http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=3&ved=0CDYQFjAC&url=http%3A%2F%2Flap.umd.edu%2Fpsyc200%2Fhandouts%2FPSYC200_0803.pdf&ei=JgN3ULPuEYXA8ASeqoBQ&usg=AFQjCNG1lQiQ_RoG9vx_93CBXb21tiUlZA&sig2=MGVTYU0TSZ0dcAHzGp1sJAType I & Type II error

• Type I error, α (alpha), is defined as the probability of rejecting a true null hypothesis
• Type II error, β (beta), is defined as the probability of failing to reject a false null hypothesis

	TRUE STATE	
DECISION	**Ho**	**H1**
Do not reject Ho	correct decision $p = 1-\alpha$	Type II error $p = \beta$
Reject Ho	Type I error $p = \alpha$	correct decision $p = 1-\beta$

Power

• Normally, no adverse consequences occur when we correctly fail to reject a null hypothesis
– Declaring not guilty an innocent man -> he is free to go
• Type I and II errors are mistakes we do not want to make
– Letting a criminal go free (Type II)
– Or worse, sending to jail an innocent man (Type I)
• That's why we set alpha to 0.05
• On the other hand, the ability to convict a guilty person is essential to our justice system
– Reject Ho, when Ho is false
• this ability, in statistics, is referred to as power

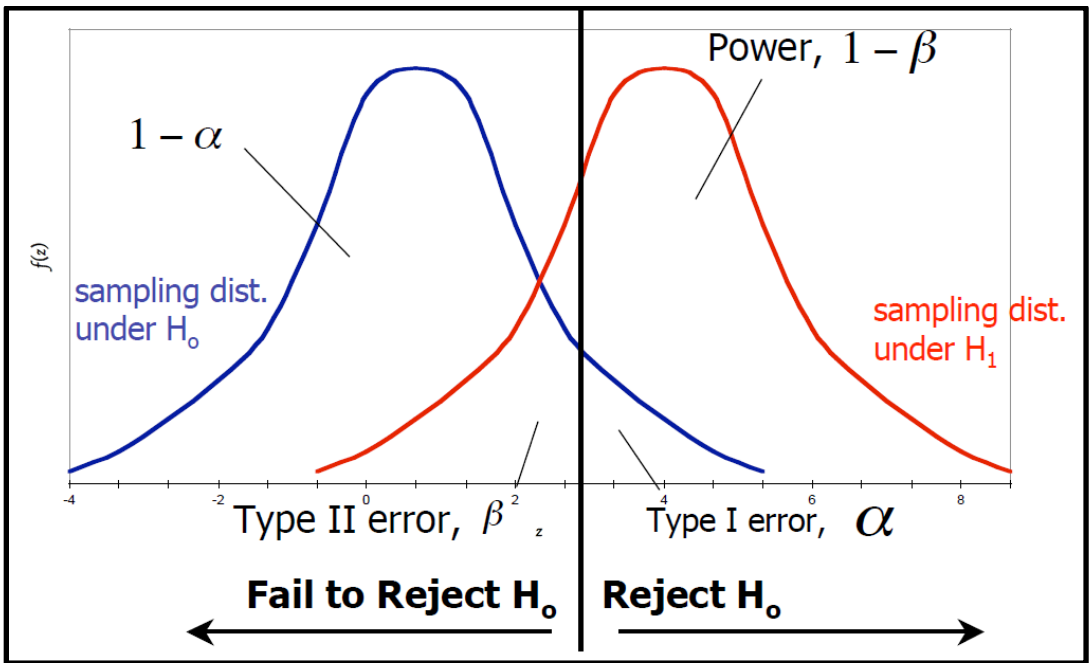
	TRUE STATE	
DECISION	**not guilty**	**guilty**
not guilty	correct decision $p = 1-\alpha$	Type II error $p = \beta$
guilty	Type I error $p = \alpha$	correct decision $p = 1-\beta$

Power

Definition

• Power is the probability of correctly rejecting a false null hypothesis

DECISION	TRUE STATE: Ho	TRUE STATE: H1
Do not reject Ho	correct decision $p = 1-\alpha$	Type II error $p = \beta$
Reject Ho	Type I error $p = \alpha$	correct decision $p = 1-\beta$



Power - Alpha & Beta

- β ->Type II Error: Fail to reject Ho even when H1 is true.
  - Power = 1 – β
  - If we increase power we reduce β, we reduce the probability of getting a Type II Error
- α -> Criterion for the test, it tells you were to start rejecting Ho.
  - We usually set α = 0.05
  - If we want a more stringent criterion,
- α decreases
- More difficult to reject Ho -> power decreases
- Power decreases -> β increases (easier to make a Type II Error)

Since Power is the probability of correctly rejecting a false null hypothesis, it is to our best interest to increase power.

Ways of increasing Power

- make alpha larger
- use one-tailed rather than two tailed test
- decrease variance
  - increase sample size
  - better measures
- increase effect size