

# APS Interest Group on Psychology Education

## Resource Material Submission – Front Page

<b>Title of Material</b>	<b>Hypothesis Generation and Critical Thinking Exercise for First Year</b>
<b>Author(s)</b>	<b>Sue Morris &amp; Jacquelyn Cranney</b>
<b>Description/Aim</b>	<b>This exercise combines two tasks—one is an introduction to hypothesis testing and the nature of variables (independent, dependent, moderator) and how these relate to the design of a study. The second task relates to critical thinking, particularly the difference between causation and correlation. These tasks should also build healthy scepticism.</b>
<b>Benefits of Resource</b>	Engaging introduction to critical thinking and ethical issues in research.
<b>Issues for Consideration</b>	
<b>Approximate Duration</b>	50 minutes
<b>Primary Content/ Process Topic</b>	Research Design
<b>Other Categories</b>	Application of scientific method, assessment of information quality
<b>Intended student level</b> <i>(e.g. Secondary, Undergraduate Introductory, Undergraduate 4<sup>th</sup> Yr/ Honours, Post-graduate)</i>	Undergraduate – Introductory
<b>Type of Material</b> <i>(e.g. classroom materials, assessment, lectures, teaching tips, articles, syllabi, simulated learning environments.)</i>	Classroom Practical/Tutorial
<b>Format of Material</b>	Pdf file
<b>Further Information Contact</b> <i>(email only)</i>	s.morris@unsw.edu.au
<b>Review Requested</b> <i>(Nb: A 'Yes' response to this category indicates that you would like feedback/comments on the materials via email.)</i>	Yes
<b>Evaluative Data Included</b> <i>(E.g. Student evaluation, comments etc.)</i>	No

**Description:**

This exercise combines two tasks—one is an introduction to hypothesis testing and the nature of variables (independent, dependent, moderator) and how these relate to the design of a study. The second task relates to critical thinking, particularly the difference between causation and correlation. These tasks should also build healthy scepticism.

**Scholarship/Evaluation of Student learning/Continuous Improvement:**

The first task could be better tied to an actual study design task that the students had to either propose or carry out, but this is sometimes difficult to do in first year, and at least this exercise gets them thinking about the difference between types of variables, and the implications for interpretations of reported relationships between variables. These activities tap into the UNSW/ALTC Guideline for Learning, “ 1. Effective learning is supported when students are actively engaged in the learning process”, and “14. Learning cooperatively with peers - rather than in an individualistic or competitive way - may help students to develop interpersonal, professional, and cognitive skills to a higher level” (see <http://www.guidelinesonlearning.unsw.edu.au>).

## Hypothesis Generation and Critical Thinking Exercise for First Year

1. Hypothesis generation exercise (15 mins)
2. Critical Thinking definition (5 mins)
3. Thinking Critically about Causality & Ethics (15 mins)

### 1. HYPOTHESIS GENERATION WORKSHEET

(Loosely based on McGuire, 1989).

Form students into groups of 4 or 5 to do this (may or not be the groups they worked in previously). Give them 10 mins to answer the questions (they should each have a copy of the stimulus below), then 5 mins for discussion.

*The purpose of this exercise is to practice the introductory steps necessary to create a hypothesis.*

*In its simplest form, a hypothesis expresses the relationship between two (or more) variables. Thus, it is important to define the variables in question. The term "variable" comes from the same root as "vary." A variable is a characteristic (usually of a person or situation) that can have at least two different values. The phrase, "violent television," does not refer to a variable, as there is no indication of how it can vary. The phrases: "Amount of exposure to violent television," or "Exposure to violent television versus exposure to nonviolent television," both describe variables as they indicate the possibility of different values. The different values of a variable can be measured either qualitatively (eg, male or female if the variable is gender) or quantitatively (eg, a certain number of pounds if the variable is weight).*

### HYPOTHESIS GENERATION WORKSHEET

(1) The variable we will be interested in is **Academic Achievement** (NB this is most obviously a DV but could also be an IV. Students can use it in either way)

A. Briefly describe this variable.

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B. Describe how this variable can be operationalised (that is, describe exactly how you determine which category or which value of the variable applies to a particular person or situation).

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(2) Select another psychological variable that you believe is related to your first variable.

A. Give it a label.

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B. Briefly describe this variable.

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C. Describe how this variable can be operationalised.

