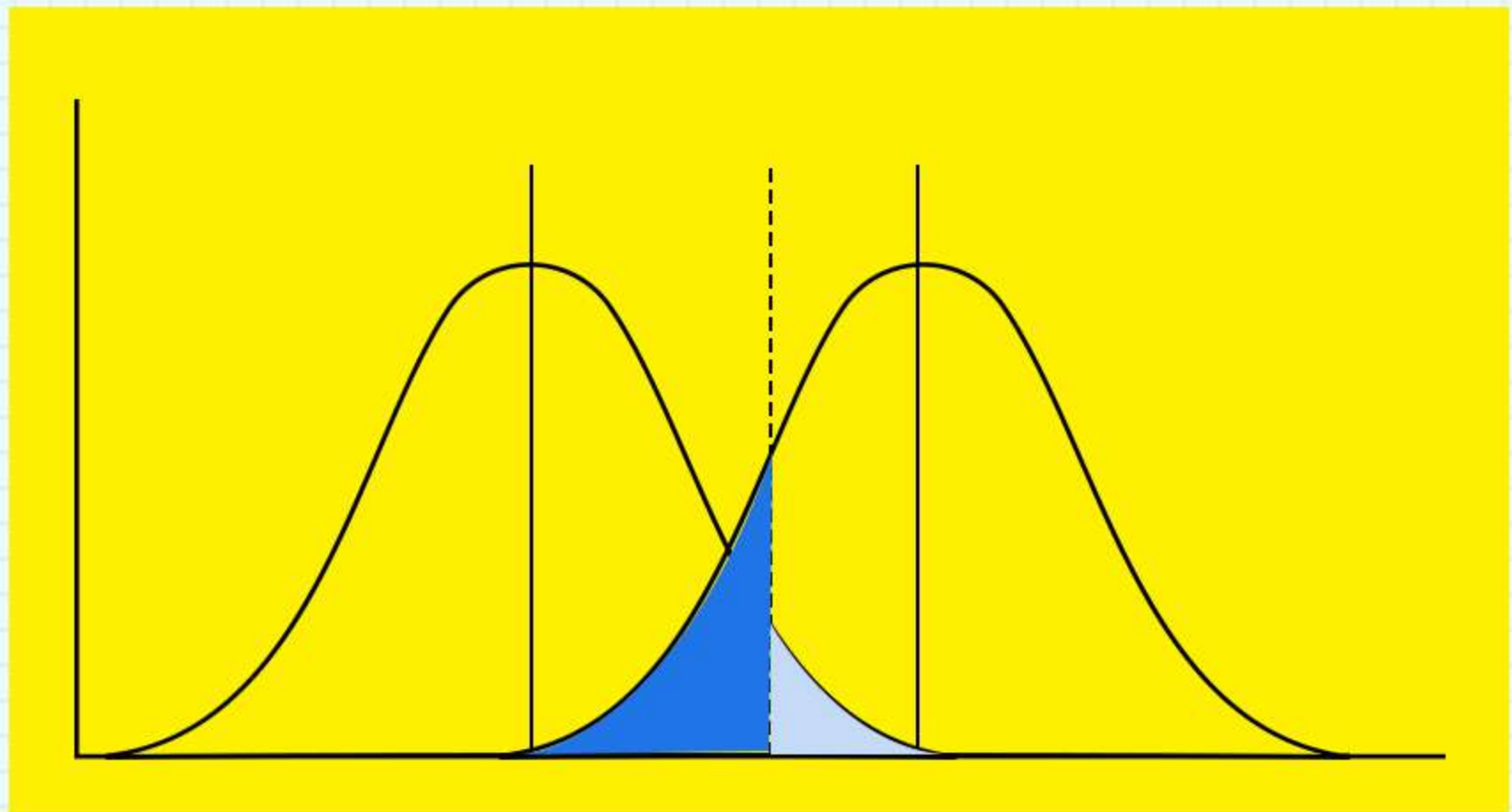


Type I vs Type II Errors

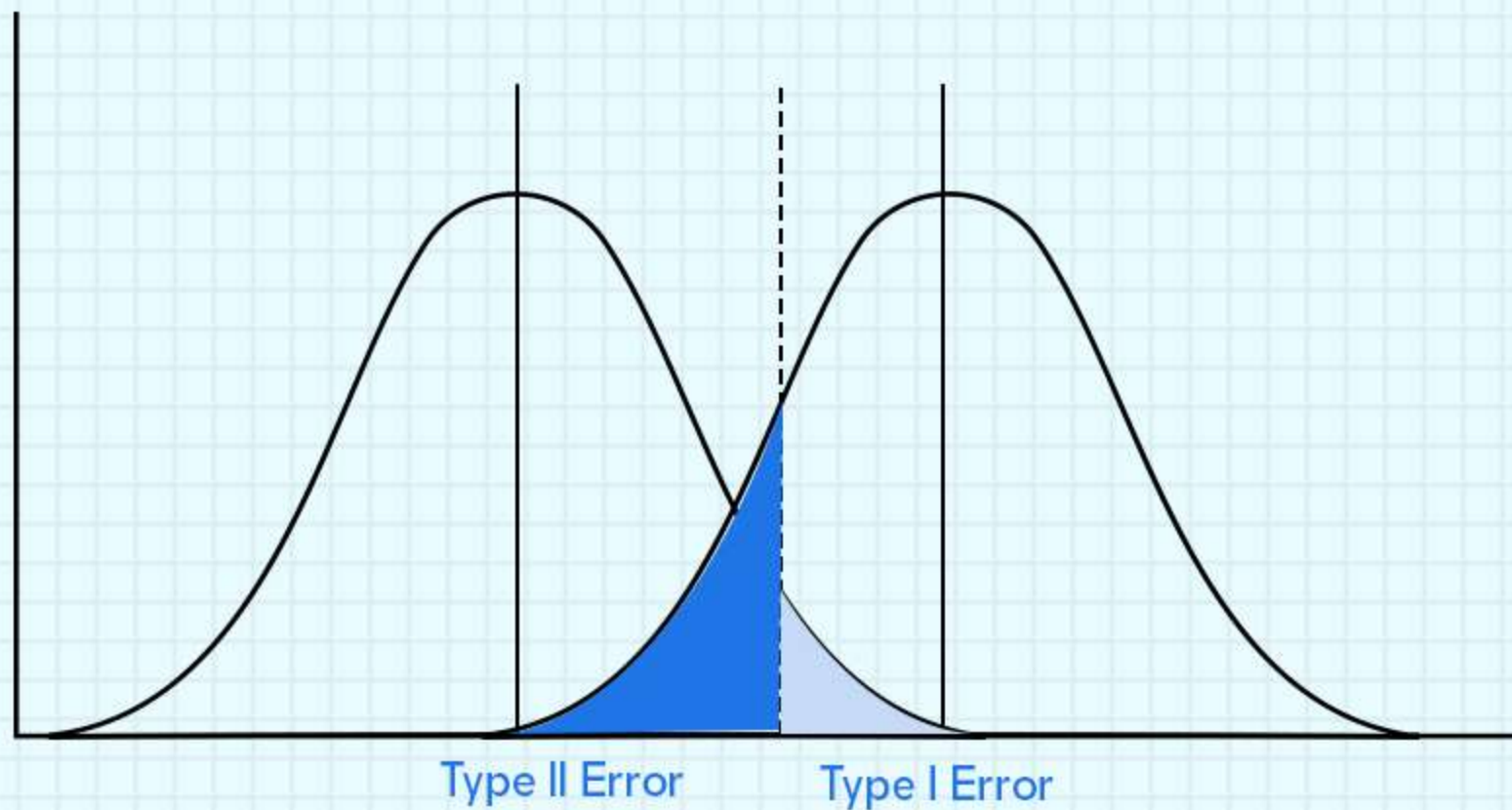
Understanding Errors in Hypothesis Testing



Highly Important for Psychology Entrances



In hypothesis testing, we make decisions based on sample data.



But here's the catch:
Our decision can be **wrong**.

There are **two types of errors**:

- Type I Error
- Type II Error

Understanding this is crucial because many exam questions test this confusion.

