Experimental Research

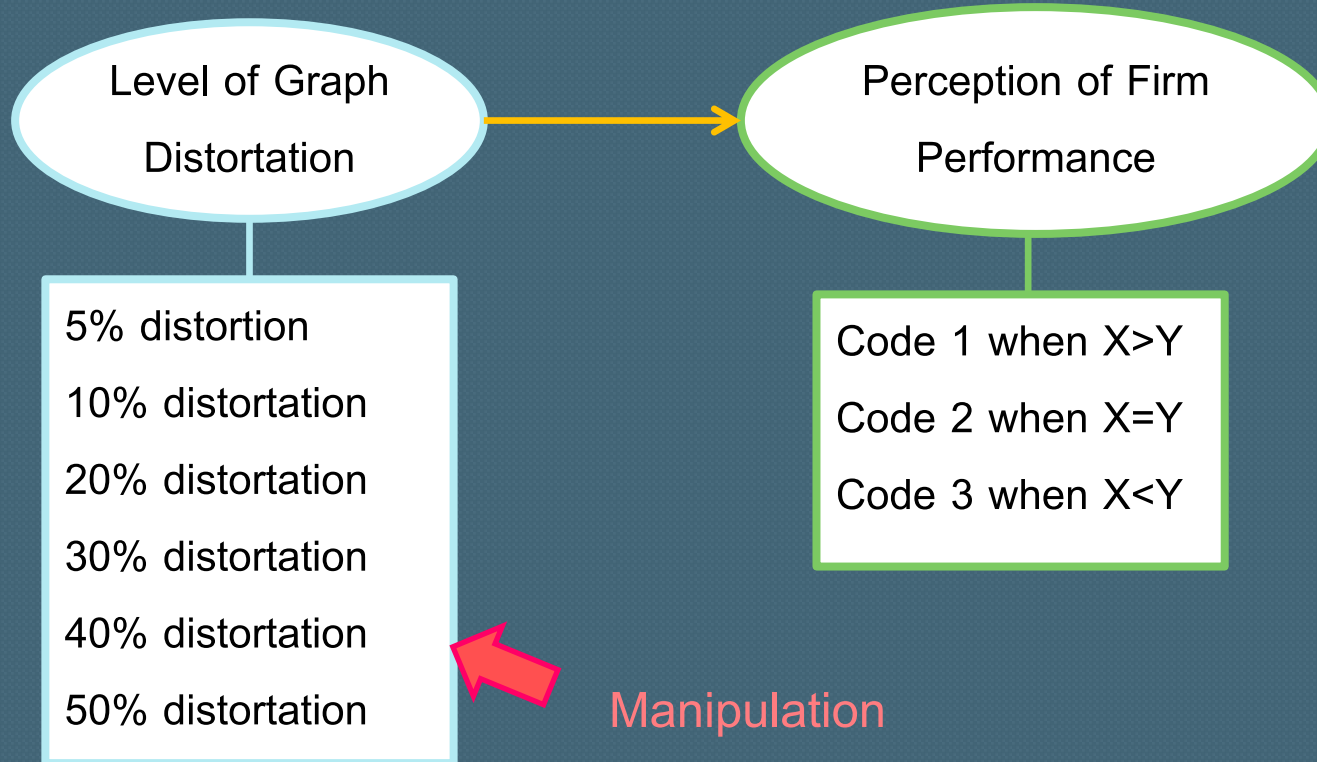# Meaning

- The experimental method is " a systematic and scientific approach to research in which the researcher manipulates one or more independent variables and controls and measures any chance in other variables.

