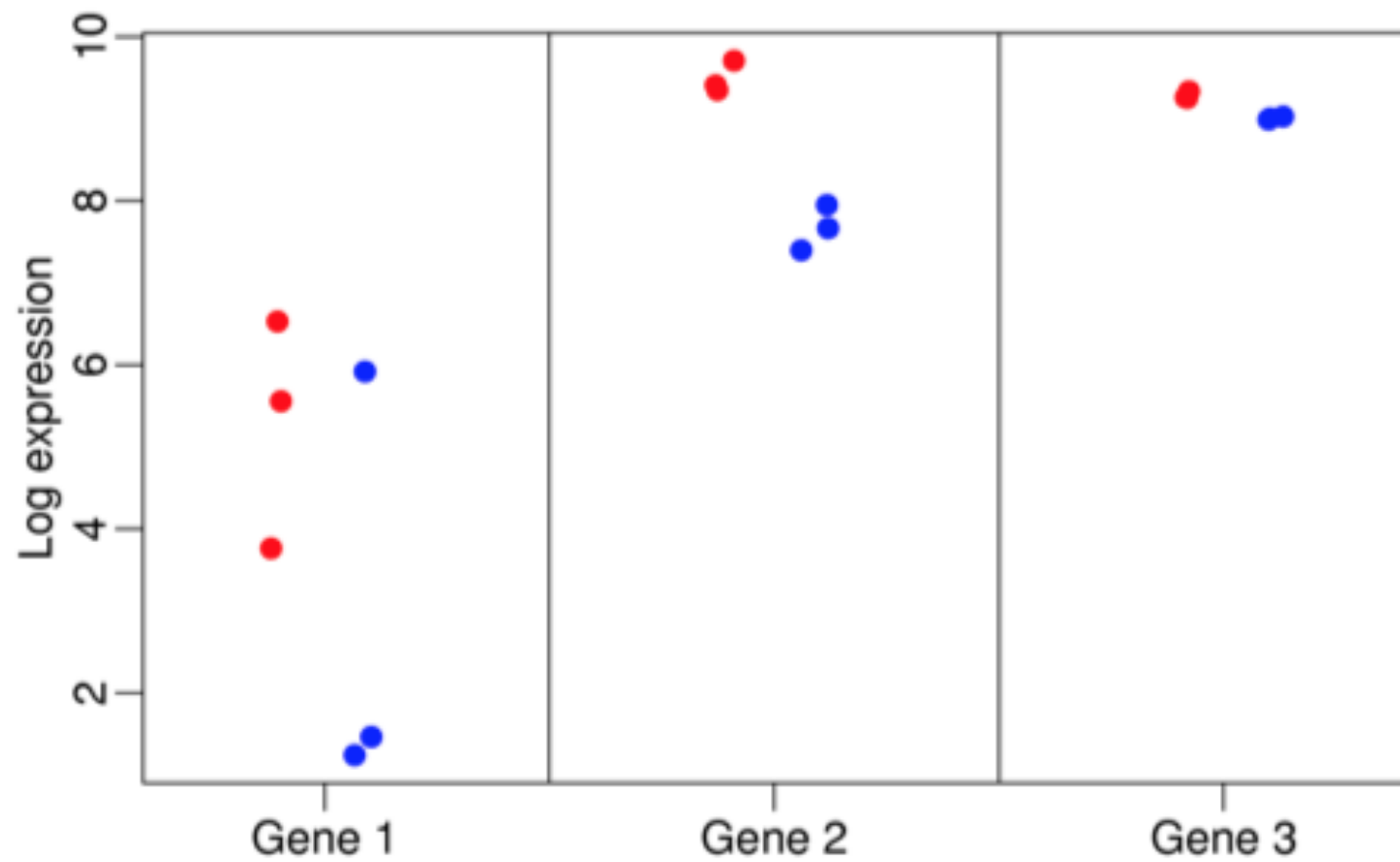


Statistical significance

Jeff Leek

@jtleek

We want to know if differences are replicable/ “real”

