

experimental design

- ▶ principles of experimental design
- ▶ experimental design terminology



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principles of experimental design

(1) control

compare treatment of interest to a control group

(2) randomize

randomly assign subjects to treatments

(3) replicate

collect a sufficiently large sample, or replicate the entire study

(4) block

block for variables known or suspected to affect the outcome

A close-up photograph of a runner's waist and legs. The runner is wearing a blue and red tank top with 'EN', 'UK', and 'oney' visible, and black shorts with a cartoon character on the side. A race bib with the number '62' is attached to their belt. They are holding a small yellow bottle with a blue cap. Several energy gel packets are strapped to their belt. A black watch is on their left wrist.

more on blocking

- ▶ design an experiment investigating whether energy gels help you run faster:
 - ▶ treatment: energy gel
 - ▶ control: no energy gel
- ▶ energy gels might affect pro and amateur athletes differently
- ▶ block for pro status:
 - ▶ divide the sample to pro and amateur
 - ▶ randomly assign pro and amateur athletes to treatment and control groups
 - ▶ pro and amateur athletes are equally represented in both groups

blocking vs. explanatory variables

- ▶ explanatory variables (factors) - conditions we can impose on experimental units
- ▶ blocking variables - characteristics that the experimental units come with, that we would like to control for
- ▶ blocking is like stratifying:
 - ▶ blocking during random assignment
 - ▶ stratifying during random sampling

placebo

fake treatment,
often used as the
control group for
medical studies

placebo effect

showing change
despite being on
the placebo

experimental terminology

blinding

experimental units
don't know which
group they're in

double-blind

both the experimental
units and the researchers
don't know the group
assignment