

Research Methods (Lecture 4)

I. INTRODUCTION

A. Doing Science

- We just won a 2 million dollar grant to study the effects of violent TV on children's aggressive behavior.
- The Congress will want a full report of our study
- What should we do first?

I. INTRODUCTION

B. The role of Hypotheses

- History of the "Hypothesis"
 - Bad scientific practice: Isaac Newton (1642-1727)
 - Championed observation and mathematical description, "Hypothesis non fingo"
 - "I do not feign a hypothesis." Newton did not speculate beyond what he can established by meticulous and precise reasoning.
 - Good scientific practice: Darwin, (1809-1882)
 - Darwin considered hypotheses to be invaluable.
 - "False views, if supported by some evidence, do little harm, for everyone takes a salutary pleasure in proving their falseness: and when this is done, one path towards error is closed and the road to truth is often at the same time opened." (Charles Darwin, The Descent of Man And Selection in Relation to Sex, 1871 [1981 Princeton University Press] Chap. 21, p. 385).

II. DEFINITION OF TERMS

A. Operationalization

- **Operational Definition:** The definition of a variable in terms of operations needed to produce or measure that variable.



II. DEFINITION OF TERMS

B. Variables

- Understanding works of fiction
 - Protagonist - Antagonist - Relationship
- Understanding scientific papers
 - Independent Variable - Dependent Variable - Relationship
- **1. Dependent Variable** (sometimes called criterion variable): The target variable. The variable that is assessed as being the result of or predicted by other variables.

II. DEFINITION OF TERMS

C. Variables

- **2. Independent Variable** (sometimes called predictor variable): The manipulated variable. Variation in the IV is predicted to be associated with variation in DV.
- Together, the IV and DV specify all the variables in a study **that the experimenter thinks is relevant**: The one(s) you are interested in (DV) and the one(s) you think influence the one(s) you are interested in (IV).

IV → DV

II. DEFINITION OF TERMS

C. Hypothesis

- **Hypothesis**: Operationally defined statement that specifies a predicted relation (causal or correlation) between the IV and DV.
 - Causal Relation: A strong claim -- that variation in the IV actually causes variation in the DV.
 - Violent TV watching causes child aggression.
 - Correlation Relation: A weak claim -- that variation in the IV is associated with variation in the DV.
 - Violent TV watching is related to child aggression

III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

- How you specify the relation between the IV and DV **makes a difference for the kind of research design you employ**.
 - A **Correlational/Descriptive Design** tests hypotheses which predict a correlational relation between the IV and DV.
 - A **Causal/Experimental Design** tests hypotheses which predict a causal relation between the IV and DV.

III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

- In Correlational/Descriptive designs, the experimenter is **passive** (merely recording the world without substantially changing it).
 - Start with lots of different people.
 - Look for one way people differ (IV)
 - See if they also differ in another way (DV)



III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

- Observational techniques**
 - Naturalistic observation of real world behavior.
 - Structured observation of laboratory behavior.
- Self-Report techniques**
 - Self-reports are instruments that ask standard questions (surveys, questionnaires)
 - Clinical interviews unstructured explorations through a flexible, conversational interaction.
 - Structured interview: Everyone asked the same questions.
- Other Methods**
 - Clinical method (case study approach) complete picture of an individual from interviews, observation and tests.
 - Psychophysiological methods of biological processes in behavior.
 - Neurological Techniques: electroencephalogram (EEG) and functional magnetic resonance imaging (fMRI).
 - Ethnography: participant observation.

III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

- Naturalistic Observational Study**
 - A correlational study using natural observational techniques of violent TV watching and aggressive behavior.
- Each researcher will observe one child over the day, noting...
 - the frequency of violent TV shows (as listed on the checklist) watched.
 - the frequency of aggressive behavior (as listed on the checklist).
- The first 10 children may look like this:

III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

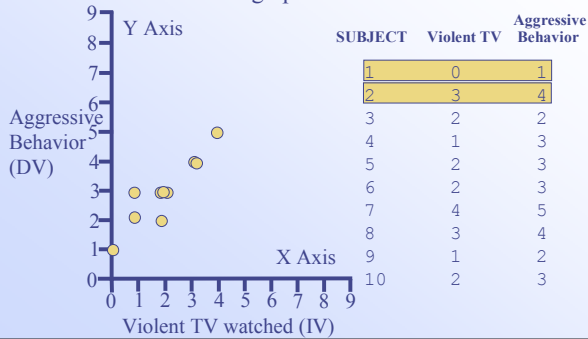
- Observational data from the study.

