

Burden of Proof

Type I and Type II Errors

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Two Types of Error

	H_0 true	H_0 false
Reject H_0	Error Type I	OK
Retain H_0	OK	Error Type II

Which error is most serious?

Some Testing Problems

Product	Claim
Drug	Patients recover better with drug, than without it.
Coding system	Error rate is less than 10^{-9} .
New road	Travel times will be reduced by at least 10 min.

- 1 Which is error worse?
- 2 Reject a true claim or confirm a false claim?

The Null Hypothesis

- 1 Recovery times are the same with or without the new drug.
 - 2 The error rate is at least 10^{-9} .
 - 3 Travel times will not be reduced by more than 10 min.
- The null hypothesis is the negative statement.
 - rejecting the hypothesis favours the proposed product
 - We **want to** reject the null hypothesis.
 - When we reject the null hypothesis
 - we **are confident** that the new product is good
 - Retaining the null hypothesis means **no conclusion**

Summary

- Type I: rejecting H_0 when it is true
- Type II: retaining H_0 when it is false
- Phrase H_0 so that Type I is the more serious error

*In later videos we will bound the probability of Type I error.
Bounding Type II errors is often impossible.*