

# 1) Lecture #5 Experimental Design

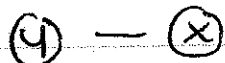
next time: probability

- $Y$  = outcome variable (brain anatomy)
- $X$  = treatment variable (psychological environment)  
(enriched vs. deprived)  
(1) (0)  
(treatment) (control)
- $Z$  = potential confounding factor (PCF) (ex: genetics)

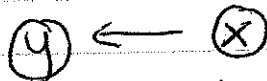
\* PCF<sup>s</sup> are the enemy in experimental design because they create bias in the conclusions unless they are controlled for.

- bias - a systematic tendency to under- or over estimate the truth
- unbiased = no bias

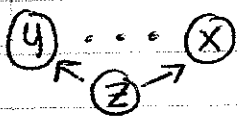
## Causal Diagram



x, y are associated



x causes y



- To defeat a PCF

at design time:

① randomly assign subjects to (T) ≡ (C). This will break the link between Z ≡ X.

• To defeat a PCF: hold it constant in comparison between (T) ≡ (C); randomization does this, but there's a better way to keep it constant.