SUBJECT	Violent TV	Aggressive Behavior
1	0	1
2	3	4
3	2	2
4	1	3
5	2	3
6	2	3
7	4	5
8	3	4
9	1	2
10	2	3

III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

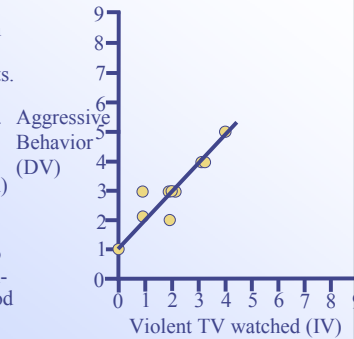
- These data can be graphed



III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

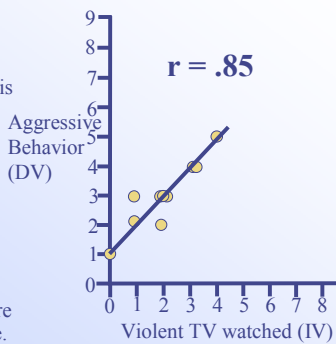
- The equation of a line is $y=f(x)$. With the equation with can find the best-fitting line for these points.
- The best-fitting line has a positive slope, meaning that there is a positive relation between the IV(x) and the DV (y).
- All the points are close to the best fitting line, meaning that the IV(x) is a good predictor of the DV(y).



III. DATA COLLECTION AND DESIGNS

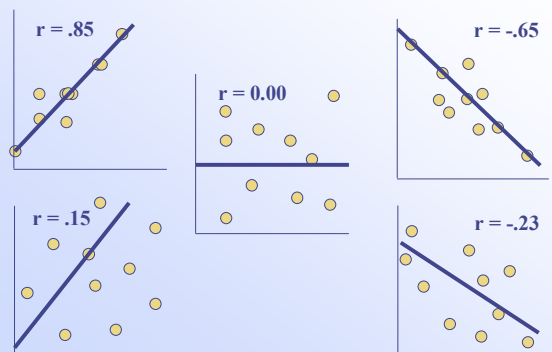
A. Correlational/Descriptive Designs

- This excursion into math lets us better understand a **correlation coefficient**.
- A **correlation coefficient** is a number ranging from +1.00 to -1.00 that reflects the strength of the relation between two variables .
 - The + or - nature of the number is the slope of best-fitting line.
 - The closer to +1 or -1 means that the points are near the best fitting line.



III. DATA COLLECTION AND DESIGNS

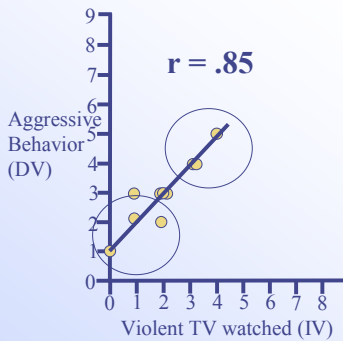
A. Correlational/Descriptive Designs



III. DATA COLLECTION AND DESIGNS

A. Correlational/Descriptive Designs

- Can we now tell Congress we have the data to prove...
 - TV violence causes aggression in kids?
 - We should outlaw violent TV shows?
- In what other ways might kids high and low in violent TV watching and aggressive behavior differ from each other?



III. DATA COLLECTION AND DESIGNS

B. Causal/Experimental Design

- In Causal/Experimental designs, the experimenter is **active** (changing the world and recording the results of that change).
 - Start with lots of different people.
 - Randomly assign them to different conditions.
 - See if they also differ in another way (DV).



III. DATA COLLECTION AND DESIGNS

B. Causal/Experimental Design

- Characteristics of C/E Designs
 - Control over IV:** Give one group of subjects one kind of experience and another group another kind of experience.
 - Usually give the **Experimental Group** a treatment and the **Control Group** no treatment.
 - Control over conditions:** All variables kept constant so there are no other differences between groups.
 - All aspects of the experiment are exactly the same between the groups, except the IV.
 - Random Assignment:** Used to insure that there are no initial differences between the groups.

III. DATA COLLECTION AND DESIGNS

B. Causal/Experimental Design

Experimental Study of Aggressive Behavior

Bandura, Ross and Ross observed children's play with a Bobo doll after they watched video of an aggressive adult being rewarded, punished, or having no consequences for her violent behavior. They found that the violent video affected aggressive behavior.

