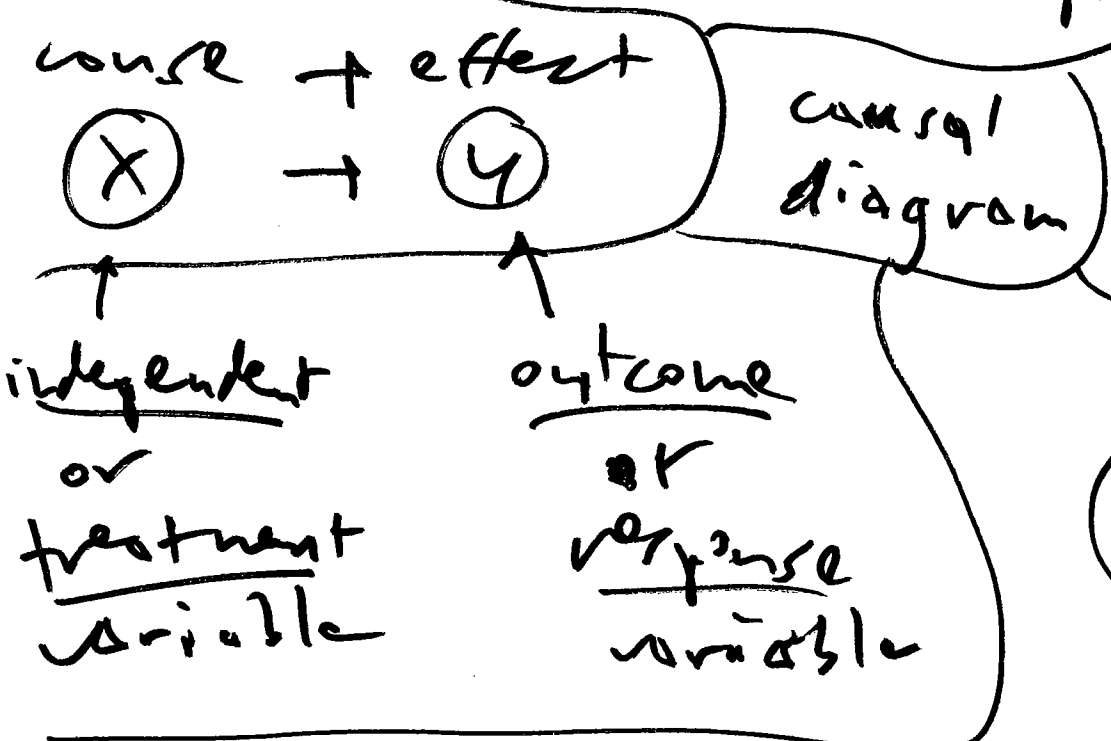


this time: experimental design;
 next time: probability
 read: T&T ch. 1, 2, ③, 5 ①
 AMS7 9 Oct 08

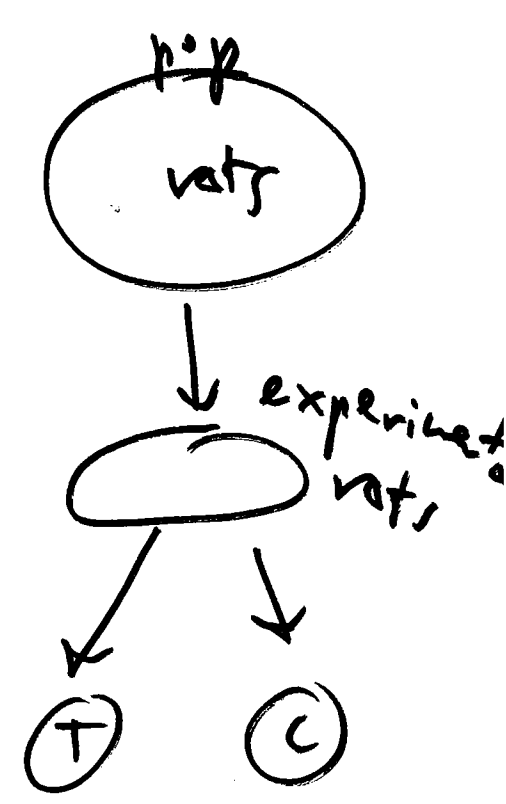
need more people to transfer into lecture section 2
 book 2 (pp. 39-41 of reader) assigned now, due Tue 2 Oct

Cause & effect relationships
 exp. design
 science article (reader p. 54)



condition	mean
T	683mg
C	647

(T-C) difference 683 - 647 = +36mg



$$\bar{T} - \bar{C} = +36 \text{ ms}$$

(absolute comparison)

