RANDOMIZED CONTROLLED TRIALS, PRACTICAL SIGNIFICANCE BIAS, PLACEBO, BINDING (10/17/19)

Read: DD (A) chpt 1-3; (B) ch 1-7

Today: LN-69

start working on HW 2 now : R-32
R-34

R-41 Read new; read at the end of class

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independent variable
$\overline{X}$ (supposedly causal factor): psychological environment

dependent response
$\overline{y}$ (outcome variable): cortex weight
brain anatomy

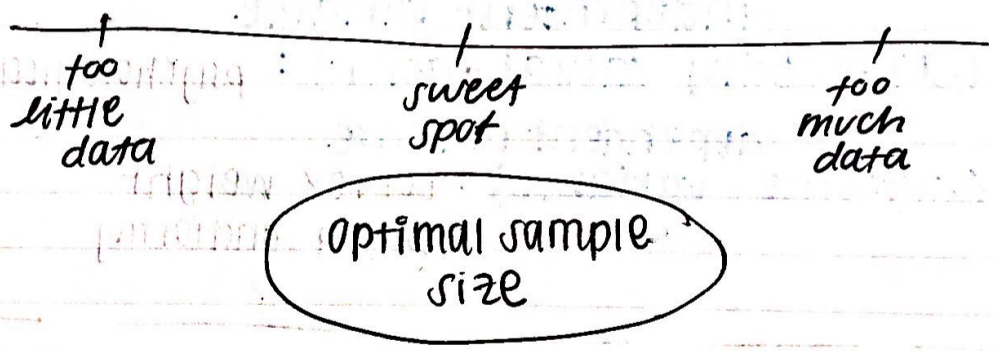
$\overline{X} \xrightarrow{?} \overline{y}$ does $\overline{X}$ cause $\overline{y}$?

subjects: male rats sample size determination (n)

Intuition | to decrease your uncertainty about something of interest to you, get more information (data) (i.e. make n ↑)

good = unbiased

$n = 120$



$\bar{y}_T = 683$ mg

$\bar{y}_C = 647$ mg

difference $(\bar{y}_T - \bar{y}_C) = +36$ mg

Q_1: Is this difference large in (real-world) practical (biological) terms?
Is this diff (practically significant)?

(A) ask on best expert

Q_2: Is this difference large in statistical terms?
Is this difference statistically significant?

A_1 approx

$$\frac{\bar{y}_T - \bar{y}_C}{\bar{y}_C} = \frac{683\text{mg} - 647\text{mg}}{647\text{mg}} = \frac{+36}{647} = 5.6\%$$

The enriched rats had ortex weights that were 5.6% heavier on average than deprived rats

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no universal rule of form

if rel diff > blah% then pracsig

answer is context specific

K neurons → $\frac{K(K-1)}{2}$ possible synapses

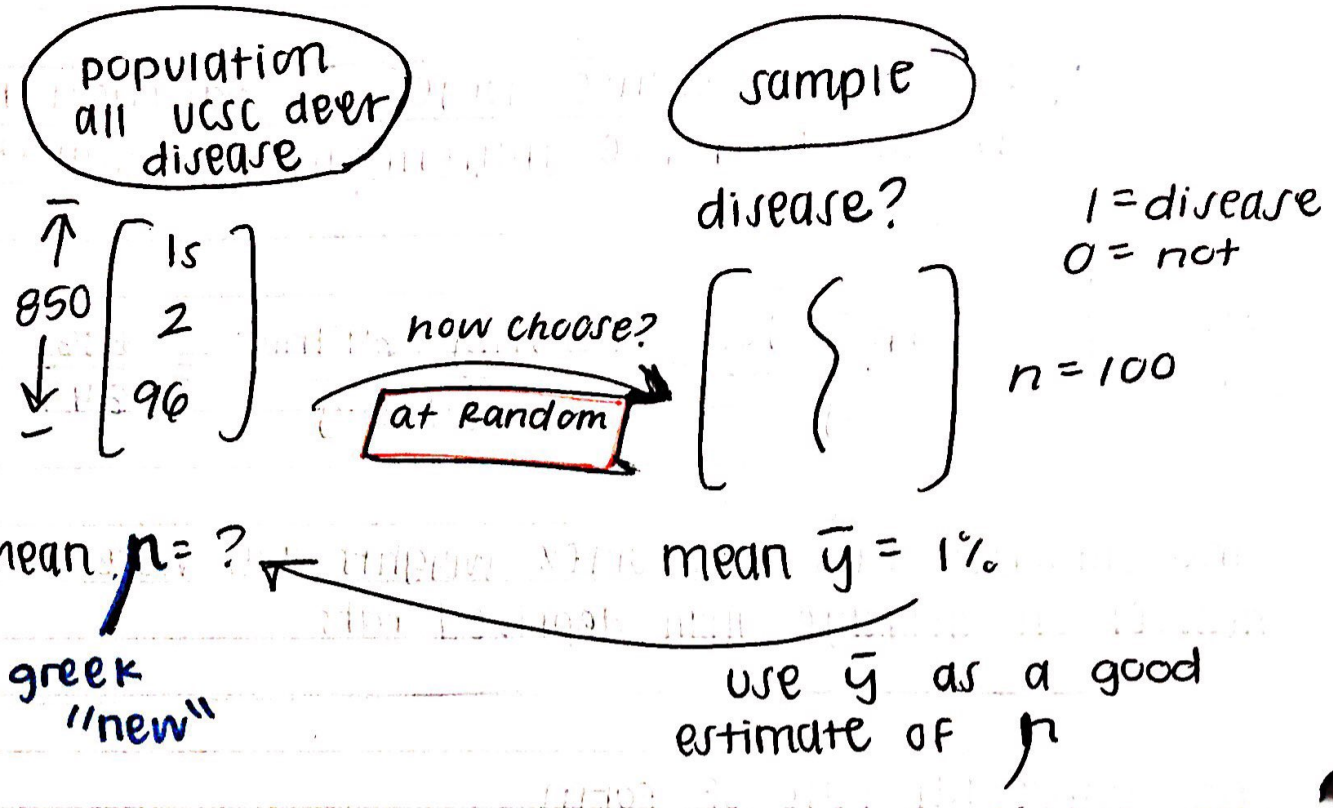
5.6% weight → $(5.6\%)^2$ increase in synapses
$= 28\%$
↗ big in biological terms (∴ pracsig)

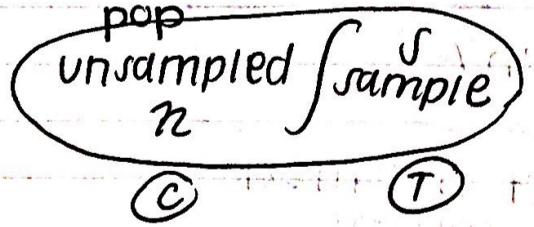
∴ means therefore

Q: How assign rats to (T), (C)?

Goal: try to make groups as similar as possible in all relevant ways, except for (T)/(C) distinction

Simplest Method: assign T/C at random





controlled experiment
(+) randomization to (T), (C) + randomized controlled experiment trial

BIAS: systematic tendency to over- or under estimate truth

x = treatment

$$= \begin{cases} 1 & \text{if } (T) \\ 0 & (C) \end{cases}$$

y = cortex (mg)

z = genetics (z)

↑ potential confounding factor

PCF ↖ enemy: bias from PCFs

RCT is valid: no bias

Placebo: same as (T) but w/o active ingredient

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double blind | RCT (Rolls Royce) | Placebo Effect