

Research Methods in Psychology

Experimental Design



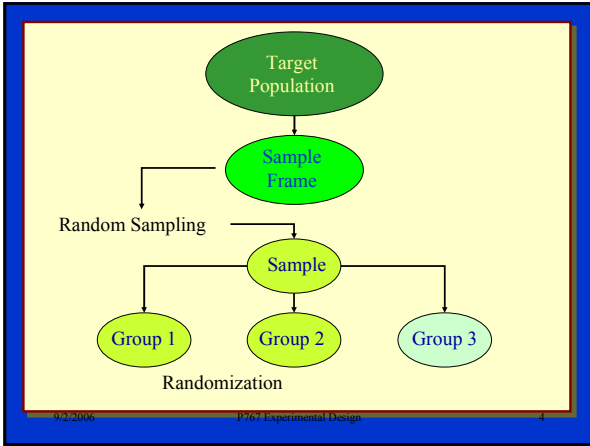
What We Will Cover in This Section

- Overview.
- Basic requirements.
- Between subjects designs.
- Within subjects designs.
- Factorial designs.
- Pre-experimental designs.



Basic Requirements

- Two or more groups.
- Participants randomly assigned to treatment conditions.
- One or more treatment conditions.



Basic Design

Treatment Groups	Independent Variable	Dependent Variable
Group 1	Treatment (s) controlled by the experimenter	Measurement(s) made after the treatments are applied.
Group 2		

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Treatment Groups

Experimental Group
Group that gets some level of the treatment being studied.

Control Group
Group in the study that does not get the experimental treatment.

Comparison Group
Group in the study that gets some alternative level of the experimental treatment.

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Characteristics of Good Treatments

- Construct valid.
 - Right construct.
- Strength
 - Right levels.
 - Right strength.
 - Salient.
- Reliable.
- Multiple levels.
- Multiple stimuli.

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Field Research Example

- In 1984 Pittsburgh National Bank had a problem with their tuition reimbursement program.
- They were paying tuition and fees for employees seeking bachelors degrees.
- Approximately 45% of the people did not want to work in the field in which they majored.
- The bank was prepared to scrap the program.

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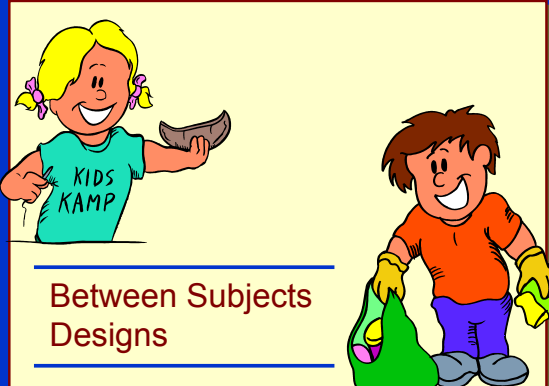
Evaluation Design

	Independent Variable	Dependent Variable
Experimental Group	342 people who attended workshop	Job posting Applications 70% Promotions: 12% Salary/grade change: 91%
Control Group	450 people who did not attend the workshop.	Job posting Applications 23% Promotions: 3% Salary/grade change: 66%

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Between Subjects Designs

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Basic Elements

- Two or more treatment conditions.
- Subjects exposed to only one treatment condition and one treatment level.

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Randomized Post-test Only Control Group

	Independent Variable	Dependent Variable
SS ₁ SS ₂ SS ₃	Treatment 1	Measure
SS ₄ SS ₅ SS ₆	Treatment 2	Measure

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Randomized Pre-test Post-test Control Group

	Pre-test	Independent Variable	Post-test
SS ₁ SS ₂ SS ₃	Measure A	Treatment 1	Measure A
SS ₄ SS ₅ SS ₆	Measure A	Treatment 2	Measure A

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Pre-test, Post-test

Benefits.

1. Evaluate the assumption that the groups are alike.
2. Look at the extent of change.
3. Evaluate the influence of participant mortality.

Issues.