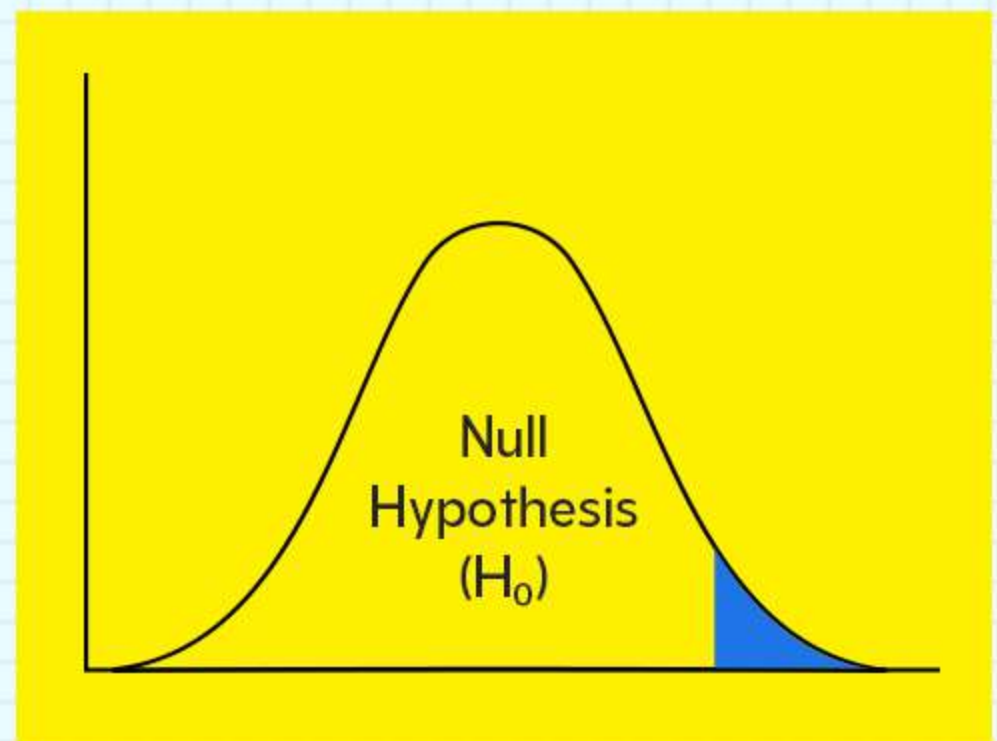


Null Hypothesis (H_0)

Before errors, you need clarity on this:

Null Hypothesis (H_0):
Assumes “no effect”
or “no difference”

Example: A new therapy has **no effect** on anxiety.



All decisions revolve around:

✓ Reject H_0 ✓ Fail to reject H_0

Errors happen in these decisions.



Type I Error (False Positive)

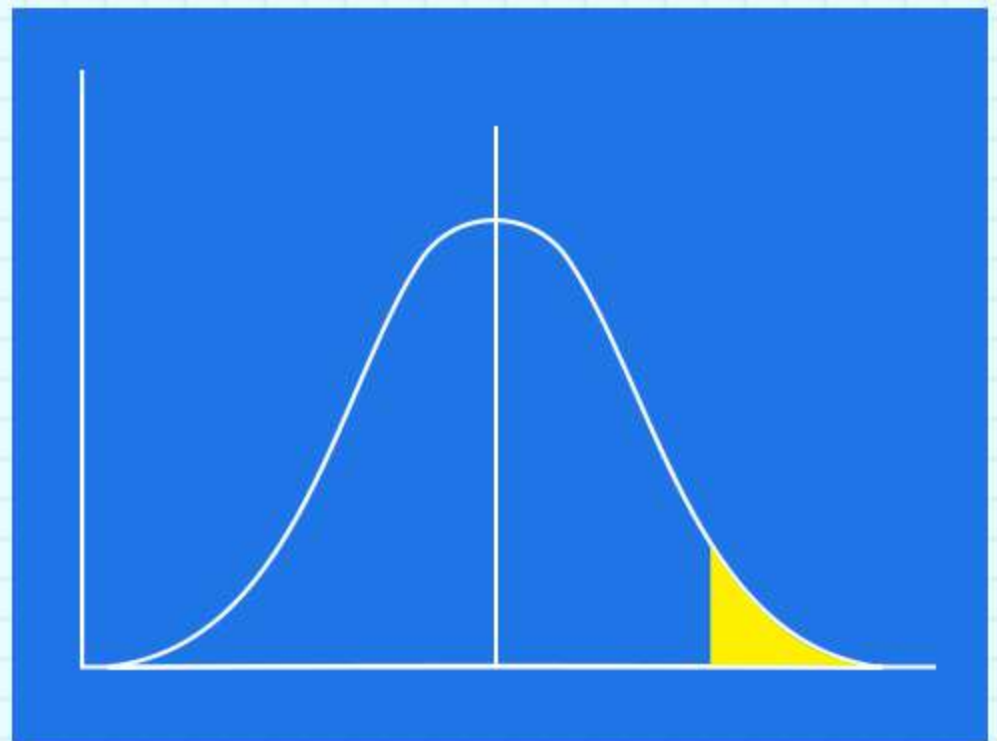
Definition: Rejecting a true null hypothesis

