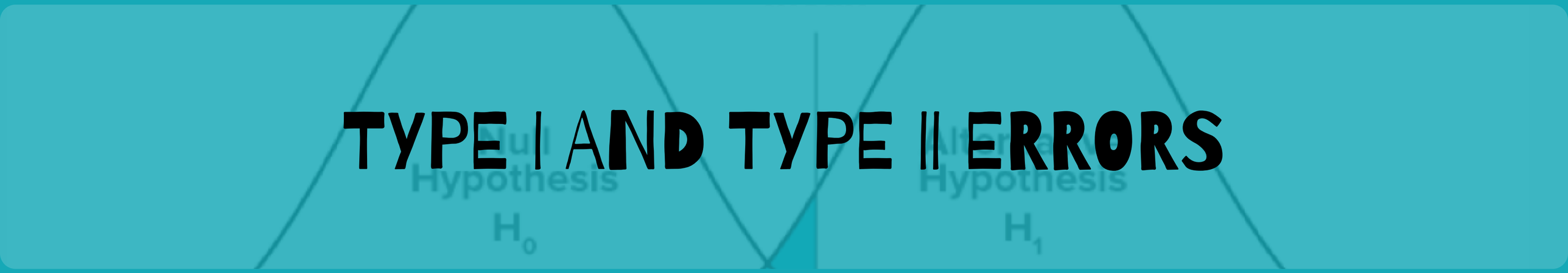
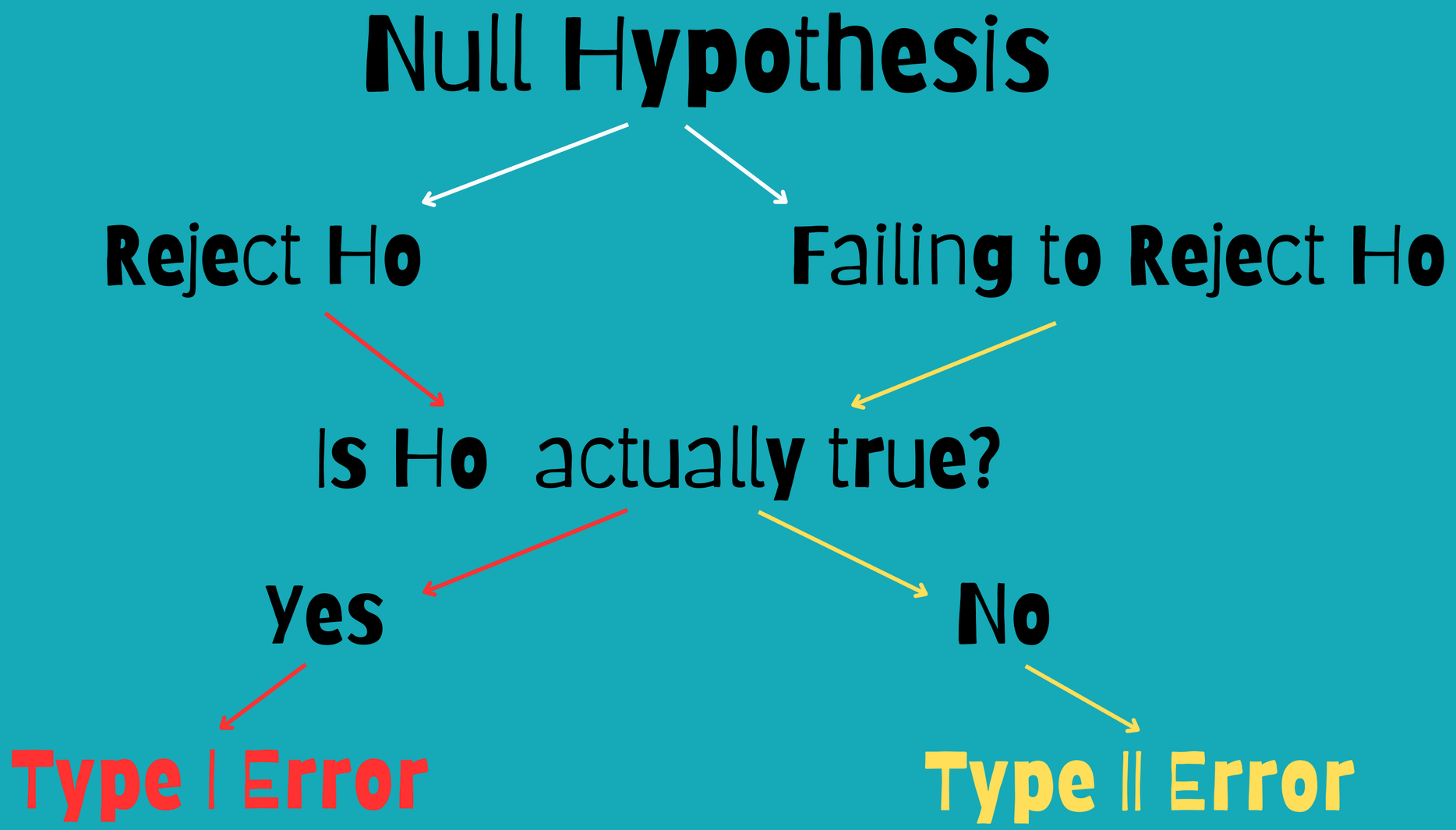


