# Principles of statistics

McGill University - Fall 2011

### Two methods for data collection

- Experimental studies: The experiment is designed, the researcher has control over the units
- Observational studies

### Beware of confounding variables

- A confounding variable is some variable that varies along with one of the variables of your study in a similar fashion which may be a wrong cause or influence your analysis. Example: Measuring the weight and IQ now and in ten years after graduation from Mcgill. You find both IQ and weight have increased. The real driving phenomenon behind this increase is not the attendance of Mcgill university, it's time.
- Dependent variable: lung cancer; Independent variable: heavy smoking, do yellow fingers cause yellow fingers?
- Muscle cramps are correlated to stress but are they correlated to coffee consumption?

**Best safeguard** Look for a cause or an illness and compare drugs using a specific protocol. Allocate the patient to either treatment using randomization. It involves randomly allocating the experimental units across the treatment groups.

### Categories of study design

- Parallel-group: each participant is randomly assigned to a treatment.
- Crossover: over time, each participant receives treatment A or B in a random sequence
- Split-body: parts of the participant (e.g. the two hands) are randomized to receive treatment A and B
- Cluster: pre-existing groups (e.g. villages, schools) are randomly selected to receive treatment A or B