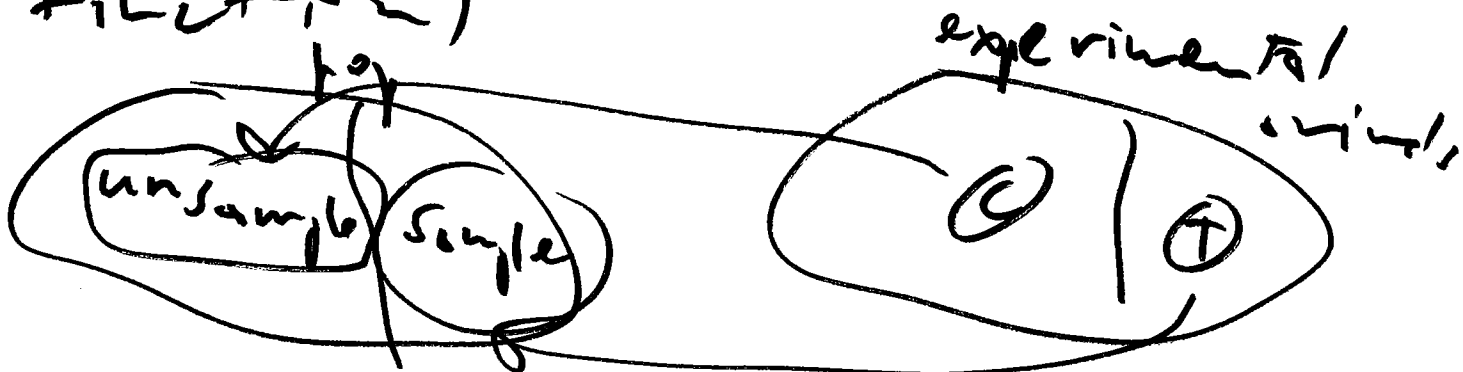
$$\frac{\bar{T} - \bar{C}}{\bar{C}} = \frac{+36 \text{ ms}}{647 \text{ ms}} = 0.056 \quad (2)$$

(relative comparison)

$$= 5.6\%$$

mean context wt. of \oplus animals was 5.6% bigger than mean context wt. of \ominus animals: this seems (barely) large in practical terms (CPU etc.)

goal: try to make \oplus, \ominus groups as similar as possible in all relevant ways (except for \oplus/\ominus distinction) F&



idea: assign experimental subjects^⑤
to t, c at random: randomized
controlled trial (RCT) ←
experiment (REE)

treatment: enriched vs deprived
(X) ① ②
outcome: cortex wt. (mg.)
(Y)

often can identify a third variable
③ that has potential to be

associated with both ① & ②:
this is a potential confounding factor

two variables u & v are assoc. (PCF)

if when one goes up or down
the other tends to go up or down
with it

PCF, are the enemy in exp. design ^(F)
because they can bias the results

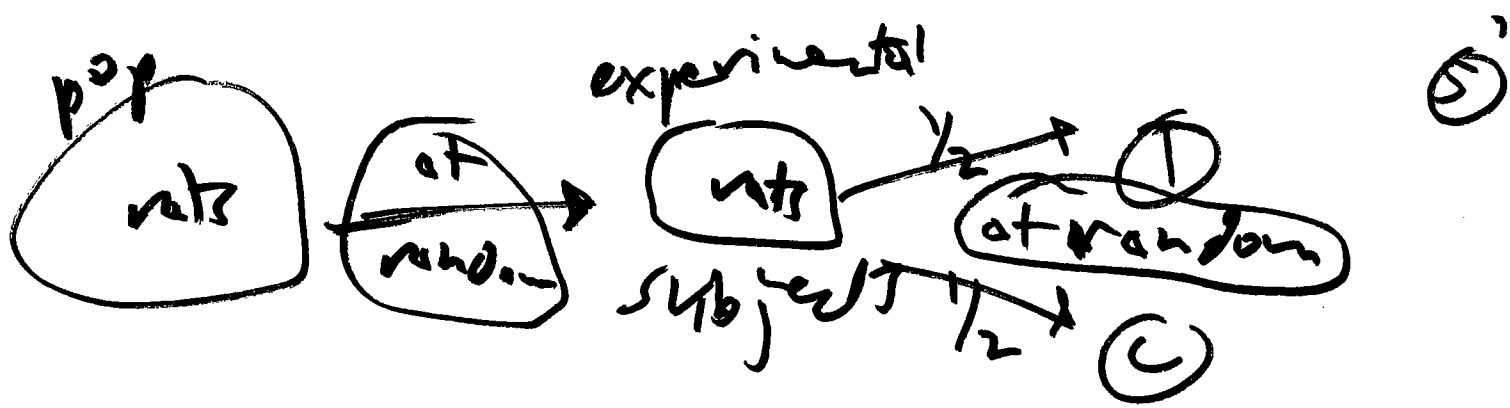
Bias: a systematic tendency
to over- or under-estimate
the truth

