

18th October 2018

Thursday

- Human RCT are often impossible on ethical grounds.
- ∴ Many times observational studies are used.
- A SECOND BEST STUDY

→ (\bar{Y}) Outcome: Systolic Blood Pressure

→ (\bar{X}) Treatment (supposedly causal factor): pill use v/s non pill use

Basic Design: Observational Study
(cf Kaiser Study)

ENEMY: Potential confounding Factor: AGE

IS age a PCF? TEST

① IS it possible that \bar{Z} and \bar{Y} are associated?
age ↑ v/s BP ↑

② IS it possible that Z_1 and X are associated?
age ↑ v/s pill use ↓

→ If we don't attempt to defeat this PCF
the results will be biased in favour of the pill.

HOW TO DEFEAT PCF?

- ① at Design X
- ② At analysis

Key idea: To defeat PCF
make both groups' PCF
constant.

→ Make groups with similar
PCFs. Withing sample.

After controlling (adjusting) for age, taking the pill increases sys. BP by 5 mmHg.

Is this difference practically significant?

• NOT SIGNI

Yes, it's small but important.

↑ accumulating over time will lead to worse health conditions.

PROBABILITY

Genetics study some disease or study

Probability: Numerical mode of uncertainty

2 main ways of thinking about meaning of probability:

- THE frequentist (relative freq. approach): 2+ repeats of one event that doesn't effect each other (in identical cond.)
- The Bayesian approach

EQUALLY LIKELY MODEL (ELM)

$$P(A) = \frac{\# \text{ of outcomes favourable to } A}{\text{total } \# \text{ of possible outcomes}}$$

$\begin{bmatrix} 1 \\ 2 \\ 9 \end{bmatrix}$ at Random \rightarrow $\begin{bmatrix} Y \\ \end{bmatrix}$ $n=1$ 'at random' - \therefore equally likely.

25% 50% 25%

Hh x Hh \rightarrow HH, Hh, Hh, hh
 \Rightarrow equally likely model also applies

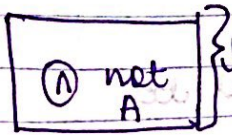
# of Children	P(at least one T.S kid)
1	25%
2	> 25%
...	...
5	?

at least one can mean:
 1 T.S baby or 2 T.S babies or 3 T.S babies
 or 4 T.S babies or 5 T.S babies.

"1 or more" = "Not 0".

$P(A)$? $P(\text{not } A)$?

'not exactly 0' = not TS baby (1) and not TS baby 2
... and not TS baby (r)



total area: 1

$$P(\square) = 100\%$$

$$1 = P(A) + P(\text{not } A)$$

$$P(A) = 1 - P(\text{not } A)$$

$$0 \leq P(A) \leq 100\%$$