

Statistical Methods for Insurance: Randomisation

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W1.C2

Review of hypothesis testing

- ▶ Terminology: null and alternative hypothesis, test statistic, significance value, p-value, critical value, decision, power, one-sided or two-sided test
- ▶ Common basic tests: one sample t-test, two sample t-test, paired sample t-test, chisquared test (for association), analysis of variance

Hypotheses

- ▶ The two hypotheses need to cover all possibilities.
- ▶ Alternative hypothesis is usually the interesting outcome, sometimes its easier to write this first. It is usually stated as an inequality.
- ▶ Null hypothesis is the usually stated as a parameter is = to some specified value. It represents a historical value, or a conservative state of business as usual where we would only rule against it if there is overwhelming evidence.

Using permutation to examine association

Example from DBCR:

The participants in this study were 48 male bank supervisors attending a management institute at the University of North Carolina in 1972. They were asked to assume the role of the personnel director of a bank and were given a personnel file to judge whether the person should be promoted to a branch manager position. The files given to the participants were identical, except that half of them indicated the candidate was male and the other half indicated the candidate was female. These files were randomly assigned to the subjects.

Your turn

Is this an observational study or an experiment? How does the type of study impact what can be inferred from the results?

	not promoted	promoted	Sum
female	10	14	24
male	3	21	24
Sum	13	35	48

	not promoted	promoted
female	0.42	0.58
male	0.12	0.88

How likely is this?

1. Break any association between gender and decision
2. Re-tabulate
3. Compute proportion of women promoted

Original:

gender	decision
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted
male	promoted

Permuted decision:

gender	decision
male	promoted
male	not promoted
male	promoted
male	promoted
male	promoted
male	not promoted
male	not promoted
male	not promoted
male	promoted
male	promoted

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