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*Once the variables are defined, the next step is to predict the relationship between these two variables by writing a hypothesis. A hypothesis is a prediction about the relationship*

between two or more variables. For now, assume that there is a causal relationship between the two variables.. This means that changing a person's score on one of the variables (the independent variable) would cause the person's score on the other variable (the dependent variable) to change For example, you might say, "Increasing the amount of violent television that a person watches will cause that person to exhibit more aggressive behaviors."

(3) State a hypothesis.

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*Hypotheses are not mere guesses. Although there is never 100% certainty that a hypothesis is true, there are usually good reasons why the researcher believes that the hypothesis is true. It is very important to note why a particular relationship is expected.*

(4) Why would you expect this relationship to exist? Give a short **theoretical** explanation for this hypothesis.

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*Frequently, researchers find the result they expected in one situation or for one group of people and find no relationship or the opposite of what they expected in a different situation (situational moderators) or for a different group of people (personal moderators). The variable that describes the difference between the two situations or the two groups of people is called a "moderator variable." For example, the amount of violent television that people watch may affect their level of aggression if they are younger than 14 years old, but not if they are older than 14 years old. In this situation, age would be a moderator variable.*

(5) Think about a possible moderator variable.

A. Give it a label.

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B. Briefly explain how you believe the relationship that you stated in part 3 would change depending on the value of the moderator variable.

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C. Give a short theoretical explanation of why you believe that this variable is a moderator variable.

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## 2. Critical Thinkers (5 mins) – class exercise

Ask students to describe the capabilities of a "critical thinker" (1-2min). Then put up the overhead for them to read (1 min). Then ask them WHY critical thinking is particularly important to psychology (cf folk psychology, intuitive theories of human behaviour, etc.)

- are open minded and can live with uncertainty
- can identify inherent biases and assumptions
- are skeptical

- distinguish facts from opinions
- recognise unsupported assumptions and faulty logic
- analyse and evaluate the evidence
- suspend judgement, don't jump to conclusions
- gather evidence for both sides of the issue
- evaluate new evidence that contradicts existing beliefs
- modify or abandon prior judgements if contradictory evidence emerges

### **3. Thinking Critically about Causality and Ethics – group exercise (15 min)**

The following accounts imply causal relationships from non-experimental data. Give each group one "study". As a group, they should:

- 1) think of an explanation for the results other than the one suggested in the headline (e.g., reverse causality, third variable problems)
- 2) think of ways to experimentally test the implied causal relationships
- 3) think of ethical concerns related to the experimental tests they come up with.

After 10 mins, you should get each group to present their case to the class (2 mins each)

#### **(1) LIVING TOGETHER LEADS TO DIVORCE**

Don't live together if you want to stay married. So says a nationwide study of over 2000 couples. The study found that couples that had lived together before getting married were 2.3 times as likely to get divorced as couples who had not lived together.

Does living together before marriage lead to divorce? How else can this finding be explained? How would you experimentally test the hypothesis that living together causes divorce? Think of ethical concerns related to the experimental test(s) you come up with.

#### **(2) COFFEE PERKS UP SEX**

If you want to perk up your sex life, drink more coffee. That's the suggestion of a study published recently in a leading health journal. Researchers found that couples that regularly drank coffee reported nearly three times as much sexual activity as couples who did not drink coffee. Coffee sales are expected to increase.

Does drinking coffee increase sex drive? How else can the findings be explained? How would you experimentally test the hypothesis that drinking coffee causes an increase in sex drive? Think of ethical concerns related to the experimental test(s) you come up with.

#### **(3) SMALL COLLEGES DRIVE STUDENTS TO DRINK**

Parents around the country are withdrawing their children from small colleges. Their action comes after a release of a survey last week that found that students attending small colleges (less than 2000 students) consumed an average of 7.2 alcoholic beverages a week. By comparison, those attending large schools (more than 20, 000 students) consumed an average of 4.5 alcoholic drinks. Parents speculated that the pressures of the small college environment were pushing their children to drink.

Does attending a small college cause students to drink? How else can this finding be explained? How would you experimentally test the hypothesis that attending small colleges causes students to drink? Think of ethical concerns related to the experimental test(s) you come up with.

#### **(4) BAGPIPES GIVE YOU MORE THAN AN EARACHE**

A survey has found that having a passion for the pipes is linked to alcoholism and can contribute to the breakdown of players' marriages. About 10% of players said their hobby had ended their marriages while 84% knew pipers who were alcoholics.

Does playing the bagpipes cause players' marriages to breakdown and cause them to become alcoholics? How else can the finding be explained? How would you experimentally test the hypotheses that playing the bagpipes causes marriage breakdown and alcoholism? Think of ethical concerns related to the experimental test(s) you come up with.

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