

Outline for Ch. 1

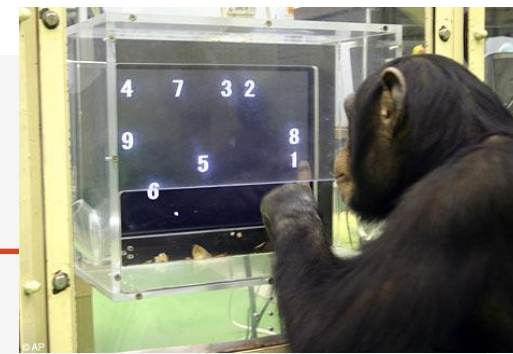
1. What are statistics?
 - descriptive
 - inferential
2. The research process
3. Populations and samples
- 4. Types of designs**
5. Types of variables

What questions do you have from the first two classes?



How to best train chimps to run the economy?

*** 2 ways to manipulate an IV. Here's the first way...



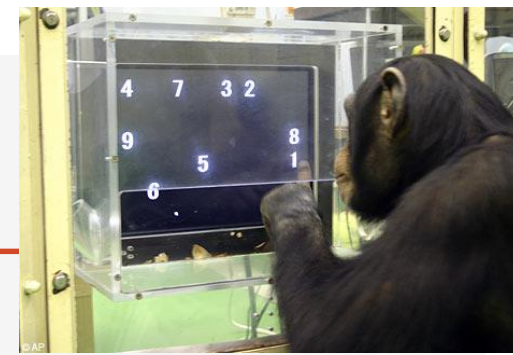
Study 1

- First, let chimps play w/features of economy → give chimps **written feedback @ economy's performance** → test chimps again.
- Then, let *same chimps* play with features of economy → give chimps **bananas (or not) based on performance** → test again.
- Compare their 2nd test performances across feedback conditions.

What are our **independent and dependent variables** in this example?
What are the **conditions** of the IV?

Remember that I will post these slides on Moodle later.

Hypothesis: Chimps will learn to run the economy better if they are trained using bananas vs. written feedback.



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Study 1

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- Compare their test performance across feedback conditions.

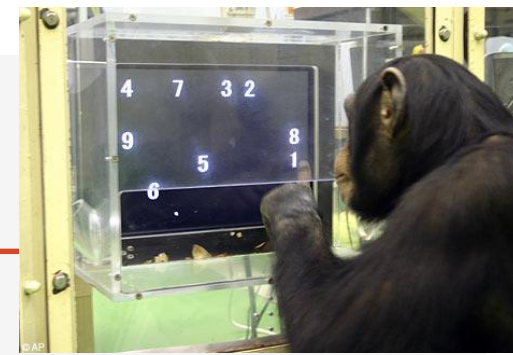
What are our **independent and dependent variables** in this example?
What are the **conditions** of the IV?

ANSWER:

IV = type of feedback
DV = performance on economy test
Conditions of IV = written vs. banana feedback

How to best train chimps to run the economy?

*** 2 ways to manipulate an IV



within-subjects design AKA *repeated measures* design

- First, let chimps play w/features of economy → give chimps **written feedback @ performance** → test chimps on running economy.
- Then, let same chimps play with features of economy → give chimps **bananas (or not) based on performance** → test.
- Compare test performance across feedback conditions.

between-subjects design

- Let one group of chimps play with features of economy → give chimps **written feedback @ performance** → test chimps.
- Let a *separate group* of chimps play with features of economy → give chimps **bananas (or not) based on performance** → test chimps.
- Compare test performance across feedback conditions.

Two Methods of Manipulating IVs

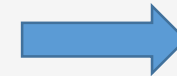
- Within-subjects (*aka* repeated measures) design

- The *same* entities take part in *all* experimental conditions

In psychology,
“entities” are
often (but not
always) people.

- Between-subjects design

- *Different* entities in each experimental condition



Most of the statistical
analyses we learn this
semester

Why is it important for us to learn about this distinction in this course?

PRACTICE – label with “within” or “between”

#1. Students take a pre-test on research methods concepts, and then take PY 221 & PY 222. At the end of PY 222, a post-test is given to see if scores have improved.

#2. Students are randomly assigned to drink either a bottle of Poland Spring® or smartwater® at the beginning of class. Dr. Valenti counts how many times each person participates during class.

#3. Freshmen are registered for 1 of 4 different ES courses. At the end of the semester, all freshmen are asked to evaluate their ES course and these evaluations are compared.

#4. A professor keeps the lights on in the classroom vs. off in the classroom on different randomly assigned days across the semester. She measures how many students nod off during class to see if lighting affects sleepiness in class.

Outline for Ch. 1

1. What are statistics?
 - descriptive
 - inferential
2. The research process
3. Populations and samples
4. Types of designs
- 5. Types of variables**

Two main types of variables

QUALITATIVE (aka **categorical**) **variables**

- Express an attribute or quality of something
- Possible responses may not have a sensible order
- Ex: *nominal variables*

EXAMPLES of variables

1. Outdoor temperature (°F)
2. Registered to vote vs. not
3. T-shirt size (e.g., S, M, L, XL)
4. Height of a plant (meters)

QUANTITATIVE **variables**

- Amounts or counts
- Measured in terms of numbers
 - Possible values/responses *can* be ordered sensibly
- EX: *ordinal, interval, and ratio scales*

Two main types of variables

QUALITATIVE (aka **categorical**) **variables**

- Express an attribute or quality of something
- Possible responses may not have a sensible order
- Ex: *nominal variables*

EXAMPLES – which is which?

