Experimental Research Designs

- The purpose of an experimental design is to provide a structure for evaluating the cause-and-effect relationship between a set of independent and dependent variables

Two classes of factors that jeopardize the validity of research findings

- Factors concerned with *internal* validity. **(cause and effect)**
- Factors concerned with *external* validity **(generalization)**.

- Internal validity is threatened whenever there exists the possibility of un-controlled extraneous variables that might otherwise account for the results of a study.

- History
- Maturation
- Testing
- Instrumentation
- Statistical regression
- Differntial Selection
- Research mortality

External Validity

Concerned with whether the results of a study can be generalized beyond the study itself:

1. Population validity (when the *sample* does not adequately represent the *population*).
2. Personological validity (when personal/ psychological characteristics interact with the treatment).
3. Ecological validity (when the situational characteristics of the study are not representative of the population).

Selecting a Design

- 1- How many independent variables are being tested?
- 2. How many levels does each independent variable have?
- 3. How many groups of subjects are being tested?
- 4. How will subjects be selected, and how will they be assigned to groups?

Types of Experimental Designs

- Simple True Experimental
- Complex True Experimental
- Quasi-Experimental

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- Complex True Experimental
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Simple True Experimental

- Characteristics
- Types
- Variations

Characteristics of True Designs

- Manipulation (treatment)
- Randomization
- Control group

Characteristics of simple true designs

- One IV with 2 levels (T, C)
- One DV

Types

- Randomized posttest control group design
- Randomized pretest-posttest control group design

Randomized posttest control group design

R	T	Post
R	C	Post

Randomized pretest-posttest control group design

R	*Pre*	*T*	*Post*
R	*Pre*	*C*	*Post*

Advantages & Disadvantages

- Advantages of pretest design
  - Equivalency of groups
  - Can measure extent of change
  - Determine inclusion
- Disadvantages of pretest design
  - Time-consuming
  - Sensitization to pre-test

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Characteristics of simple true designs

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Complex True Experimental

- Randomized matched control group design
- Increased levels of IV
- Factorial design
- Multiple DVs

Complex True Experimental

- Randomized matched control group design
- Increased levels of IV
- Factorial design
- Multiple DVs

Randomized matched control group design

M	*R*	*T*	*Post*
M	*R*	*C*	*Post*

- **Used in small samples**
- **↑ cost in time & money**

Complex True Experimental

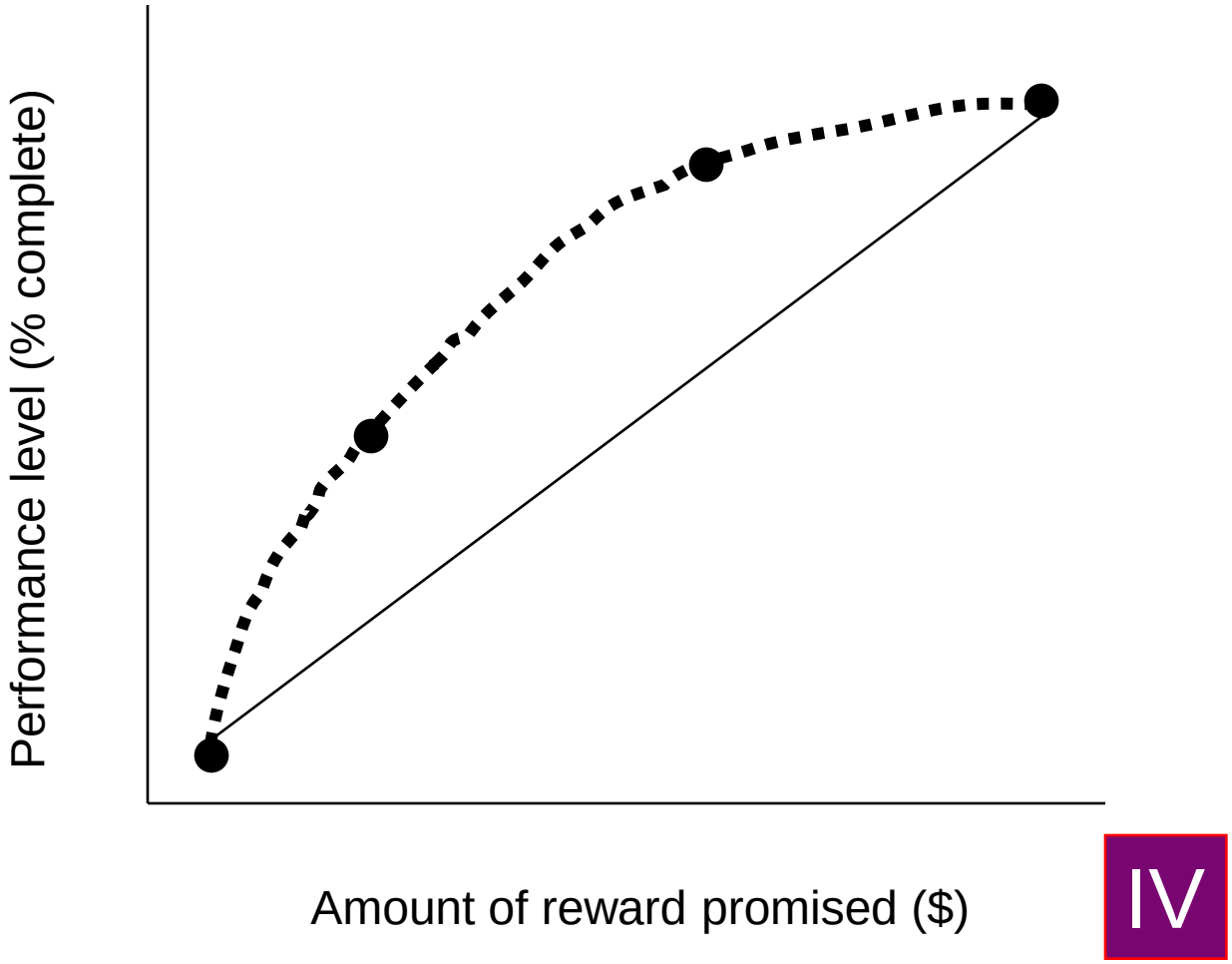
- Randomized matched control group design
- Increased levels of IV
- Factorial design
- Multiple DVs