Randomization
will tend to

defeat enemy of PCF, by
promoting comparability of ①, ②

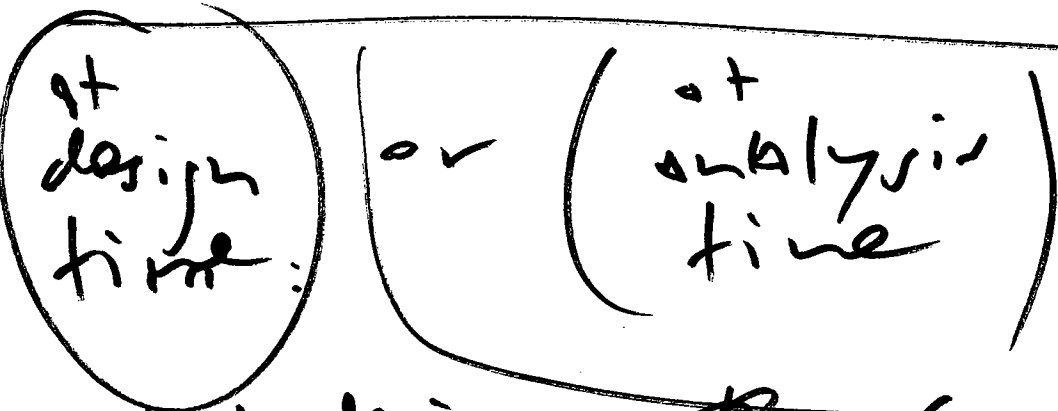
(PCF)
genetic
predisposition to
layer - rank context

randomized controlled trial \leftrightarrow
completely randomized design



how

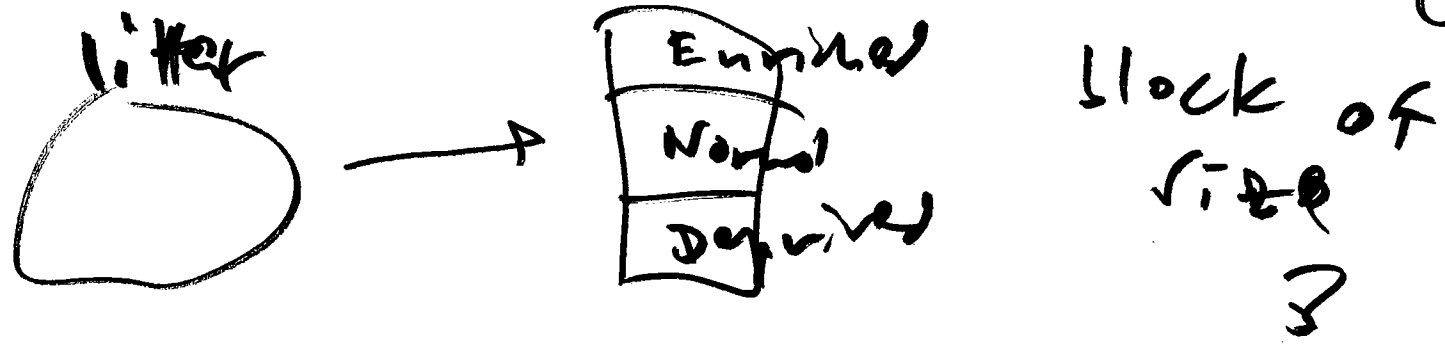
defeat a PCF: hold it constant



actual design: ~~from 60 litters~~ from genetically pure strain of rat they chose 2 rats at random from each litter & assigned to ⓐ, ⓑ

at random: matched pairs

design; special case of randomized blocks design



matched pairs → special case of randomized blocks with block size

2

pair #	(E)	(D)	
1	683	649	+34
2	708	658	+50
⋮	⋮	⋮	⋮
60	699	688	+11

(T - C)

