

Sampling and Experimental Design

How do we get data?

Round 1 Matchups

Observational Studies vs. Experiments

Watch & record

No Causation

Administer
Treatment

Causation
possible

Populations vs. Samples

Everybody

Parameters vs. Statistics

Sampling Methods

The SRS - Simple Random Sample

Every possible sample has an equal chance of being selected

Stratified Random Sample

Break into groups (blocks) and choose from each group

Cluster Sample

Break into groups and choose entire groups

Systematic Random Sample

Every n^{th} person

The Dreaded Convenience Sample - Booooo

Cautions in Sampling

Generic Bias - systematic skewing
of results

✓ Wording Bias

✓ Undercoverage

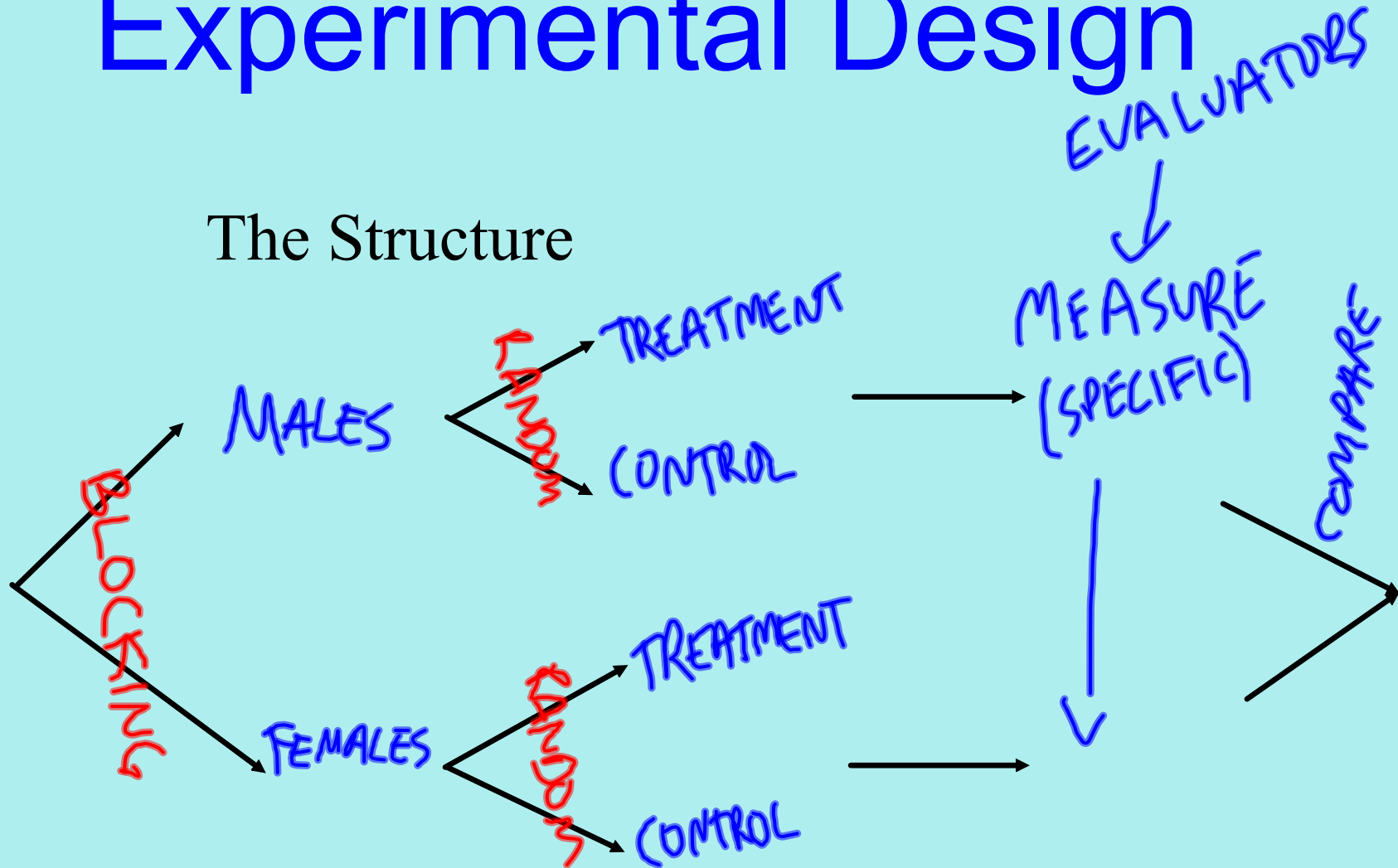
✓ Response Bias
people lie

✓ Non-Response Bias
no answer

Voluntary Response - Bad

Experimental Design

The Structure



Terminology

Factors —

Levels — Different amounts of the treatment

Treatment

Placebo — looks, feels, tastes, sounds like the treatment — but isn't

Blind — Subject does not know whether they are receiving the treatment or not

Double Blind — Subject AND Evaluators don't know whether or not the subject received the treatment

Tips for Success

- ✓ Completely Randomized Design
- ✓ What are you measuring?
- ✓ Who's blind (and how)?
- ✓ Identify confounding variables *Justify*

The Mantra

Block for variables you know about

and

Randomize for variables you don't.

Special Designs

Matching—

Before and After

Match and pair up subjects

Each pair  treatment
control

Generalizability

Specifically...to whom or what does the experiment apply

Principles

Control

Randomization

Replication - sample size

Keys to causation



Simulation

✓ What constitutes one trial

✓ Random Digit Assignment (table)

0-9
00-99

000-999

1-0
01-00

Sampling Frame

How you record results - table - each trial is recorded

Repetitions

How do we get data?

✓ Surveys - easy, cheap - correlational data

✓ Experiments - ^{seeking} causation expensive

✓ Simulations
probabilities must be known