

Choosing designs and subjects (Bordens & Abbott Chap. 4)

IV. CHOSING DESIGNS AND SUBJECTS

A. Articulating a Hypotheses

- Once we have examined all the nitty-gritty details of a study (e.g., variables, variable levels), it is time to conceptually organize the details into a meaningful research study.
- We use a conceptual apparatus to help make sense of scientific writing which is not unlike one used in making sense of fiction.
 - Understanding works of fiction: Protagonist - Antagonist - Relationship
 - Understanding works of scientific: Independent Variable - Dependent Variable - Relationship

IV. CHOSING DESIGNS AND SUBJECTS

A. Articulating a Hypotheses

- **1. Dependent Variable**
 - Sometimes called a criterion variable. The target variable. The variable that is assessed as being the result of or predicted by other variables.
- **2. Independent Variable**
 - Sometimes called a predictor variable. The variable that is varied to see if its related to a target variable.
 - True IV: Variable with levels that can be assigned to participants.
 - Subject IV: Variable with levels that are a property of a person and can not be assigned to a person.

IV. CHOSING DESIGNS AND SUBJECTS

A. Articulating a Hypotheses

- 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).
- This is because variation in the IV is supposed to be related to variation in the DV!

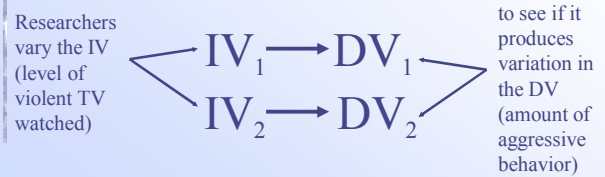
IV → DV

IV. CHOSING DESIGNS AND SUBJECTS
A. Articulating a Hypotheses

- A title of a research paper is a good place to find the variables (typically not operationalized) which the researcher thinks are important.
- Identify the IV and DV in the following titles?
 - The effects of violent TV watching on aggressive behavior.
 - The developmental logical reasoning from childhood to adolescence
- **Can you identify the IV and DV in the title of your paper?**

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A. Articulating a Hypotheses

- A scientific study involves varying the IV to see if it is associated with variation in the DV.



IV. CHOSING DESIGNS AND SUBJECTS
A. Articulating a Hypotheses

- Experiments also contain variables that researchers do not consider as “relevant” but spend a lot of time thinking about.
- **3. Extraneous Variable(s):** Variables that are associated with IVs and also influences DVs.
 - **As we will see, extraneous variables are related to IVs and affect the DVs, making it impossible to attribute variation in DVs to IVs alone.**



IV. CHOSING DESIGNS AND SUBJECTS
A. Articulating a Hypotheses

- We can now define a hypothesis
- **4. Hypothesis:** Operationally defined statement that specifies a predicted relation (causal or correlation) between the IV and DV.
 - Two predictive relations can be expressed in a hypothesis:
 - **Correlational:** A weak claim -- that variation in the IV is associated with or serves as a predictor of variation in the DV
 - **Causal:** A strong claim -- that variation in the IV actually causes or produces variation in the DV.

IV. CHOSING DESIGNS AND SUBJECTS

A. Articulating a Hypotheses

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

IV. CHOSING DESIGNS AND SUBJECTS

B. Correlational Design

- 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)



IV. CHOSING DESIGNS AND SUBJECTS

B. Correlational Design

- To find out how people actually behave, a researcher may choose observational or self-report techniques among others
 - Naturalistic observation** consists of going into the natural environment to observe a particular behavior.
 - Self-reports** are instruments that ask questions about people's perceptions, thoughts, abilities, feelings, attitudes, beliefs, and past experiences.

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B. Correlational Design

- Naturalistic Observational:** correlational study 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:

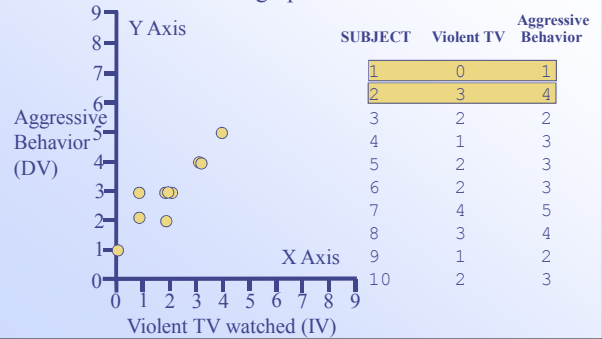
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B. Correlational Design

- 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

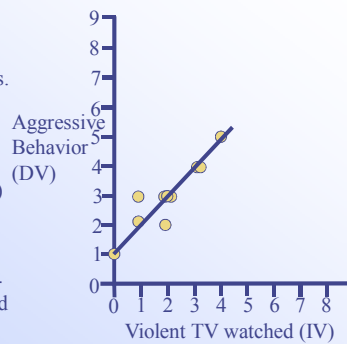
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B. Correlational Design

- These data can be graphed



IV. CHOSING DESIGNS AND SUBJECTS
B. Correlational Design

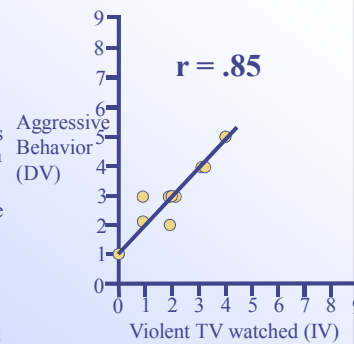
- The equation of a line is $y=f(x)$. With the equation with can find the best-fitting line for these points.
- The best-fitting line has a positive slope, meaning that there is a positive relation between the IV(x) and the DV (y).
- All the points are close to the best fitting line, meaning that the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



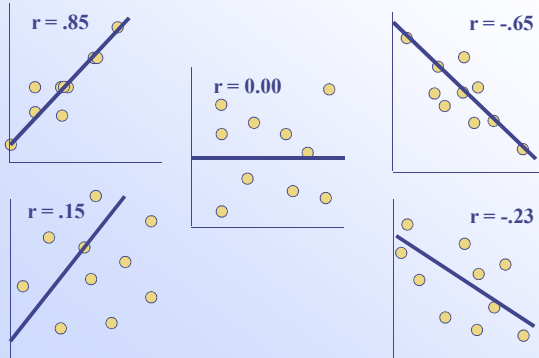
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B. Correlational Design

- 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.



