Null-Hypothesis Testing

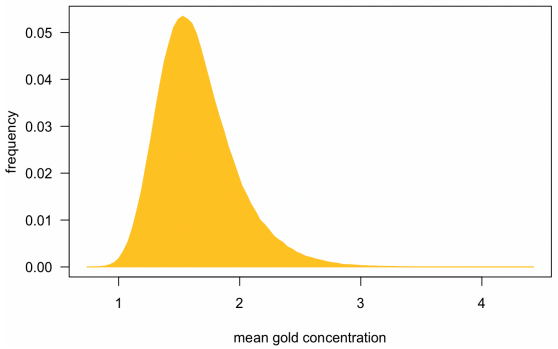
State null & alternative hypotheses

Hypotheses are statements, not questions.

Null hypothesis: “Nothing special here”.

Usually more interested in the alternative than the null.

Generate distribution of outcomes



There are several ways to generate this distribution.

Choose a significance (α) level

Our standard of what we consider rare or unusual

Commonly 0.05, but can be anything

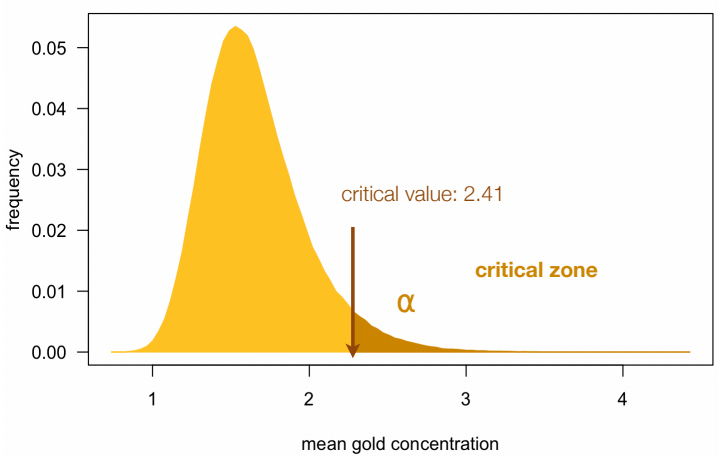
Find the critical value

The first value of our statistic that we would consider rare or unusual

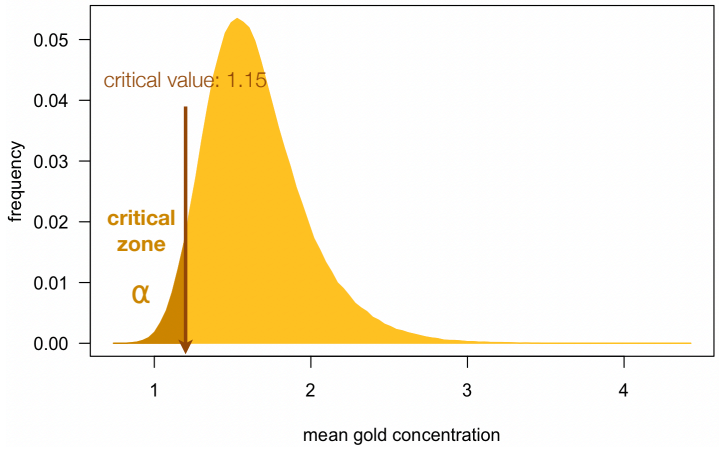
Depends on the distribution, the significance level, and our alternative hypothesis

Three variations: right-tailed, left-tailed, two-tailed

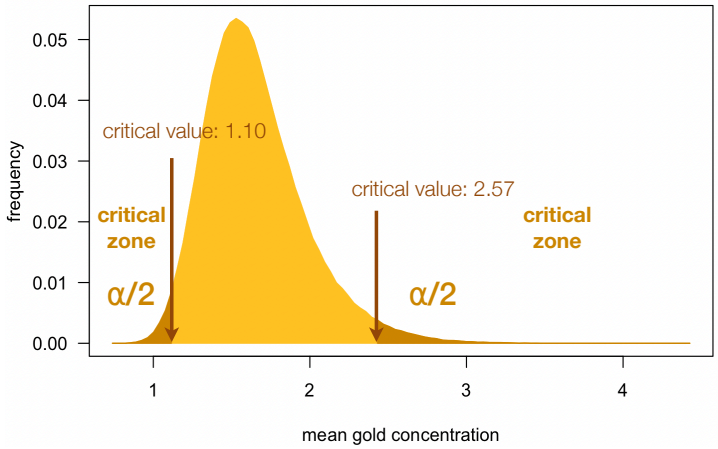
Right-tailed tests



Left-tailed tests



Two-tailed tests



Collect data & measure statistic

The data should not inform the previous steps.