TYPE I AND TYPE II ERRORS

Presented By
Simran Uppal

TYPE I AND TYPE II ERRORS



TYPE I AND TYPE II ERRORS – EXAMPLES

1) COVID-19 TEST

Ho: You do not have Covid

Ha: You have Covid

Type I: Test says you have but actually you don't

Type II: Test says you don't but actually you have

2) GHOST HUNTING

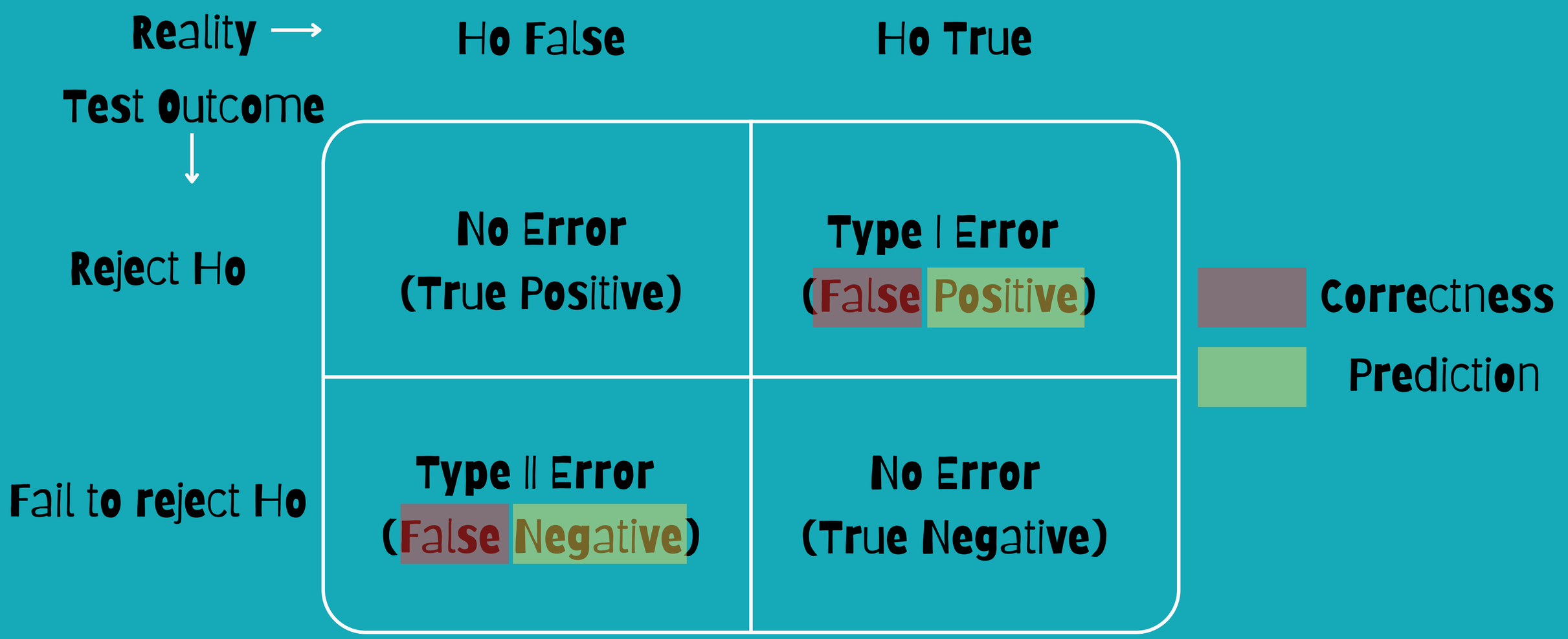
Ho: No ghosts in the house

Ha: House is haunted

Type I: Test says the house is haunted when there are no real ghosts

Type II: Test says there are no ghosts when in reality the house is haunted

TYPE I AND TYPE II ERRORS



Reject Ho (1) – Positive Prediction

Fail to reject Ho (0) – Negative Prediction

ALPHA AND BETA PROBABILITIES