Example

Level of Graph Distortion → Perception of Firm Performance

5% distortion

10% distortation

20% distortation

30% distortation

40% distortation

50% distortation

Manipulation

Code 1 when X>Y

Code 2 when X=Y

Code 3 when X<Y

Note: Beattie V. and Jones J. M. (2002). Measurement distortation of graphs in corporate reports: an experimental study

A Range of Definitions

- ⊙ **True Experiment**

  - ➤ Random Selection + Random Assignment (Strict definition → Sciences)

- ⊙ **Quasi-Experiment**

  - ➤ Random Assignment (Wide definition → Social Sciences)

Definitions

- **Random Selection**

  - ➤ Selecting samples from population <u>randomly</u> using sampling techniques such as simple random sampling, stratified sampling, cluster sampling etc.
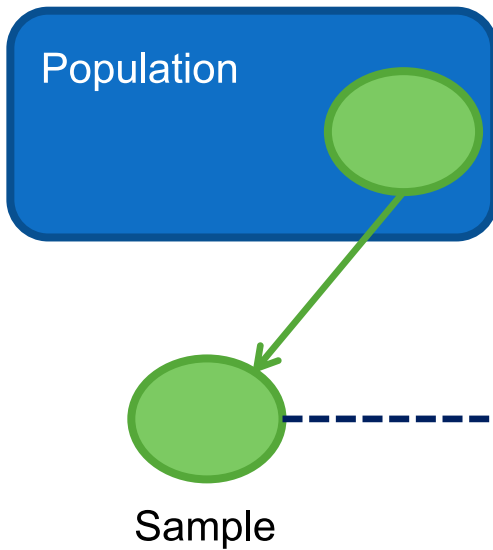
- **Random Assignment**

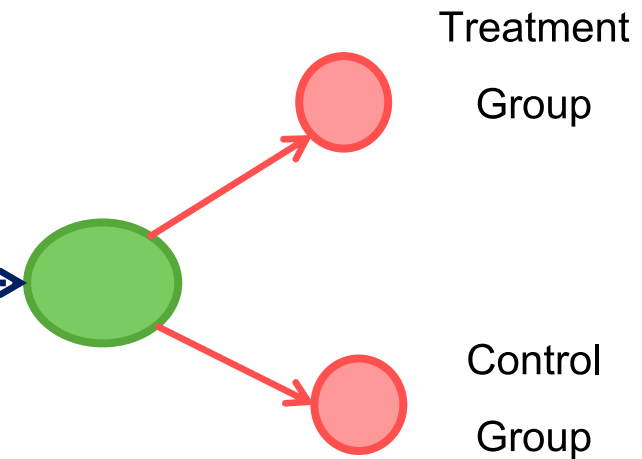 - ➤ Assigning participants to treatment group and control group <u>randomly</u>