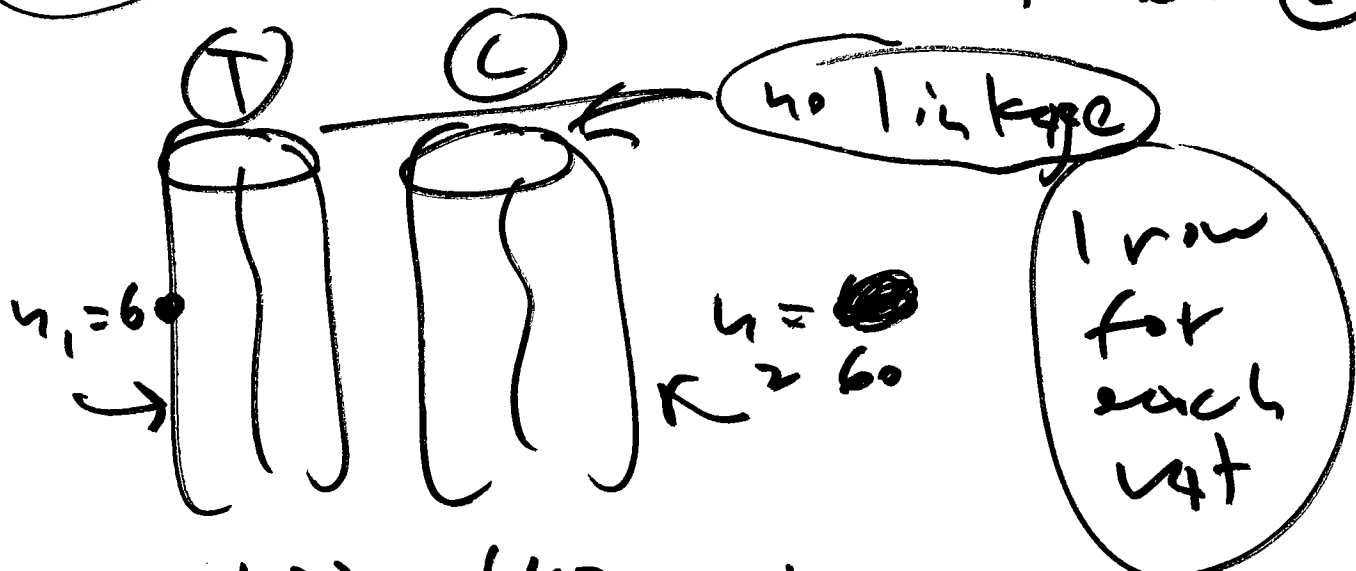
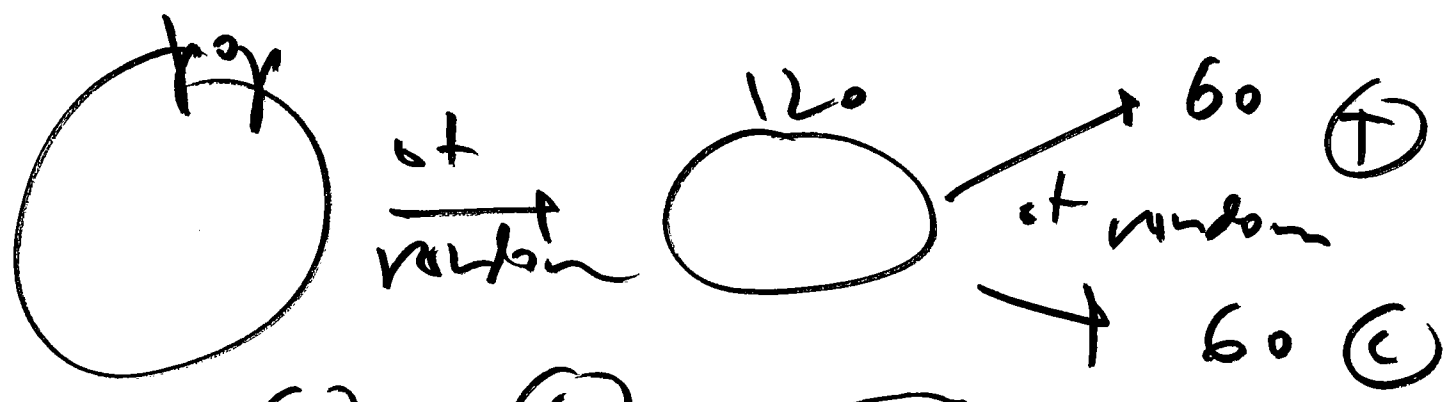
matched pairs design

focus on column of differences

mean (683) (649)

1 row for each pair

T completely randomized design: O_2
 data



mean 683 647

context ut	T/C?
60	1 ⋮ 1
60	0 ⋮ 0

1 = T
0 = C

$n = 120$

matched pairs designs: tend to be more accurate than completely randomized designs

a design is valid if it introduces no bias into the process of estimating cause & effect correctly

both matched pairs &

completely randomized designs are valid, but the former tends to be more accurate (& also more complicated / expensive)