Increased Levels of IV

- Provides more complete information about the relationship between the IV & DV
- Detects curvilinear relationships
- Examines effects of multiple treatments

Reward Amount			
$0	$1	$2	$3

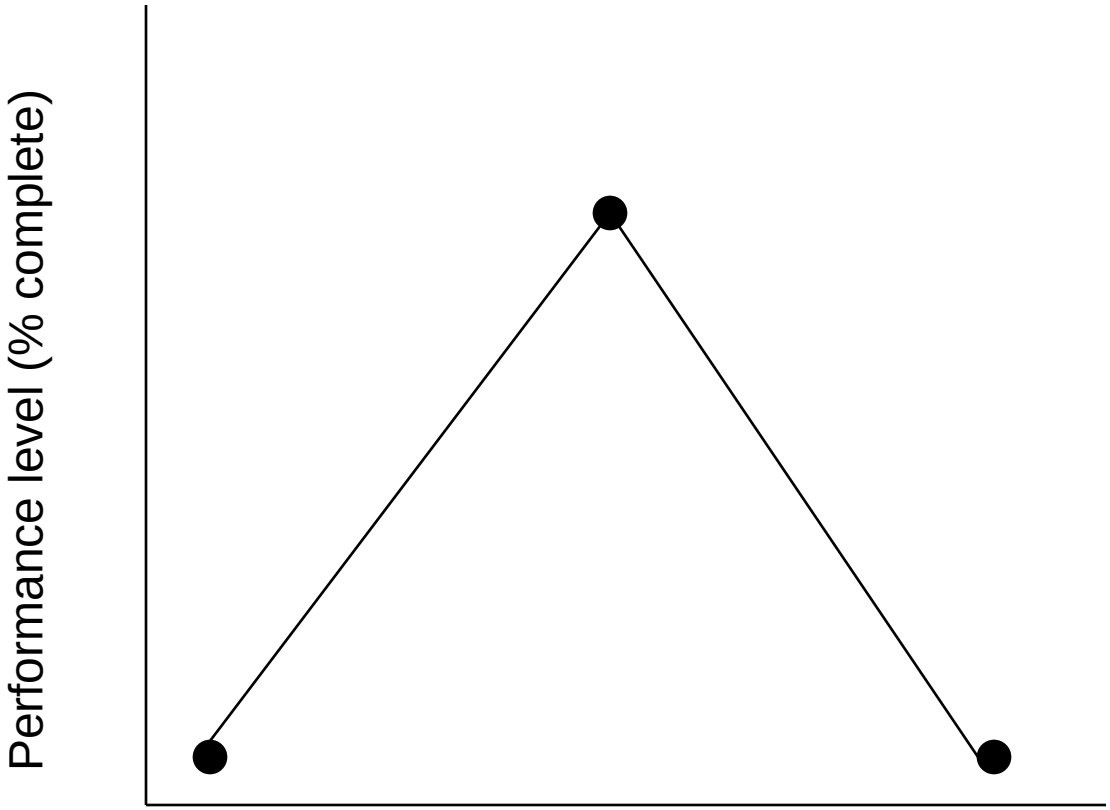
DV



IV

Increased Levels of IV

DV



IV

Complex True Experimental

- Randomized matched control group design
- Increased levels of IV
- Factorial design
- Multiple DVs

Factorial Design

- >1 IV (factor)
- Simultaneously determine effects of 2 or more factors on the DV (real world)

Do differing exercise regimens (hi, med, lo intensity) have the same effect on men as they do on women?

- 3 X 2 (Exercise Regimen X Gender)
  - Exercise Regimen – 3 levels
  - Gender – 2 level

		Gender	
		Male	Female
Exercise Intensity	High		
	Medium		
	Low		

Do strength gains occur at the same rate in men as they do in women over a 6 mo. training period? Measurements are taken at 0, 2, 4, 6 mo.

