

Experimental Design

Topic Test

- 1
- a Paired Comparison
or Randomised Block design
 - b Randomized controlled trial
or Blind trial
 - c To estimate the size of experimental error
or To see if the results of repeated investigations are consistent

Any kind of blocking
will reduce experimental error

Any kind of randomisation
or blinding will reduce bias

2 Weakness of Strategy 1: e.g. The CVs are not assigned to the two systems at random.

This may result in bias arising from one set of CVs being easier to process

Weakness of Strategy 2: e.g. The CVs are processed twice and it may be easier to process the CVs the second time than the first time leading to order bias.

3 a Use a coin flip to randomly assign volunteers to the control and experimental groups (e.g. Heads = control, Tails = Experimental)

↳ Block by "Sex at birth": Put all males into one group and females into another group.

Use a coin flip to then allocate the males into a male control and male experimental group. Repeat for females.

b Ensure the number of males and females are the same
Ensure similar ages of volunteers

← Things that are easily controlled.

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- e.g.
- James should collect data on how much his customers spend at the bar
 - He can do this by using the till / balance sheet to record each transaction
 - To reduce bias he can collect data on randomly chosen days throughout the year
 - He can also randomise any promotions / menu items throughout the year
 - To reduce experimental error he can freeze his prices throughout the year
 - He can also compare takings across the same days e.g. Mondays.

5

a A double blind trial is where neither the patients or the people administering the treatment are aware which group the patient has been assigned to

b A double blind trial reduces the bias arising from the expectations of the patients and the people administering the treatment.

c The control group is the group assigned the placebo
The experimental group is the group assigned the treatment.

d A placebo is a false treatment: it looks like the true treatment but has no effect on the results.

An example may be a sugar pill.

(e.g.)
e Two-sample t-test

IF • The population of percentage improvements for both the treatment and placebo are independent, normally distributed with equal, unknown variances.

6 a Only a sample of 1 pair of days is taken so any results are biased to that 1 pair of days.

b Experimental error in this context would be any variation in results arising from confounding factors such as the weather or traffic on the day.

c i Paired Comparisons reduce the experimental error arising from the differences in takings between different days.

ii Randomisation reduces the bias arising from the order in which supplies were used.

7 a e.g. Double blind trial - To reduce the bias arising from the expectations of the patients and researchers

Randomisation - To reduce the bias arising from applying one steroid to a particular side

b e.g. The patients applied the treatment to themselves.

8 a The control group is the group using the standard desks
The experimental group is the group using the sit-stand desks.

b A blind trial is where the workers would be unaware which type of desk they are using. This will reduce bias arising from the workers expectations surrounding the experiment.

c The workers will be working at the desk so will be aware of what type of desk it is.

- d e.g.
- Only NHS staff were used
 - Some results are from questionnaires which are self-reporting.

← things kept the same / subjective results

e Time Point (3/6/12 months)

f e.g. Two-sample t-test.

← (Any 2 or more sample test)