Meaning: You say there is an effect, but actually there isn't.

Also called: False Alarm

Example: You conclude therapy works, but it actually doesn't.

Probability of Type I Error = α (**alpha**)
(Usually set at 0.05 in exams)



Type II Error (False Negative)

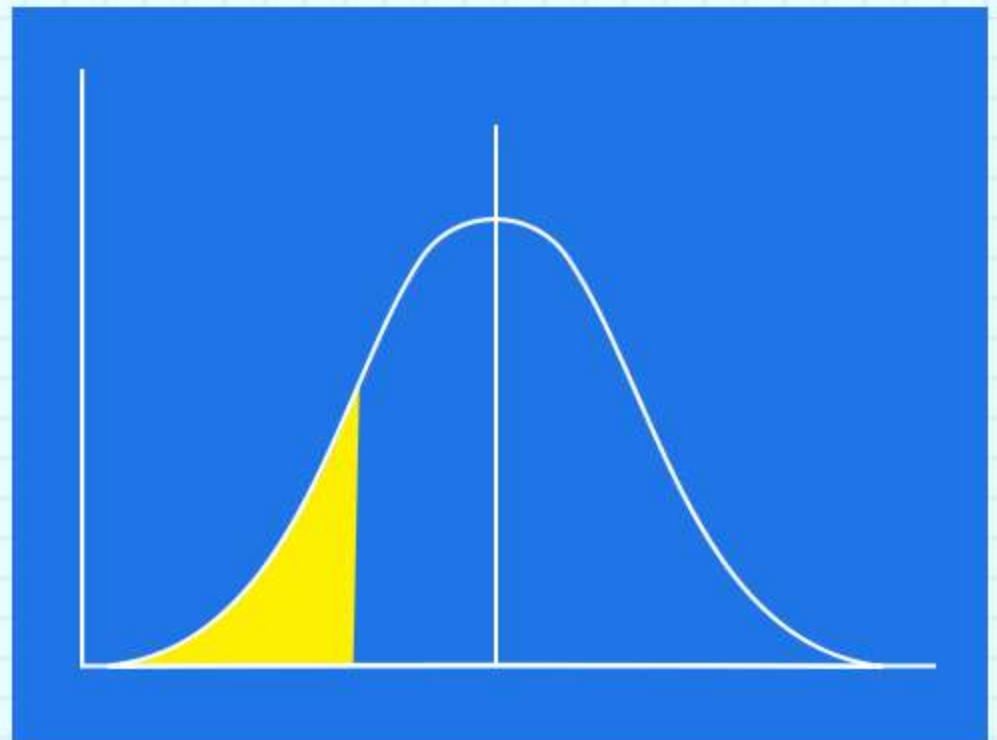
Definition: Failing to reject a false null hypothesis

Meaning: You say no effect, but actually there is one.

Also called: Miss

Example: You conclude therapy doesn't work, but it actually does.