- 2 X 4 (Gender X Time)
  - Time – 4 levels
  - Gender – 2 levels

- Advantages of factorial designs:
  - Greater protection against Type I error
  - More efficient
  - Can examine the interaction
- Disadvantages:
  - ↑ subject # for between factor designs

Complex True Experimental

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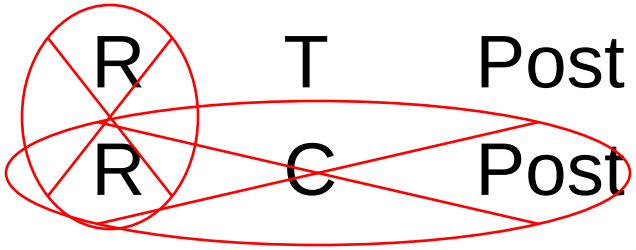
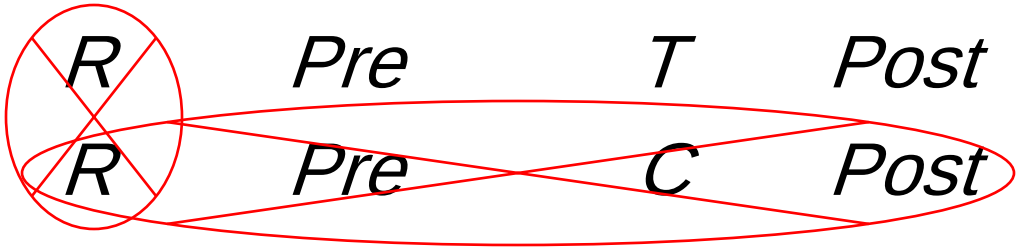
Randomized posttest control group design



Randomized pretest-posttest control group design



Quasi-experimental Designs

- One group posttest-only design
- One group pretest-posttest design
- Non-equivalent control group design
- Non-equivalent control group pretest-posttest design
- Time series
- Single subject designs (Case study)
- Developmental designs

Quasi-experimental Designs

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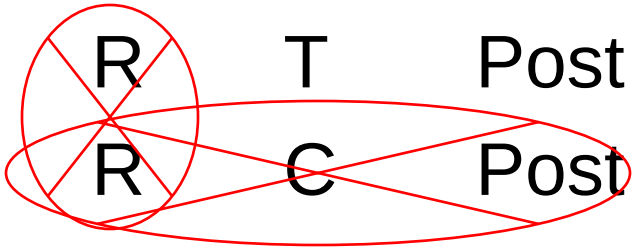
Randomized posttest control group design



One group posttest-only design (One shot study)

T *Post*

No control of IV threats
Use?

Quasi-experimental Designs

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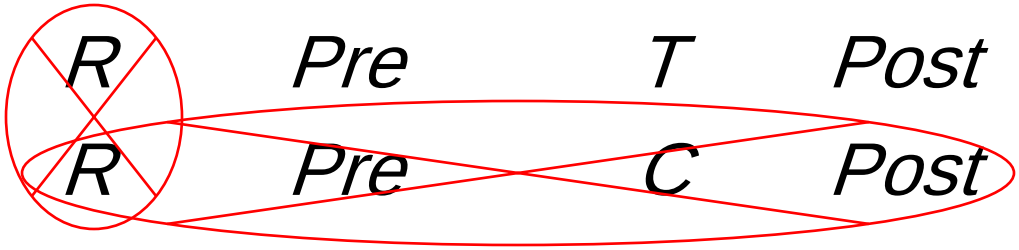
Randomized pretest-posttest control group design



One group pretest-posttest design

Pre T Post

- History
- Maturation
- Testing
- Instrument decay
- Regression

Use control group

Quasi-experimental Designs

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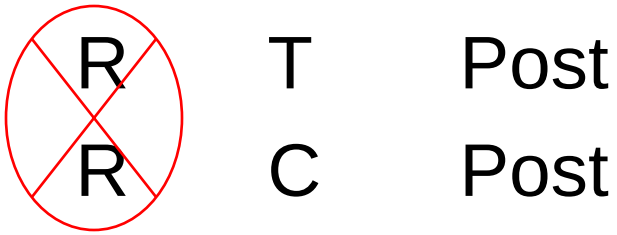
Randomized posttest control group design



Non-equivalent control group design (Static group comparison design)

T *Post*

C *Post*

- Selection bias

Quasi-experimental Designs

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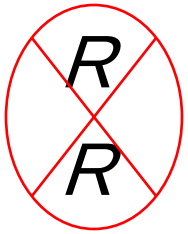
Randomized pretest-posttest control group design



Pre *T* *Post*

Pre *C* *Post*

Non-equivalent control group pretest-posttest design

Pre T Post

Pre C Post

- Can check selection bias

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Time series

Pre Pre Pre Pre T Post Post Post Post

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Developmental Research Designs

Longitudinal

- Powerful (within subject)
- Time consuming
- Attrition
- Testing effect

Cross Sectional

- Less time consuming
- Cohorts problem