Definitions

Random Selection

Population

Sample

Random Assignment
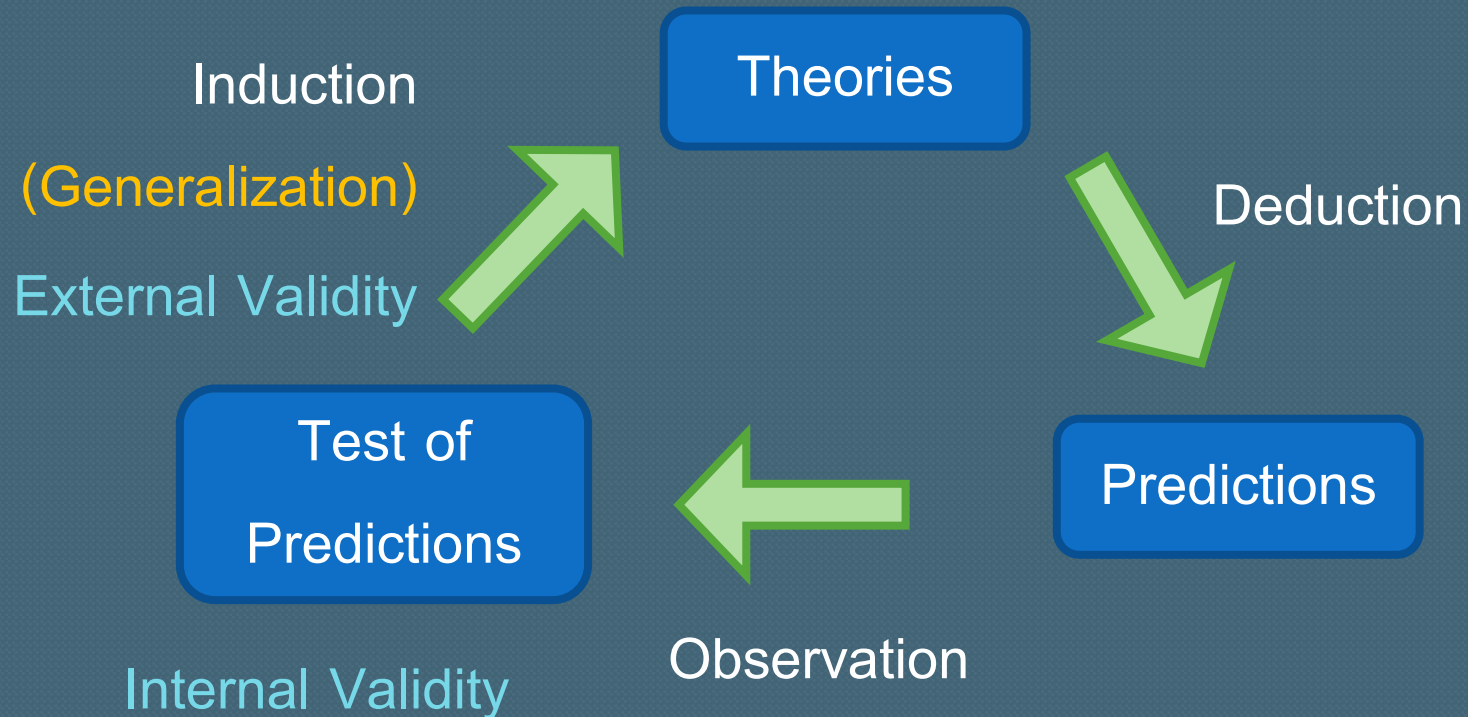
Treatment Group

Control Group

Strength and Weakness

- **Strength**
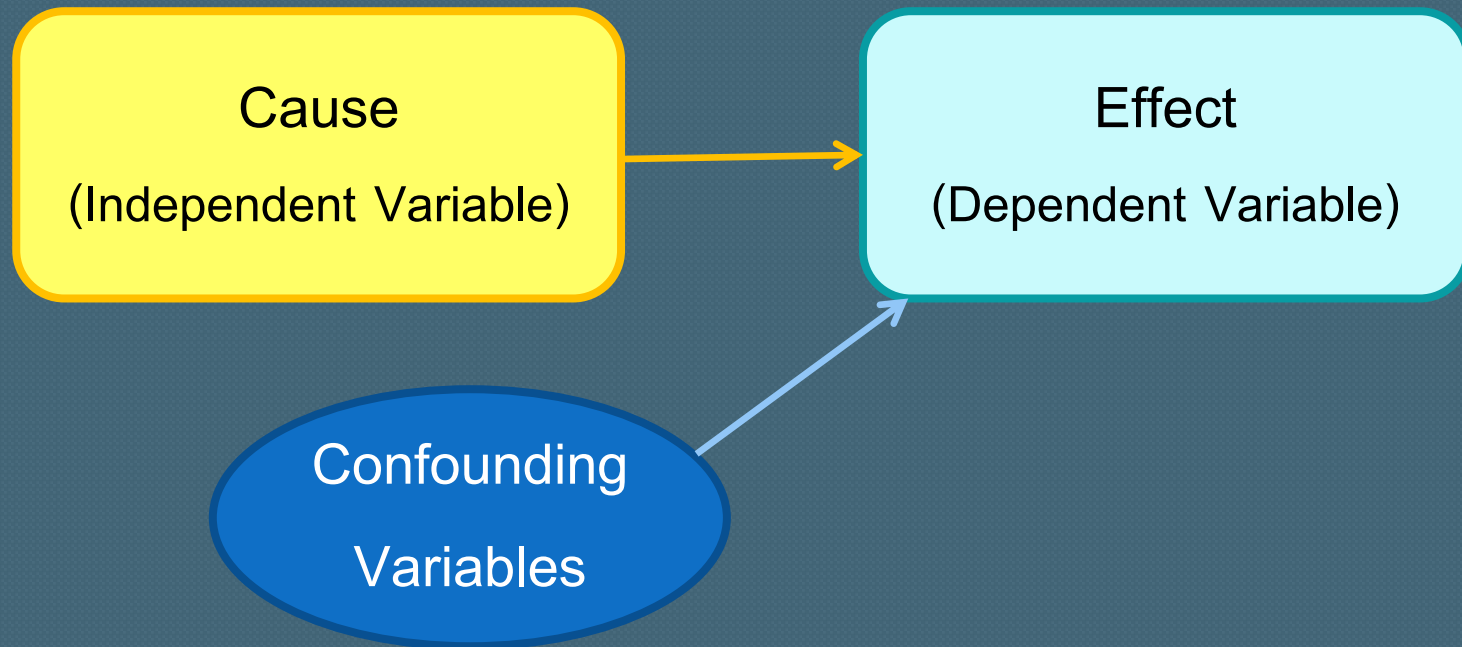 - Strong Internal Validity (with strong research design, can eliminate confounding variables quite efficiently)
- **Weakness**
  - Sacrifice External Validity (cannot generalize the results)