Probability of Type II Error = β (**beta**)



Key Comparison

Type I Error:

- Reject H_0 when true
- False positive
- Controlled by α

Type II Error:

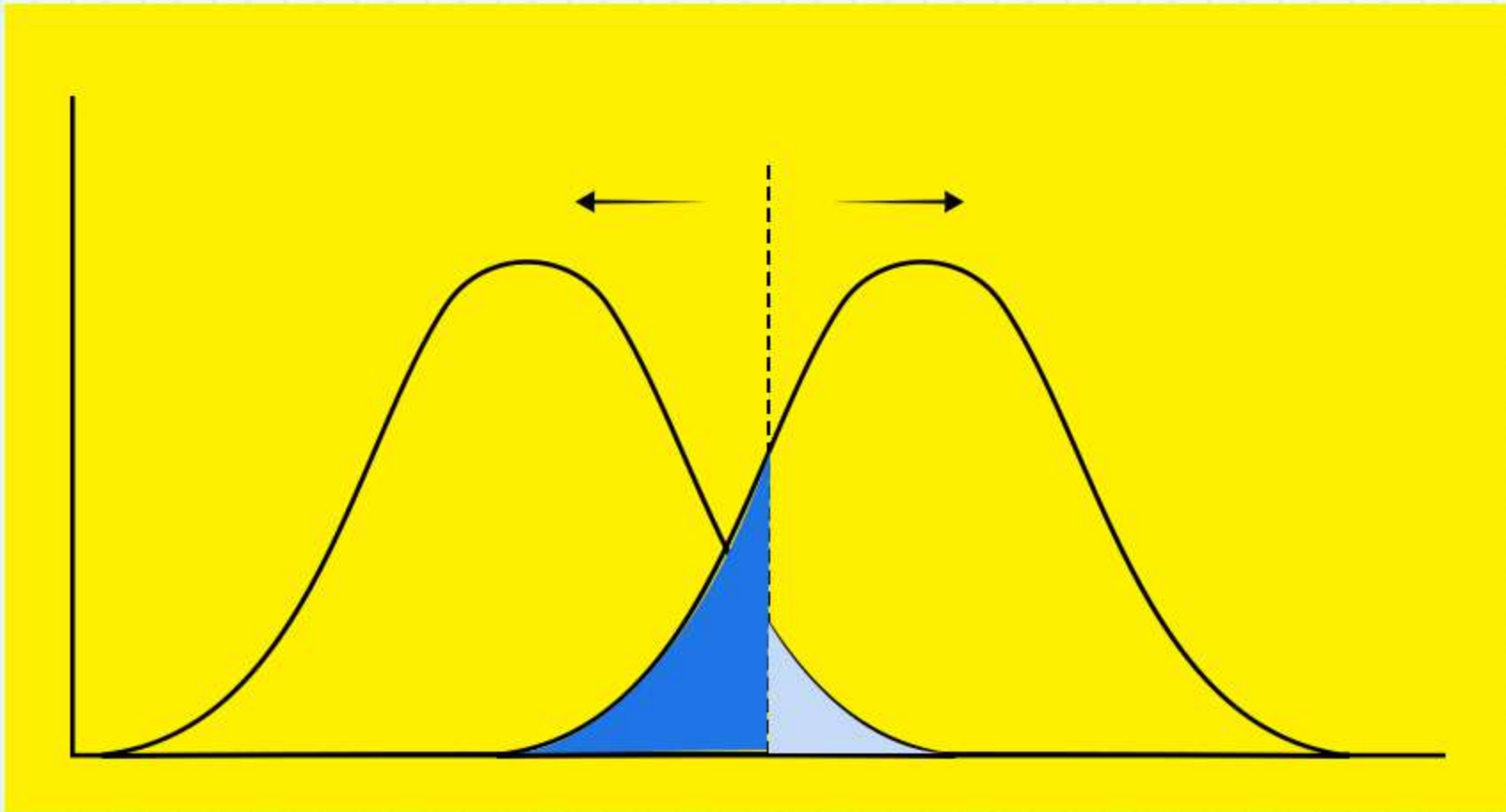
- Fail to reject H_0 when false
- False negative
- Related to β

Shortcut:

- Type I = “Seeing something that isn’t there”
- Type II = “Missing something that is there”



Trade-off Between Errors



Decreasing α (stricter test):

