



no prior knowledge /
expectations about θ .

Today decide if statements about θ are "reasonable"

Tests of hypotheses

Two hypotheses about population

H_0

H_1

Procedure: Decide on a statistic $\hat{\theta}$ whose value will tell us which hypothesis to choose.

A test of hypothesis consists of:

Hypotheses H_0, H_1 about our population (typically about param. θ)
a statistic $\hat{\theta}$, and a partition of
values of $\hat{\theta}$ into two sets R_0, R_1
when $\hat{\theta} \in R_0 \Rightarrow$ accept H_0 reject H_1
 $\hat{\theta} \in R_1 \Rightarrow$ accept H_1 reject H_0

In practice:

$H_0 =$ "no actionable result" "default"
null hypothesis

$H_1 =$ "actionable result" alternative hypothesis.

Important idea: don't want to conclude H_1 unless
it is true.

Def A type I error = when test tells us to conclude
 H_1 when H_0 is true.

(implicit assumption H_1 xor H_0)

$\alpha \equiv P(\text{type I error})$ "level of significance of the test"

Def A type II error = when reject H_0 even though it's true.

$\beta \equiv P(\text{type II error})$ $1-\beta$ "power of test"

Strategy:

for $\alpha = 0.05$ or 0.005

try to make β as small as possible w/ this constraint on α .

Example: