Pre-test/Post-test w/ Two Groups

change-score [paradigm] logic

Treatment Group

before **–** ***after*** **=** ***change***

Control (no-treatment) Group

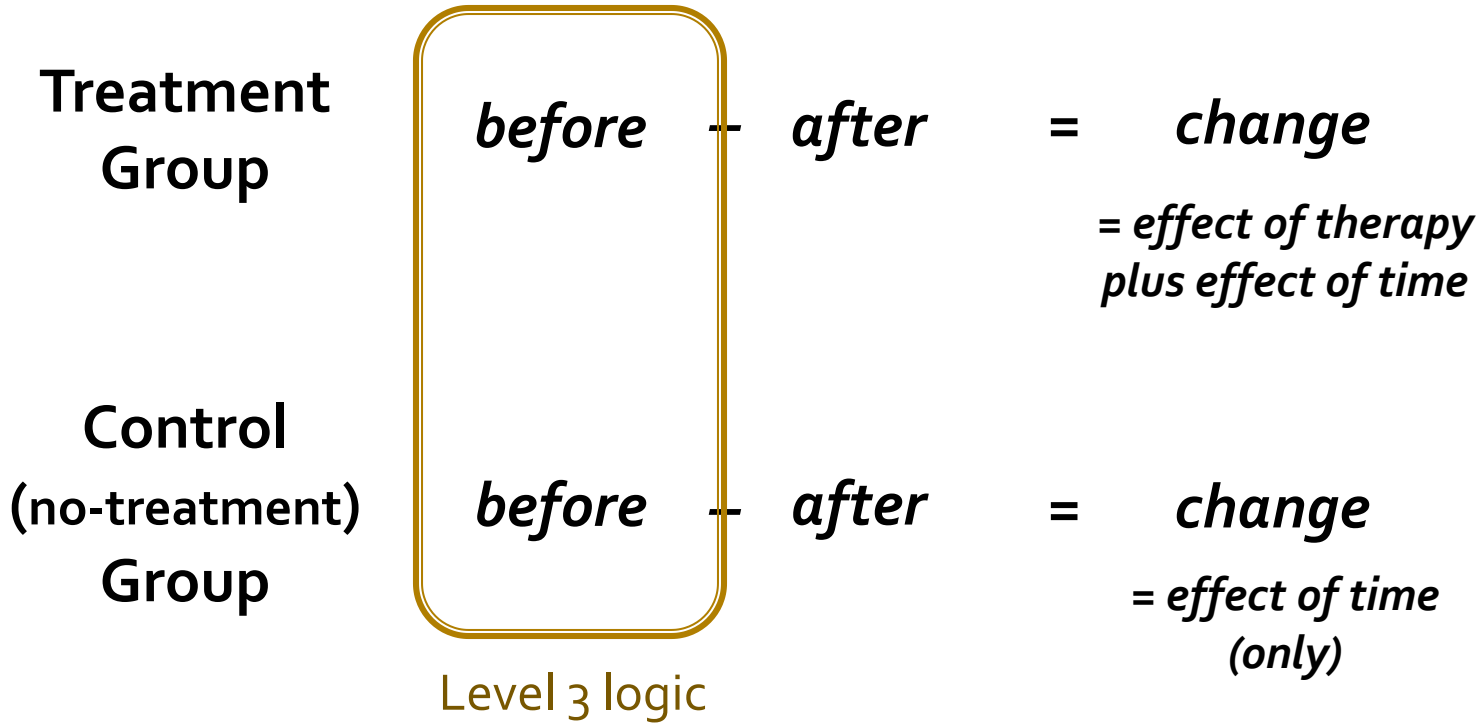
before **–** ***after*** **=** ***change***

Pre-test/Post-test w/ Two Groups

Treatment Group	***before***	**–** ***after***	=	***change*** = ***effect of therapy plus effect of time***
Control (no-treatment) Group	***before***	**–** ***after***	=	***change*** = ***effect of time (only)***

Level 4 logic

Pre-test/Post-test w/ Two Groups



External Validity

2+1 threats
1 counter &
trade-off

Internal Validity

1 threat
4+1 counters
3 points

2+1 threats
validation &
trade-off

Construct Validity

1 ½ threats
verification &
1/√N rule

Statistical Conclusion Validity

1. low convergent validity / not exhaustive

1. pre-validate (before using)

2. low discriminant validity / not exclusive

2. pre-validate (before using)

+1. reactivity

+1. trade-off with realism

2+1 threats validation & trade-off

Construct Validity

Internal Validity

1 threat
4+1 counters
3 points

1. confounds

1. hold constant
2. equal on average
3. measure and remove (covariate)
4. measure and subtract (control expt)
5. converging operations

1. when choosing manipulation
2. when implementing design
3. when running, collecting, and analyzing

1. violating assumption(s) of the analysis (affects both)

1. verify that assumptions not violated

+½. noisy data (only affects power)

+½. (usually) run more subjects

1 ½ threats
verification &
1/√N rule

Statistical Conclusion Validity

External Validity

2+1 threats
1 counter &
trade-off

1. subject specificity

1. use representative sample

2. context specificity

2. use realistic context (same as above, really)

+1. reactivity

+1. trade-off with realism

Psychology as an Empirical Science

- scientists make assertions that can be ***falsified*** (these assertions can be descriptive or explanatory)
- empirical scientists use data to test their assertions (the data must be objective and replicable)
- psychology is an empirical science
- therefore, psychologists make claims that can be shown to be false by objective and replicable data

The "Lopsided" Nature of Evidence

- scientists usually make *general* assertions
  (e.g., depression [always] causes anxiety)
- even one set of [replicable] data can falsify or disprove a general assertion
  (thus, you can prove a general assertion to be false)
- in contrast, no matter how many times that you verify an assertion or prediction, you cannot be sure that it will always be verified
  (thus, you cannot prove a general assertion to be true)
  (your confidence can increase, but never to 100%)

Unique Attributes of Psychology

- psychologists often wish to make assertions about unobservable constructs (e.g., depression)

  this is done via **operational definitions**
  (aka indexing functions, linking hypotheses)

- psychological data often consist of sets of variables, instead of single measures
  (i.e., we often use condensed scores)

- the data that psychologists use are relatively noisy
  (i.e., our measures have high unreliability, so we often use summary scores)

Choosing a General Method

- is this exploratory or are you testing a cause-effect theory or are you testing efficacy?
  - exploratory -> field correlational study
  - cause-effect -> laboratory experiment
  - efficacy -> 2G pre/post or field experiment
- if exploratory, is the expected relationship strong?
  - yes -> stay in the field
  - no -> might switch to laboratory
- if cause-effect, is it ethical to manipulate the cause?
  - yes -> stay with experiment
  - no -> must switch to correlational study

Setting Up & Running an Experiment

- choose a measure for the DV (yes, this is first)
  issues: convergent & discriminant validity + reliability
- choose a *selective* manipulation for the IV
  issue: internal validity (also: stats vs external & construct)
- choose a design type (within vs between)
  issues: statistics vs internal (& external & construct) validity
  and deal with design-specific potential confounds
- choose a method of recruiting subjects
  issues: external validity (also: stats)
- while running the expt & analyzing data, avoid bias
  issue: internal validity

Setting Up & Running a Correl Study

- choose the type of study (survey vs obs)

  issues: what are you interested in? then realism, reactivity, effort

- choose the specific measures

  survey: realism & reactivity, then con val and stats

  obs: don't get caught & avoid bias … prevent overload

- choose any covariates to also include
- choose a method of recruiting subjects
- while collecting and analyzing the data, avoid bias
- (move on to cross-lagged? with more covariates?)

The Exam, itself

- **12:30 pm on Mon** in W290 Chem (here)
- same general format as before, but longer

  120 minutes, not 75 minutes

Also: please get to 1.5 hours of "Research Exposure" by next Wed … else, incomplete

Last-minute Questions

- 7 pm on Sun evening:

  http://www.justin.tv/directory/science_tech

  look for “Uipsymeth” stream

  if it asks for password: “examF”