Strength and Weakness

Induction

(Generalization)

External Validity

Theories

Deduction

Test of Predictions

Observation

Predictions

Internal Validity

How to eliminate the effects of Confounding variables

```
Cause
(Independent Variable)
```

```
Effect
(Dependent Variable)
```

```
Confounding
Variables
```

How to eliminate the effects of Confounding variables

- Control Group
  - A group that receives no treatment over the same period of time but undergoes exactly the same tests
- Random Assignment
  - Assign participants into Treatment group and Control group randomly
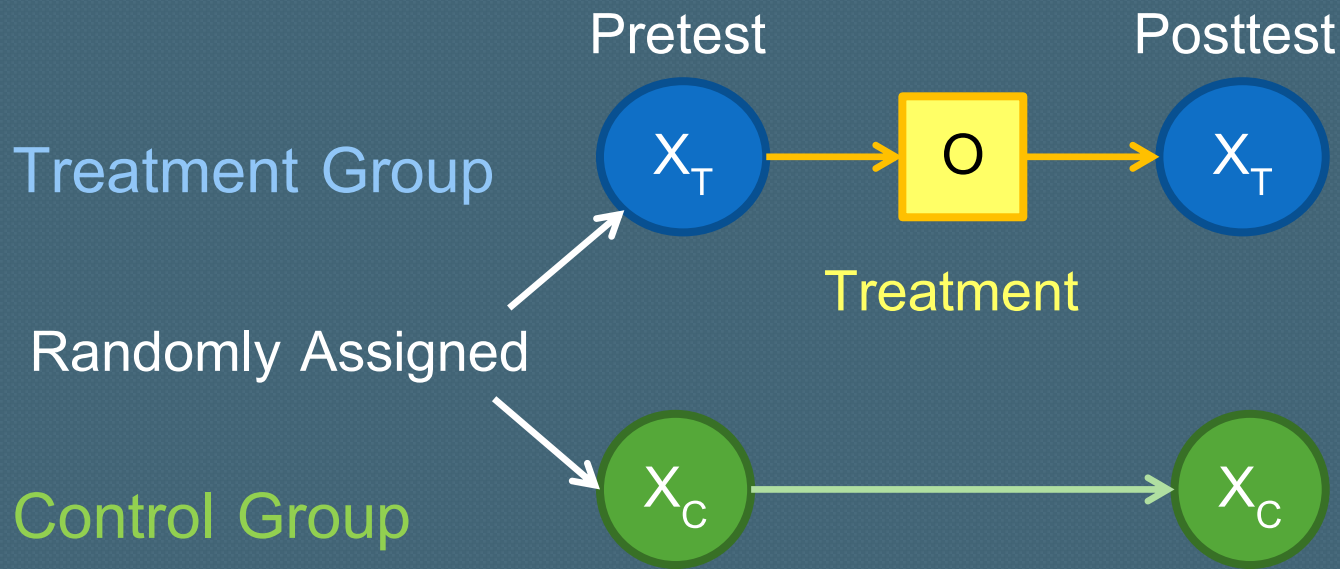- Matched-Pairs
  - Match every subject in one group with an equivalent in another