- $\downarrow$ Type I error
- $\uparrow$ Type II error

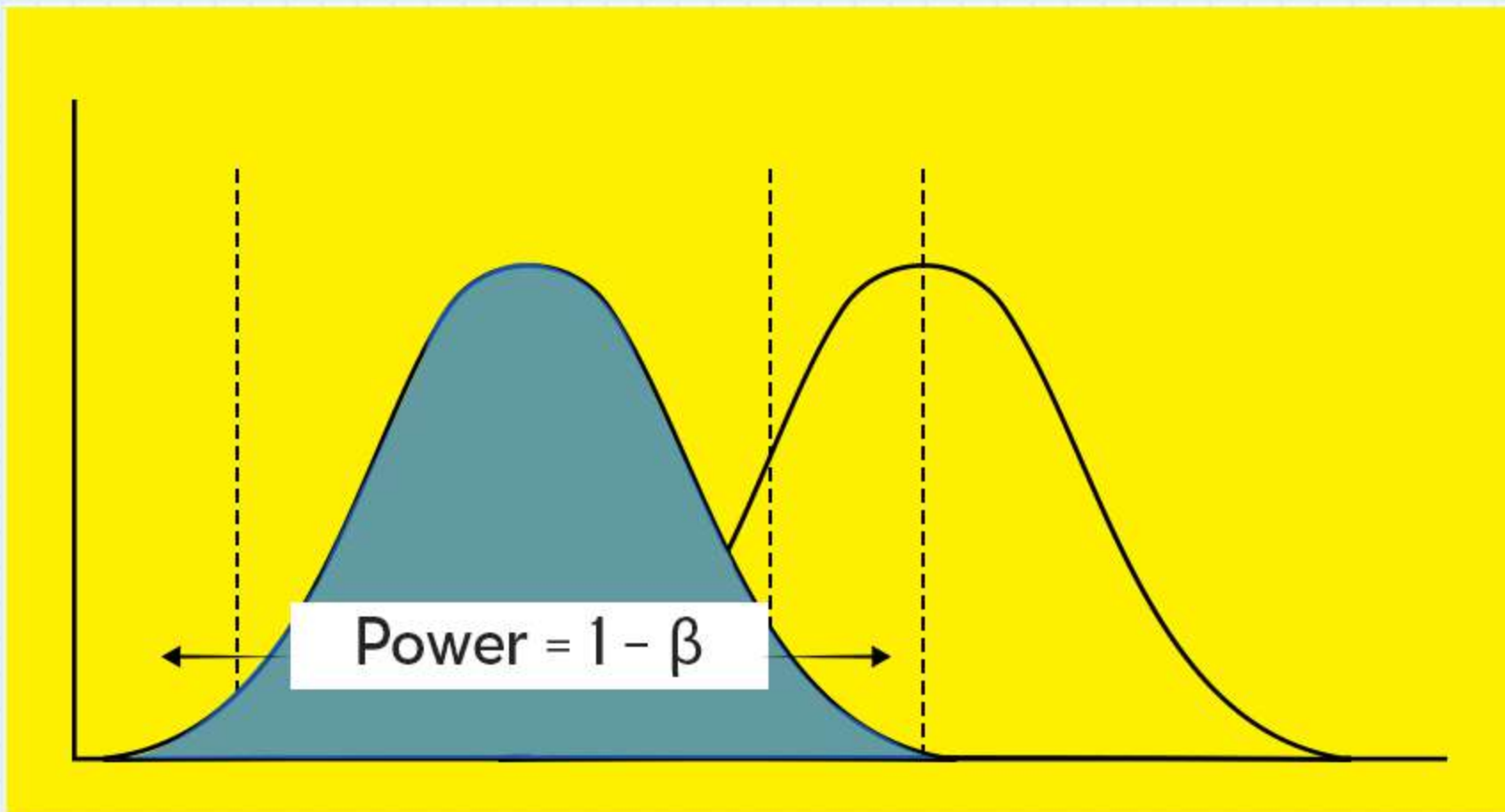
Increasing α :

- $\uparrow$ Type I error
- $\downarrow$ Type II error

You cannot minimize both simultaneously



Power of a Test



Power = 1 - β

Meaning:

Probability of correctly rejecting a false null hypothesis.

High power =

- ✓ Less Type II error
- ✓ Better detection of real effects

Influenced by:

- Sample size
- Effect size
- Significance level





Think & Answer!

Q1. Rejecting a true null hypothesis is called:

a

Type I
Error

b

Type II
Error

c

Sampling
Error

d

Standard
Error

Swipe carefully, the next slide reveals the answer!



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Correct Answers: Q1 - A. Type I Error