Accept or reject null hypothesis

If our statistic is in the critical zone,
we consider it an unusual or unexpected result,
so we **reject the null hypothesis**.

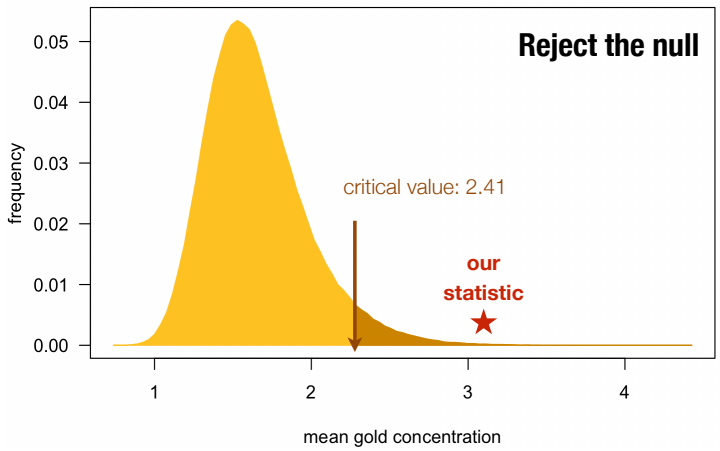
If our statistic lies outside the critical zone,
we don't consider the statistic as unusual,
so we **accept the null hypothesis**.

Accept or reject null hypothesis

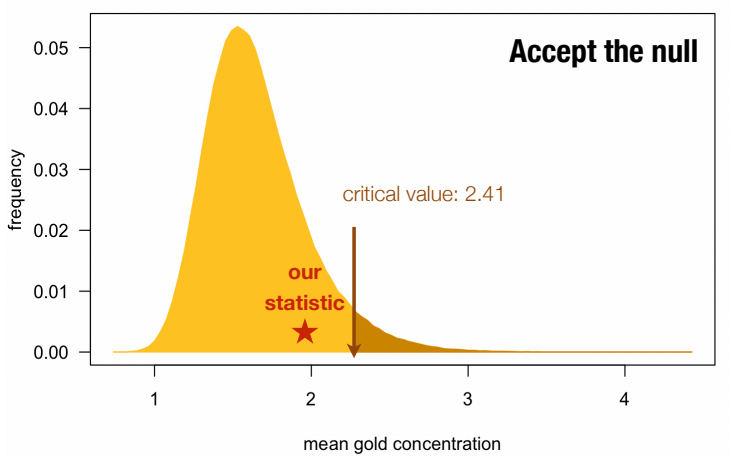
We never say that the null hypothesis is true or false,
or that it is right or wrong.

Based on our decision, though,
we will act **as if** it is correct or not.

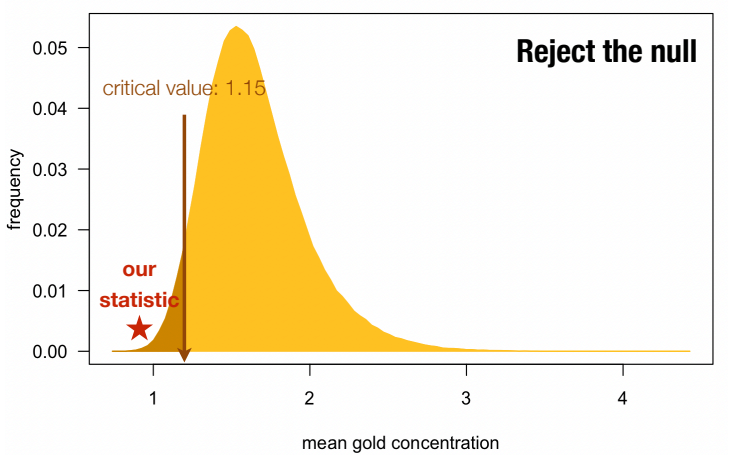
Example 1



Example 2



Example 3



Example 4