1. Takes time.
2. Demand characteristics.
3. Carry over effect.
4. Testing reactivity.
5. History.

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Matched Random Assignment

	Independent Variable	Post-test
SS _{1A} SS _{2B} SS _{3C}	Treatment 1	Measure A
SS _{4A} SS _{5B} SS _{6C}	Treatment 2	Measure A

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Matched Random Assignment

Benefits

1. Minimizes probability that groups will be different on a key variable.
2. Reduces random subject error.

Issues.

1. Time consuming.
2. Never sure you have controlled for all variables.
3. Complicated with multiple variables.

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Within Subjects Designs

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Within Subjects Design

	Independent Variable	Post-test
SS ₁ SS ₂ SS ₃	Treatment 1	Measure A
SS ₁ SS ₂ SS ₃	Treatment 2	Measure A
SS ₁ SS ₂ SS ₃	Treatment 2	Measure A

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Example

	Independent Variable	Post-test
SS ₁ SS ₂ SS ₃	Milk Chocolate	Preference
SS ₁ SS ₂ SS ₃	German Chocolate	Preference
SS ₁ SS ₂ SS ₃	Dark Chocolate	Preference

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Question

What is a potential problem with this design?



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Benefits and Issues

Benefits.

1. Fewer participants.
2. Reduce subject variability.

Order effects.

1. Practice effect.
2. Fatigue effect.
3. Carryover effect.
4. Sensitization effect (demand characteristics).

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Counterbalancing

- Varying the order of the presentation of the independent variable.
- Full counterbalancing.
 - Issue here is the number of possibilities is $N!$.
- Randomized blocks.

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Counterbalancing

	Trial 1	Trial 2	Trial 3
S1	Milk Chocolate	German Chocolate	Dark Chocolate
S2	Dark Chocolate	Milk Chocolate	German Chocolate
S3	German Chocolate	Dark Chocolate	Milk Chocolate

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Multiple Variable (Factorial) Designs

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Factorial Design

A design in which participants are exposed to two or more treatments.

Outcomes

Main Effect

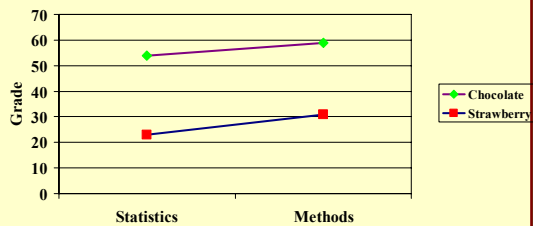
The influence that one variable alone has independently of the other variables.

Interaction

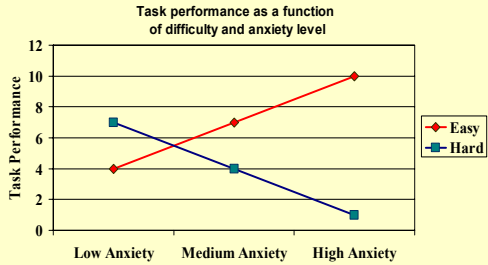
The influence that two or more variables together have on the dependent variable over and above their main effects.

Main Effect Example

Influence of bribery type on grade in two classes



Example



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Uses of Factorial Designs

1. Testing for moderator effects.
2. Are there order effects.
3. Controlling extraneous variables.

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Thought Problem #1

Justa Minnit decided to evaluate the effect of taking one long versus several short breaks on the learning level of his class. Justa took the Tuesday class and had them take one 15 minute break. For the Wednesday class Justa have the students three 5 minute breaks. Justa then gave both classes the same quiz to measure learning.

1. **What kind of design is this?**
2. **Is this a good or bad design? Why?**
3. **How could this study be improved?**

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Thought Problem #2

Pickup N. Dropoff wanted to evaluate the influence of Jolt on the driving habits. Dropoff had a group of people drink 12 oz of Jolt, then assessed their ability to drive through a set of traffic cones. Dropoff then waited an hour and had the people drive through the cones again. He evaluated the differences number of cones hit.

1. **What kind of design is this?**
2. **Is this a good or bad design? Why?**
3. **How could this study be improved?**

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Thought Problem #3

Petal D. Stamen was interested in the influence that flowers would have on women's affection toward men. Petal sent a dozen roses to a random sample of women then asked them to fill out a well researched affection survey.

1. **What kind of design is this?**
2. **Is this a good or bad design? Why?**
3. **How could this study be improved?**

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The End

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