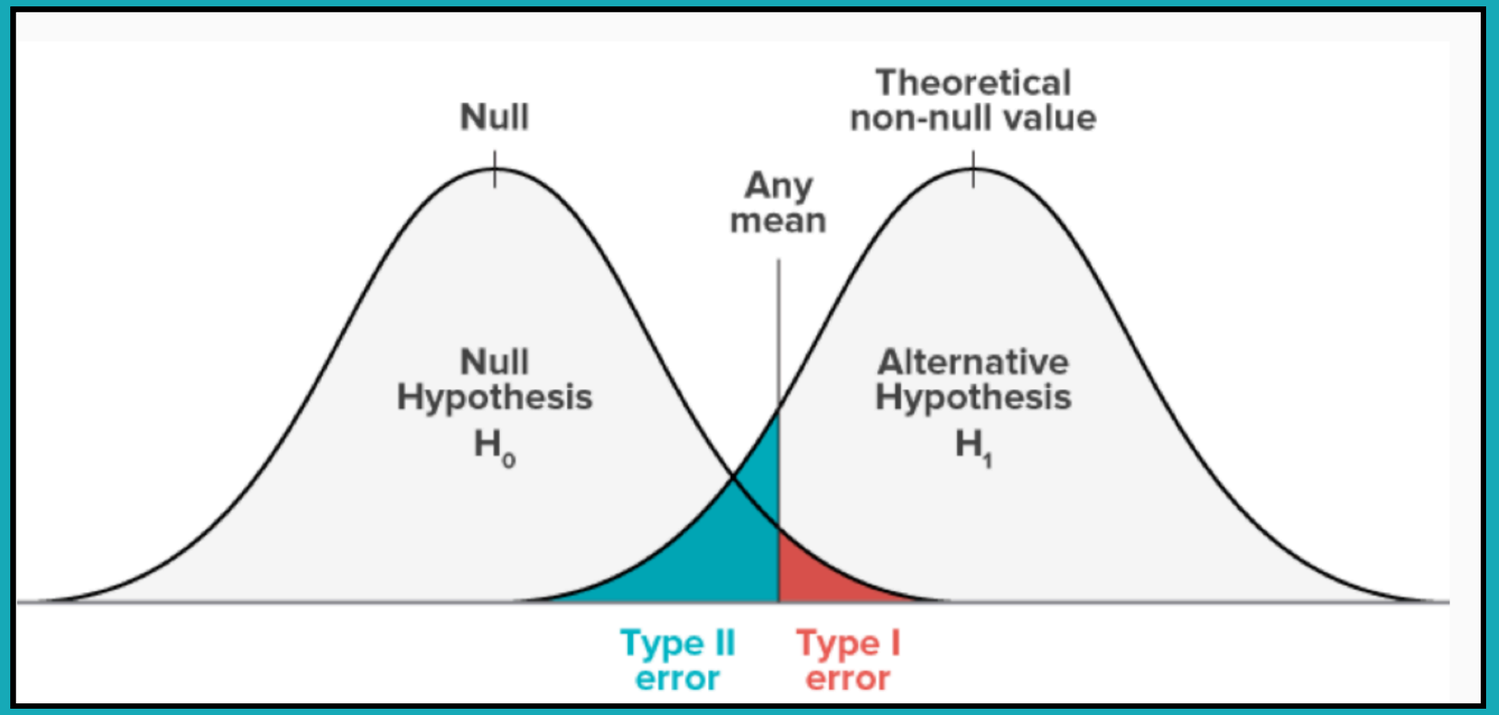
Type I Error

Significance Level

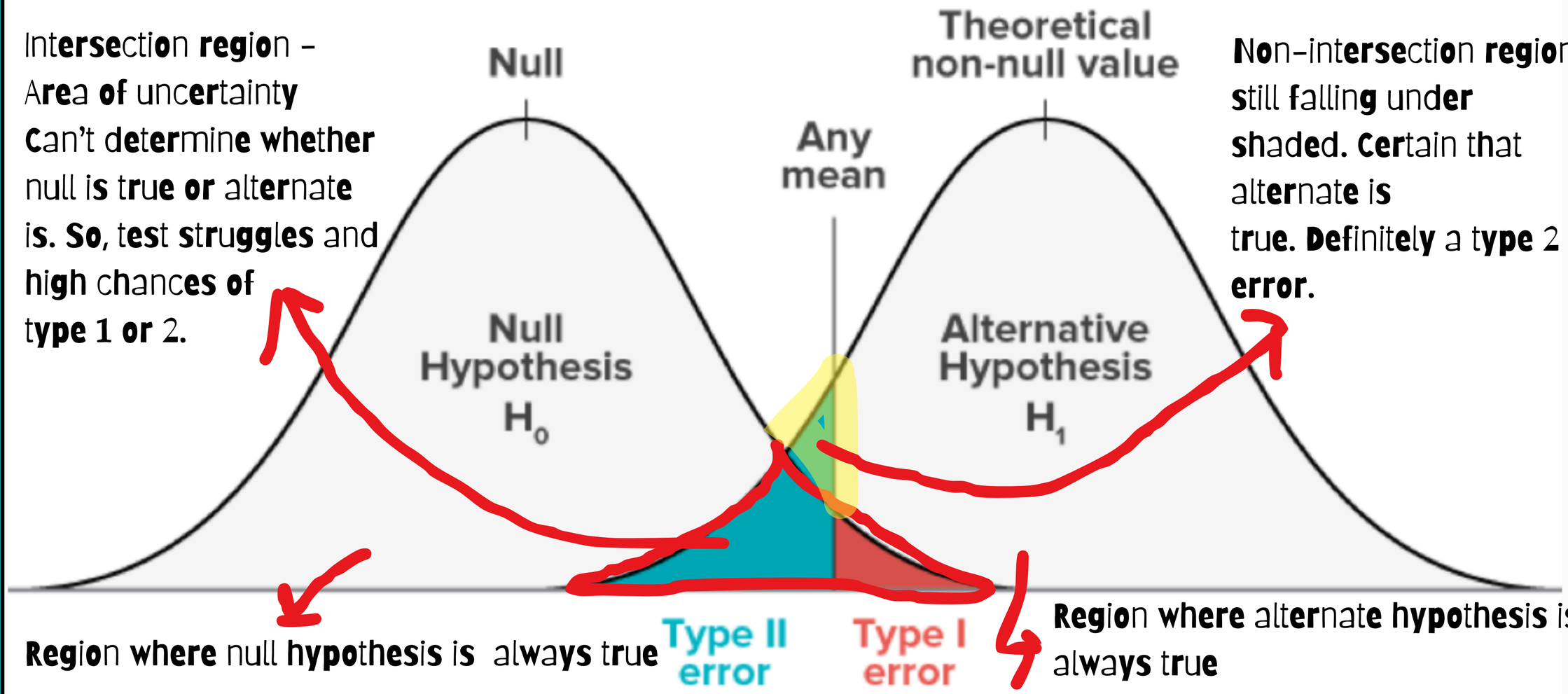
(alhpa)

Type II Error

Beta Probability



Intersection region – Area of uncertainty Can't determine whether null is true or alternate is. So, test struggles and high chances of type 1 or 2.



Non-intersection region; still falling under shaded. Certain that alternate is true. Definitely a type 2 error.

Region where null hypothesis is always true

Region where alternate hypothesis is always true

MAIN REASON – TYPE I AND TYPE II ERRORS

Significance level (alpha)	Higher alpha leads to Type I Lower alpha leads to Type II
Sample Size	Small Sample Size can lead to both types of errors: May not accurately represent the TRUE POPULATION

BALANCING TYPE I AND TYPE II ERRORS

Trade-off	**Lowering** alpha **decreases Type I** but **increases Type II**
Sample size	**Increasing sample size reduces both Type I** and **Type II**
Statistical Power (1-beta) [For Type II]	B -> **Probability of failing to reject Ho when** it **is false** 1 - B -> **Probability of correctly rejecting a false Ho**

TRADE-OFF EXAMPLES

1) QUALITY CONTROL IN MANUFACTURING

Ho: Product meets safety standards
Ha: Product does not meet safety standards

Go for Type I

2) MEDICAL TRIALS

Ho: New drug is not effective
Ha: New drug is effective

Go for Type II

THANK YOU!