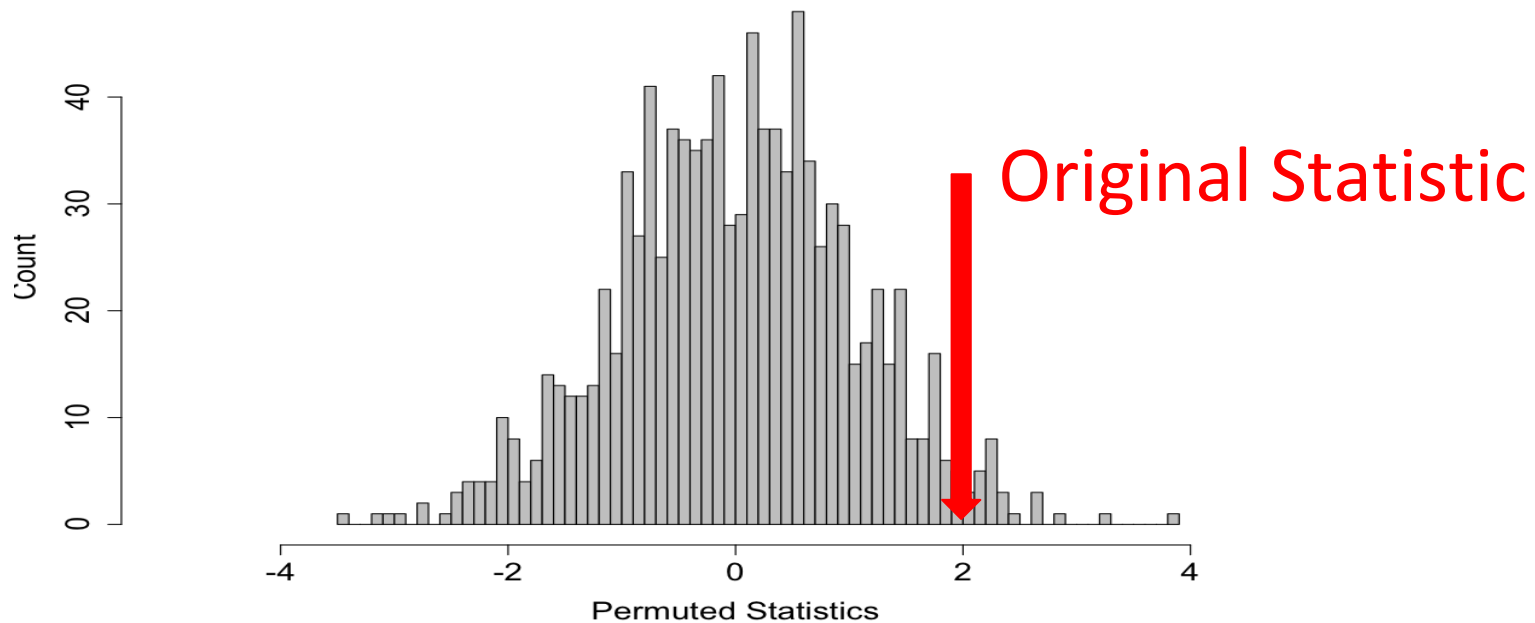


The t-statistic

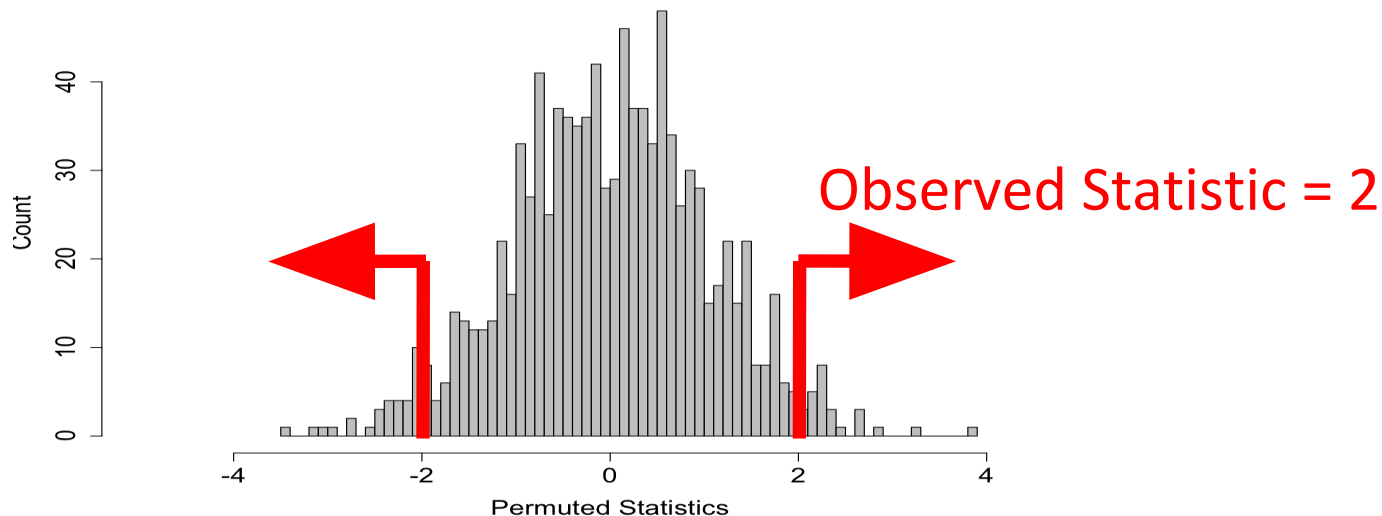
$$\frac{\bar{Y} - \bar{X}}{\sqrt{\frac{s_Y^2}{N} + \frac{s_X^2}{M}}}$$

P-value

p-values



how to calculate



$$\text{P-value} = \frac{\{ \# \mid S^{perm} \mid \geq \mid S^{obs} \mid \}}{\# \text{ of Permutations}}$$

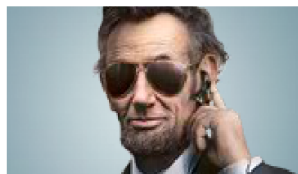
Know what a p-value is/isn't

The probability of observing a statistic that extreme if the null hypothesis is true.

The p-value is not

- Probability the null is true
- Probability the alternative is true
- A measure of statistical evidence

A common mistake



ABRAHAM LINCOLN CREATED
THE SECRET SERVICE.
THE DAY HE WAS ASSASSINATED.
TIMING IS EVERYTHING.

TAKE A NUMBER

Putting a Value to ‘Real’ in Medical Research

By NICHOLAS BAKALAR

Published: March 11, 2013

When medical researchers report their findings, they need to know whether their result is a real effect of what they are testing, or just a random occurrence. To figure this out, they most commonly use the p-value.

[Enlarge This Image](#)

0.05

This number (the p stands for probability) is arrived at through a complex calculation designed to quantify the probability that the results of an experiment were not

FACEBOOK

TWITTER

GOOGLE+

SAVE

E-MAIL

SHARE

PRINT

REPRINTS