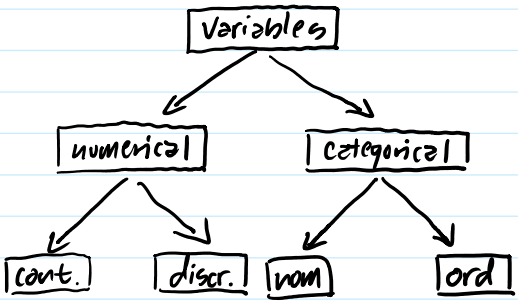
# Experiments

Wednesday, January 25, 2023

Previously...

## Types of Variables




## Sampling methods

1. Simple random sampling (SRS)
2. Stratified sampling
3. Clustered sampling

## Problematic Sampling

1. Cherry picking samples
2. Voluntary surveys
3. Convenience sample

} could lead to anecdotal evidence or biased sampling

could skew results

## Relationship between variables

explanatory variable —might affect→ response variable

Questions you can ask:
Is A associated with B?
or
Does A caused B?

$y = f(x) + W$

- $y$: response
- $x$: explanatory
- $f(x)$: relationship on how x affects y.
- $W$: randomness or noise

You need to be careful on how to use "association" or "causation" because association does not imply causation.
Causation can only be inferred from a randomized experiment.

## Observational vs Experimental Studies

- Observational study
  - Data with no treatment/intervention.
  - conclusions: sufficient to show associations between variables or form hypothesis that we later check using experiments.
    You cannot conclude causal relationships but can conclude generalizations.
  - Two forms: 1. prospective study → identify individuals and collect data.
    2. retrospective study → Collect data after events have occurred.

ex. 1. Following a group of patients over many years to assess cancer risk.
2. Reviewing past medical records.

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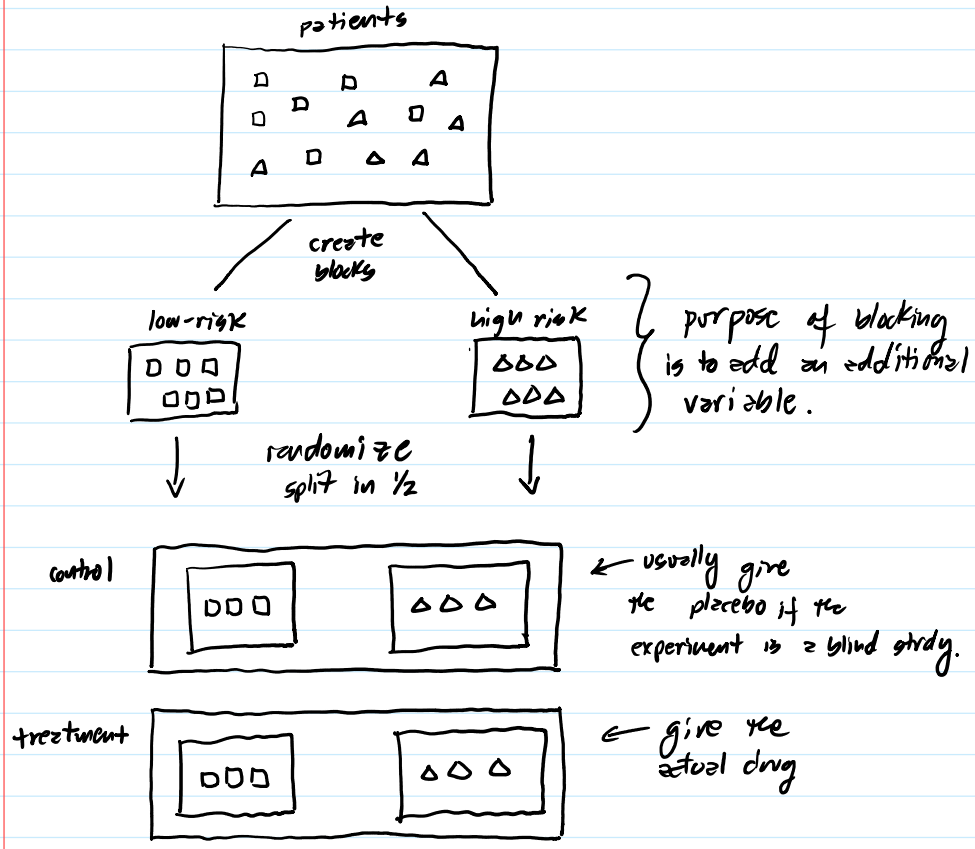
- Experimental study
  - Data with treatment/intervention
  - Conclusions: You can conclude causal relationships.

Four principles:
1. controlling.
2. Randomization.
3. Replication.
4. Blocking.

} reduce bias in experiments

ex. Let's say we created some drugs.
Does this drug reduce risk of HA?




Types of blinded study:

1. Single-blinded → participants blinded, experimenter not blinded
2. double-blinded → both participants and experimenter are blinded.