1. Outdoor temperature (°F)
2. Registered to vote vs. not
3. T-shirt size (e.g., S, M, L, XL)
4. Height of a plant (meters)

QUANTITATIVE **variables**

- Amounts or counts
- Measured in terms of numbers
 - Possible values/responses can be ordered sensibly
- EX: *ordinal, interval, and ratio scales*

QUALITATIVE (aka categorical) variables

- Express an attribute or quality of something
- Possible responses may not have a sensible order
 - Ex: *nominal variables*

Which is which?

1. Outdoor temperature (°F)
2. Registered to vote vs. not
3. T-shirt size
4. Height of a plant (meters)
5. Type of Olympic medal
6. Outcome of a coin toss
7. Time btwn thunder & lightning
8. How old someone is
9. College major
10. Occupation
11. Annual income in dollars & cents
12. Distance btwn 2 students in room
13. How much do you like broccoli on a scale of 1-not at all to 10-an extreme amount?

QUANTITATIVE variables

- Amounts or counts
- Measured in terms of numbers
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*binary or dichotomous
qualitative variable
(only 2 categories)*

QUALITATIVE (categorical) variables

- Express an attribute or quality of something
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Which is which?

1. Outdoor temperature (°F)
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★ on a scale of 1-not at all to
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QUANTITATIVE variables

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There is a self-graded HW assignment on Moodle related to these important concepts.

Teamwork!

What are the benefits of working in teams?

Once you get into your teams, please introduce yourselves by sharing your name, pronouns, year, where you're from, and what you did over e-term.

Team #1: Averì, Haleigh, Kendall, Sarah Kaye, and Trey

Team #2: Chloe, E, Lindsey, & Stefanie

Team #3: Emily B, Gigi, Montana, and Tera

Team #4: Aliya, Ella, Emily E., and William



PRACTICE #1

- Jade wants to know whether watching football makes people more aggressive. She has all Ps in her study watch 10 minutes of a football game in which there is a good deal of aggressive tackling, and then she has her Ps punch a punching bag for 15 seconds – it's a special, high-tech punching bag that records amount of force. She also has the Ps watch 10 minutes of baseball in which no aggression is displayed, and then has them punch the punching bag for another 15 seconds. The order of the two tasks (baseball vs. football) is randomly determined for each participant. She compares the average force of each set of 15s punches.
 1. Is this a correlational study or an experiment? Why do you think so?
 2. Identify the predictors/outcome variables/IVs/DVs.
 3. Classify your predictor/IV as *qualitative* or *quantitative*.
 4. Does "between-subjects" or "within-subjects" better fit the study design, and why do you think so?

PRACTICE

1. Is this a correlational study or an experiment? Why do you think so?

ANSWER: An experiment. She *manipulates* sport, making all Ps watch 10 min. of both sports, and randomly determining the order.

2. Identify the predictors/outcome variables/IVs/DVs.

ANSWER: IV = sport watched (baseball vs. football); DV = aggression (measured as force of punches)


3. Classify your predictor/IV as *qualitative* or *quantitative*.

ANSWER: IV is qualitative – baseball and football are the categories (in this case, also known as the *levels (or conditions, or groups)* of the IV)

4. Does “between-subjects” or “within-subjects” better fit the study design? Why?

ANSWER: within-subjects, because each level of the IV (baseball & football) is administered to each entity (i.e., each P watches both sports)

PRACTICE – same scenario

- Jade wants to know whether watching football makes people more aggressive. She has all Ps in her study watch 10 minutes of a football game in which there is a good deal of aggressive tackling, and then she has her Ps punch a punching bag for 15 seconds – it's a special, high-tech punching bag that records amount of force. She also has the Ps watch 10 minutes of baseball in which no aggression is displayed, and then has them punch the punching bag for another 15 seconds. The order of the two tasks (baseball vs. football) is randomly determined for each participant. She compares the average force of each set of 15s punches.
- **How would we make this study a correlational study?**
 - We'd need to *measure* "watching football" & *measure* "aggression"
 - record, assess, have Ps report
 - She might hypothesize that the more hours per week a person spends watching football, the more aggression they tend to display.
 - Note that the language here does not explicitly refer to cause and effect.

PRACTICE #2

Suppose we *measured* “watching football” in the following ways. Identify whether each measure is **qualitative** or **quantitative**

1. put Ps in front of a screen with football and ask them to watch for as long as they’d like, and time them.
2. give people a questionnaire asking how many hours of football they tend to watch per year.
3. ask people which sport they watch the most of in a given year – baseball or football.

1. Quantitative
2. Quantitative
3. Qualitative *and in particular, it's a binary qualitative variable*

Practice #3

Generate three different variables and, for each, describe a way to measure it. Then, given the way you are choosing to measure each variable, state, for each, whether the variable is being measured in a qualitative or quantitative way.

Everyone should record the examples and labels (qualitative/quantitative) in their notebooks. Also select three spokespersons from your group, to tell your examples to the broader class.

Other rules:

- You must work as a team. That is, don't split up the work. Discuss everything.
- You cannot use any of the examples that I have provided today (e.g., the variables *age* and *college major* are off limits) or any examples provided in your textbook.
- Among your three examples must be at least one quantitative and at least one qualitative variable. The third example is up to you.

For Tuesday. Give yourself at least 2 hours for these tasks.

- Finish Ch. 1 reading (if you haven't already)
- Complete some self-graded homeworks (on Moodle)
- Study all of the PPT slides for Chapter 1
- Complete quiz between 8:00 am and 12:30 pm
- **During Tuesday's class, you'll work in groups on Practice Lab #1. If at all possible, bring your laptop with your lecture slides and textbook downloaded.**
- Also, remember weekly office hours
<https://gvalenti.youcanbook.me/>