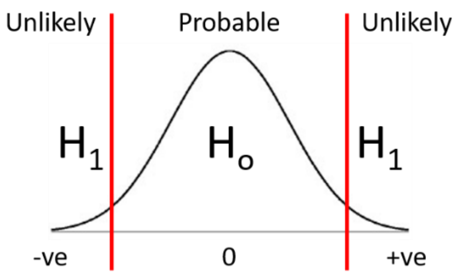
Notes on Hypothesis Testing

All types of hypothesis testing

Hypothesis testing is about using a particular sample of data to make conclusions about the whole population of that data. Whilst we can make specific measurements of a particular sample, we usually can't make these, and therefore 100% certain conclusions, for whole populations. For this reason, we talk about confidence limits and levels when investigating hypotheses.

Whilst we can calculate theoretically expected statistical values, particular samples will differ and may not necessarily (in fact rarely) match these exactly. We therefore compare the theoretical likelihood of the particular sample result against our accepted confidence limits to determine whether we accept that it could have occurred naturally or not.

If…	Then…
• The data suggests that there *is no* significant effect. • There is nothing special about this particular sample result which is within our accepted limits of probability. • It could have occurred naturally so we therefore conclude that no other factors had an effect.	H_0:
• The data suggests that there is *a* significant effect. • This particular sample result is beyond our accepted limits of probability. • It is so unlikely to have occurred naturally that that we therefore conclude that some other aspect had an effect.	H_1:



Some Symbols

Measure	Sample	Population
Mean average	$\bar{x}$	μ
Standard deviation	s	σ
PMCC	r	ρ

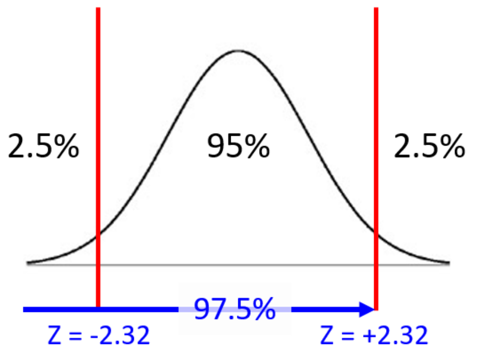
Testing using the Normal Distribution

Some notes to be added here...

Testing for Correlation

The Null Hypothesis	Possible Alternate Hypotheses		
	One Tailed		Two Tailed
$H_0: \rho = 0$ (there is no correlation)	$H_1: \rho < 0$ (there is –ve correlation)	$H_1: \rho > 0$ (there is +ve correlation)	$H_1: \rho \neq 0$ (there is correlation and it could be +ve or –ve)

Testing for Sample Means (Confidence Intervals)



-2.32	$<$	z	$<$	$+2.32$
-2.32	$<$	$\frac{X-\mu}{\frac{\sigma}{\sqrt{n}}}$	$<$	$+2.32$
$-2.32\frac{\sigma}{\sqrt{n}}$	$<$	$X-\mu$	$<$	$+2.32\frac{\sigma}{\sqrt{n}}$
$-2.32\frac{\sigma}{\sqrt{n}}-X$	$<$	$-\mu$	$<$	$+2.32\frac{\sigma}{\sqrt{n}}-X$
$+2.32\frac{\sigma}{\sqrt{n}}+X$	$>$	μ	$>$	$-2.32\frac{\sigma}{\sqrt{n}}+X$
$X+2.32\frac{\sigma}{\sqrt{n}}$	$>$	μ	$>$	$X-2.32\frac{\sigma}{\sqrt{n}}$
$X-2.32\frac{\sigma}{\sqrt{n}}$	$<$	μ	$<$	$X+2.32\frac{\sigma}{\sqrt{n}}$

$$\mu = X \pm 2.32\frac{\sigma}{\sqrt{n}}$$