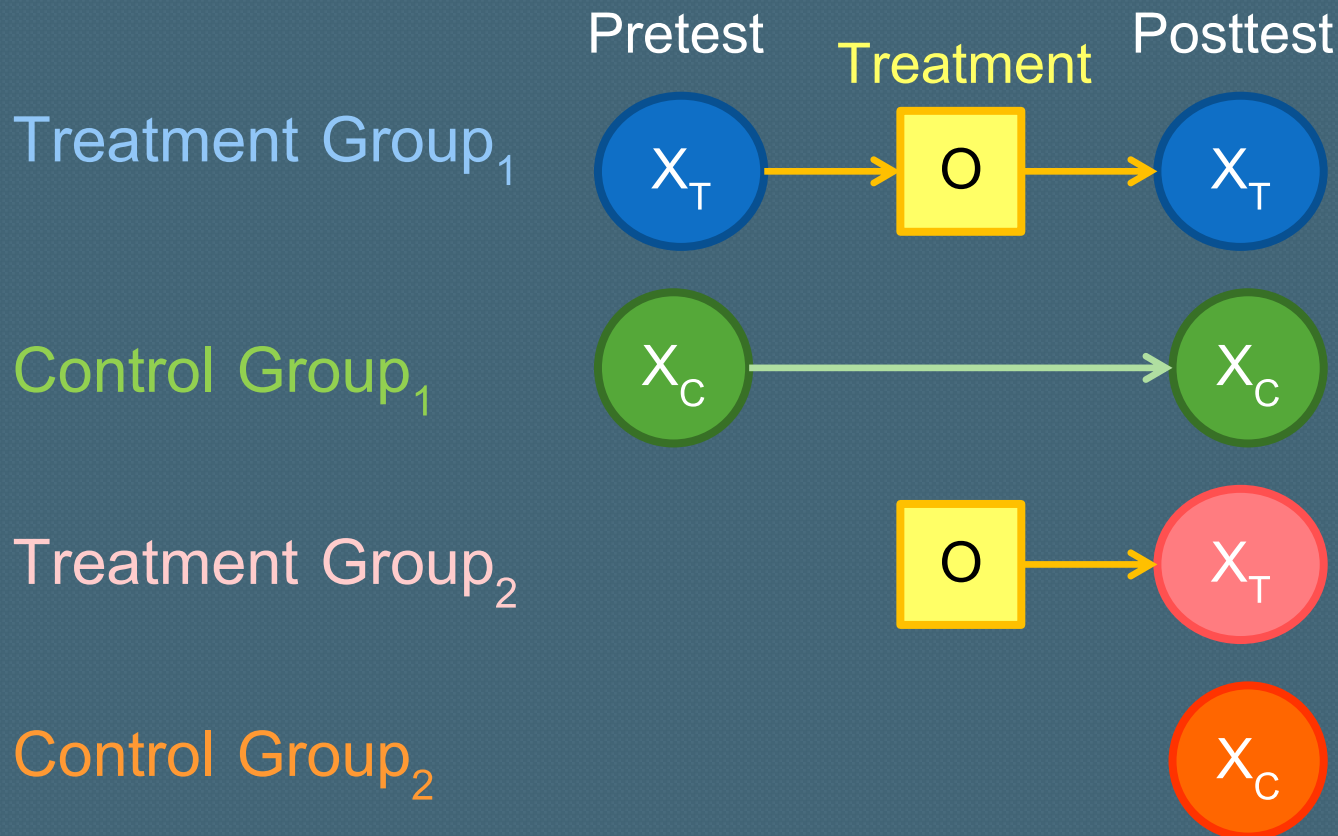# Typical Designs in Experimental Research