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B. Correlational Design



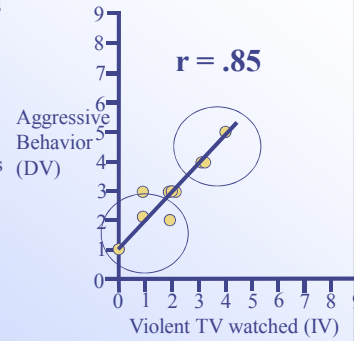
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B. Correlational Design

Can we now tell Congress we have the data to prove...

- TV violence causes aggression in kids?
- We should outlaw violent TV shows?

What extraneous variables might there be in our study?

In what other ways might kids high and low in violent TV watching and aggressive behavior differ from each other?



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B. Correlational Design

- Correlation and Causation
- 1. Third Variable problem**
 - EVs may underlie the correlations
 - Statistical compensation for control over EVs
 - Partial correlation
 - Multiple regression
- 2. Directionality problem**
 - Directionality information unavailable.
 - Correlations computed over time with statistical compensation for initial difference (cross lag correlations).

IV. CHOSING DESIGNS AND SUBJECTS
C. Experimental Design

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



IV. CHOSING DESIGNS AND SUBJECTS
C. Experimental Design

- Another way for an experimenter to be **active** in changing the world is to assign the same subjects to different conditions
 - Start with different people (fewer than before).
 - Assign each to each level of the IV.
 - See if they also differ in another way (DV).



IV. CHOSING DESIGNS AND SUBJECTS
C. Experimental Design

- Characteristics of Experimental Designs
- Control over IV:** Experimenter controls who gets the IV and when they get it.
 - Give one group a treatment (**Experimental Group**) and another group no treatment (**Control Group**) and see the influence on the DV.
 - Give all participants one level of the IV and then the other (careful for varying order of presentation)

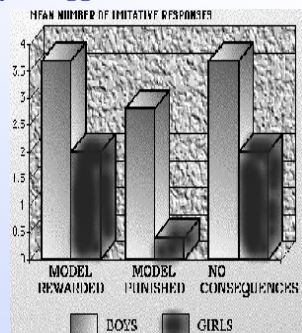
IV. CHOSING DESIGNS AND SUBJECTS
C. Experimental Design

- Characteristics of Experimental Designs
- Control over Conditions:** All variables kept constant in order to make sure that there are no other differences between the groups.
 - All aspects of the experiment are exactly the same between the groups, except the IV.
- Control over Initial differences**
 - Random Assignment:** To insure that there are no initial differences between the groups, subjects are randomly assigned to conditions.
 - Or use the same subjects in each condition, controlling for order effects

IV. CHOSING DESIGNS AND SUBJECTS
C. 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.



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D. Research Settings

- Lab Setting: Any artificial setting relative to the setting in which behavior usually takes place.
 - Why study behavior in an artificial setting?
 - To control EVs, often at the expense of the generalizability of the results
 - Reading skills studied in a research room not in a classroom with distractions and other problems.
 - Try to simulate the real world conditions in the lab.
 - **MUNDANE REALISM**: Extent to which simulation and real world match
 - **EXPERIENTAL REALISM**: Extent to which participants are psychologically involved in simulation.

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D. Research Settings

- **Field Setting**: Setting in which behavior typically occurs
 - Field experiments often involve naturalistic observations recognizing that any attempt to experimentally manipulate IVs or to control EVs will affect the natural setting.
 - But it does not have to be that way. Experimental study of helping -- the lost letter technique.
- Field studies are more easily generalize but lack control.

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E. Participants

- Populations and Samples
- **Population**: The group of people to whom you would like to apply your findings
- **Sample**: The people you do your research on.
- Characteristics of the sample affects the validity of **generalizing** to the population.
 - **Random Sampling**: All members of the population have an equal chance to be in the experiment.
 - Distinguished from random assignment and not usually needed, unless the research is applied.

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E. Participants

- Psychology Students vs. Volunteers
- We know for sure that compared to non-volunteers, volunteers are people who ...
 - are more educated
 - come from higher SES
 - have higher IQs (but not when volunteering for atypical research)
 - have higher need for approval
 - are more social

IV. CHOSING DESIGNS AND SUBJECTS

E. Subjects

- We are pretty sure that compared to non-volunteers, volunteers are people who ...
 - are arousal seeking
 - are unconventional, if volunteering for sex research
 - are more likely female, (except for research involving physical or emotional stress)
 - are less authoritarian
 - are proportionally more likely to be Jewish than Protestant but more likely Protestant than Catholic
 - Are less conforming unless except for females volunteering for clinical research

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E. Subjects

- If volunteers are your sample, the population to whom you are generalize to include only other volunteers
- To solve this problem of generalization, sample from Introductory Psychology and give the students extra credit.
 - Motivate a broad cross section of students to involve themselves in your study.
 - They are a more representative sample of the population, allowing for generalization to a broader segment of the population.