

## Writing Hypotheses

### Qualitative IVs

Focus on group differences, not on variable relationships; identify all groups/categories of the IV involved and make clear which groups will have more or less of the DV for directional hypotheses.

#### Example

IV: Sex (males and females)

DV: Weight

#### Directional

Generic: Group A will have more of the DV than Group B.

Specific to Sex and Weight: Males will weigh more than females.

#### Non-directional

Generic: There will be a **difference** in DV between Group A and Group B.

Specific to Sex and Weight: There will be a difference in weight between males and females.

#### Null

Generic: There will be **no difference** in DV between Group A and Group B.

Specific to Sex and Weight: There will be no difference in weight between males and females.

### Quantitative IVs

Focus on relationship between IV, not on group differences.

#### Example

IV: Weight of Car

DV: Miles per Gallon (MPG)

Review positive (time studying and test scores) and negative (car weight and MPG) relationships.

↑↑   ↑↓   ↓↓

#### Directional

Generic: There is a positive (or negative) association between IV and DV

or

Generic: The higher the IV, the higher (or lower) will be the DV.

Specific to Weight and MPG: There is a negative association between car weight and MPG.

or

Specific to Weight and MPG: The heavier the car, the lower will be MPG.

#### Non-directional

Generic: There will be an association between the IV and DV.

Specific to Weight and MPG: There will be an association between car weight and MPG.

#### Null

Generic: There will be no association between the IV and DV.

Specific to Weight and MPG: There will be no association between car weight and MPG.

## Some Practice

- Review “Variables and Scales of Measurement” link and related practice exercise on course web page
- Review “Hypotheses” link and related practice exercise on course web page
- Write directional, non-directional, and null hypotheses for the following variable sets:
  1. IV = Class Size and DV = Student Achievement
  2. IV = Student sex (male/female) and DV = Verbal Scores
  3. Students whose parents are educators will earn higher scores on a test than students whose parents are not educators. (What are the IV and DV here? Rewrite as non-directional and null.)

## Answers

1. IV = Class Size and DV = Student Achievement

Directional: The larger the class, the lower will be student achievement

Non-directional: There is an association between class size and student achievement

Null: There is no association between class size and student achievement

2. IV = Student sex (male/female) and DV = Verbal Scores

Directional: Females are expected to demonstrate greater verbal scores than area males.

Non-directional: There will be a difference in verbal scores between males and female.

Null: There will be no difference in verbal scores between males and female.

3. Students whose parents are educators will earn higher scores on a test than students whose parents are not educators. (What are the IV and DV here? Rewrite as non-directional and null.)

IV = Parental occupation

DV = test scores

Non-directional: There will be a difference in test scores between students with parents who are educators and students whose parents are not educators.

Null: There will be no difference in test scores between students with parents who are educators and students whose parents are not educators.

## Common Errors

- Confuse categories and variables (attempting to treat a variable category like a variable)
- Incorrect comparisons (comparing IV to DV rather than correctly comparing DV across categories of IV)
- Creating arbitrary group comparisons when IV is quantitative (comparing DV between higher and lower IV)
- Using relationship when difference should be focus, or vice versa (write about difference if IV is qual., write about relationship if IV is quant.)
- Each of the above represent poor or ambiguous wording

## Examples of Problematic Wording

How should these be reworded?

- a. "There will be a difference between student sex and reading test scores."
- b. "There is no difference between parents' occupation (educator vs. non-educator) and test scores."
- c. "There will be a difference between males and weight and between females and weight."
- d. "Heavy cars will have lower MPG than light cars." (Note: IV = Car weight, DV = MPG)
- e. "Sex will be positively related to reading scores."
- f. "Type of instruction (cooperative learning or self-paced) affects student achievement."

This wording suffers from the same problem:

"Type of instruction (cooperative learning or self-paced) is related to student achievement."

(Note: 30 to 70, pre-post for both groups)

## Answers

- a. "There will be a difference between student sex and reading test scores."

Problem: incorrect comparison of the IV to the DV

Revised: There will be a difference in reading test scores between males and females.

- b. "There is no difference between parents' occupation (educator vs. non-educator) and test scores."

Problem: incorrect comparison of the IV to the DV

Revised: Students' test scores will be similar whether their parents' occupation is educator or non-educator.

- c. "There will be a difference between males and weight and between females and weight."

Problem: treats categories of a variable as if they are variables

Revised: There will be a difference in weight between males and females.

- d. "Heavy cars will have lower MPG than light cars." (Note: IV = Car weight, DV = MPG)

Problem: Arbitrarily created groups to compare (heavy vs. light)

Revised: The heavier the car the lower will be MPG. or There is a negative association between car weight and MPG.

- e. "Sex will be positively related to reading scores."

Problem: Incorrect usage of relationship when difference should be key

Revised: There will be a difference in reading scores between males and females.

- f. "Type of instruction (cooperative learning or self-paced) affects student achievement."

This wording suffers from the same problem:

“Type of instruction (cooperative learning or self-paced) is related to student achievement.”

(Note: 30 to 70, pre-post for both groups)

Coop Learn      pretest = 30      treatment for 6 weeks      posttest = 70

Self-paced      pretest = 30      treatment for 6 weeks      posttest = 70

Problem: Ambiguity – specify whether groups will differ

Revised: There will be a difference in student achievement between those who use coop learning and those who use self-paced instruction.