- Pretest-Post test Design with Control Group

- Solomon Four-Group Design

- Matched Subjects Design

- Between-Subjects Design

- Within-Subjects Design (Repeated Measures Design)

Pretest-Posttest Design with Control Group

Pretest   Posttest

Treatment Group

X_T → O → X_T

Treatment

Randomly Assigned

Control Group

X_C → X_C

Solomon Four-Group Design

	Pretest	Treatment	Posttest

Treatment Group$_1$ X_T → O → X_T

Control Group$_1$ X_C ————————→ X_C

Treatment Group$_2$ O → X_T
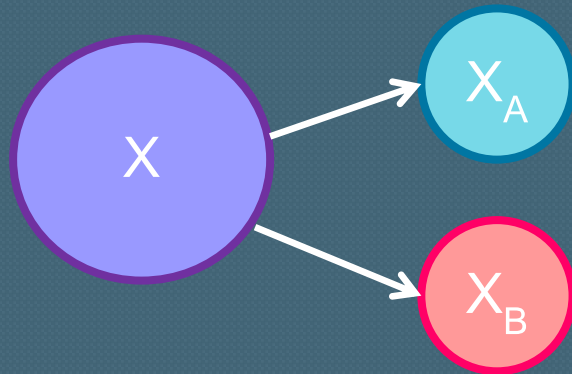
Control Group$_2$ X_C

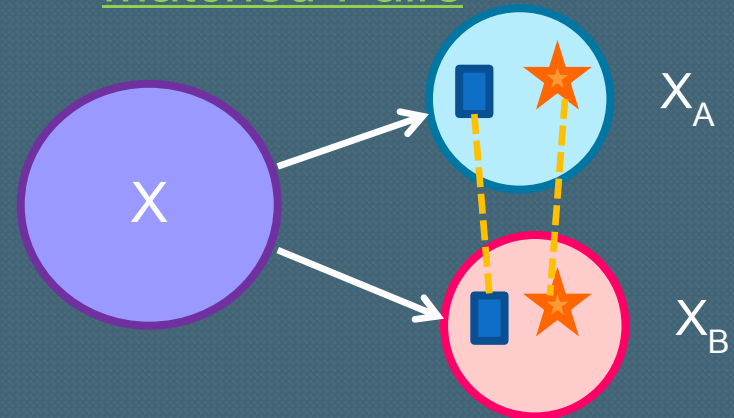Note: All participants are randomly Assigned.

Matched Subjects Design

❖ <u>Concept</u>: Using separate experimental groups for each particular treatment, but relies upon matching every subject in one group with an equivalent in another.

<u>Random Assignment</u>

X → X_A

X → X_B

<u>Matched-Pairs</u>

X → X_A

X → X_B

Between-Subjects Design

❖ The most common in experimental research

❖ <u>Concept</u>: Participants can be part of the treatment group <u>or</u> the control group, but cannot be part of both.

🙂 Pretest → Treatment A → Posttest

🙂 Pretest → Treatment A → Posttest

🙂 Pretest → Treatment B → Posttest

🙂 Pretest → Control → Posttest

Between-Subjects Design

❖ <u>Advantage</u>: Very little contamination by extraneous

factors

❖ <u>Disadvantage</u>: 1) Need a large number of participants

2) Individual variability

3) Assignment Bias

Within-Subjects Design

❖ <u>Concept</u>: Every single participant is subjected to every single treatment.

Pretest ➡ Treatment A ➡ Treatment B ➡ Posttest

Pretest ➡ Treatment A ➡ Treatment B ➡ Posttest

Pretest ➡ Treatment A ➡ Treatment B ➡ Posttest

1st TEST   2nd TEST

Within-Subjects Design

❖ <u>Advantage</u>: 1) Require fewer participants

2) Reduce the chance of variation between

individuals

❖ <u>Disadvantage</u>: 1) Carryover Effect

(First test adversely influences the other.)

2) Order Effect (A → B, B → A)

3) Dropout Rate

Pilot Study

- Objective: To ensure that the experiment measures what it should and that everything is set up right.

- Solution: After getting information about errors and problems, "improve the design" before running the real experiment