

**Answers to Study Questions
for
Chapter 11**

(Don't forget that the companion website also has multiple choice questions that you can take for practice. You will find them here:

http://www.southalabama.edu/coe/bset/johnson/dr_johnson/2mcq.htm)

As a starting point, let's quickly review the three necessary conditions for establishing cause and effect:

Condition 1: Variable A and variable B must be related (the relationship condition).

Condition 2: Proper time order must be established (the temporal antecedence condition).

Condition 3: The relationship between variable A and variable B must not be due to some confounding extraneous or "third" variable (the lack of alternative explanation condition).

It is also important to establish a theoretical explanation and then empirically test predictions based on that theoretical explanation.

11.1. Why is experimental research much stronger than nonexperimental research when the researcher is interested in making cause and effect statements?

The strongest experimental studies are the best for making statements of cause and effect (i.e., experiments with random assignment) because they establish a relationship, proper time order (because the IV is manipulated and then the outcome is observed), and they rule out alternative explanations (because random assignment equates the groups on all extraneous variables at the start of the experiment). On the other hand, nonexperimental research is good at establishing that a relationship is present but has problems with the other two conditions (establishing proper time order and ruling out alternative explanations).

11.2. Why must a researcher sometimes conduct nonexperimental research rather than experimental research?

Because there are many independent variables (needing to be studied) that cannot be manipulated or it would be unethical to manipulate them. Remember that it is the research question that drives research.

11.3. Why must researchers watch out for the "post hoc fallacy"?

Because it is easy to "explain" things after the fact. You should avoid the logical fallacy of assuming that because event A preceded B, A must have caused B. If you do generate theory or new hypotheses based on what you observed in the past (which is fine), you must remember that you must also test those predictions with new data.

11.4. Name of a potential independent variable that cannot be manipulated.

Cigarette smoking, amount of violence seen on television, whether someone drops out of high school, or whether someone uses illicit drugs.

11.5. Explain the problems with the simple cases of causal-comparative and correlational research. Why is a researcher not justified in making a cause and effect claim from these two cases?

The bottom line is that both of these simple cases of nonexperimental research are only useful for making statements about the observed relationship between two variables. Neither of these two simple cases is useful for establishing evidence of causality; to do this, you must also attempt to establish proper time order and to control for potentially confounding variables. In short, to conduct high quality nonexperimental research, you must improve upon these “simple cases.”

- (Note that when you move into higher quality nonexperimental research, you should drop the correlational and causal-comparative terminology and use the clearer and more useful terminology explained in this chapter. The nine major nonexperimental research designs that are discussed in this chapter and are based on our terminology are shown in Table 11.3.)

11.6. Explain exactly how strong experimental research fulfills each of the three necessary conditions for cause and effect.

In the strongest of all the experimental designs you have manipulation, a comparison group, and random assignment to groups. (By now, you BETTER have the three necessary conditions for causation memorized.) Condition one (relationship condition) is established in these strong designs (also called randomized designs) by checking to see if the group means are different on the dependent variable after administration of the independent variable. Condition two (proper time order condition) is established because the researcher manipulates the independent variable and then looks for changes in the dependent variable. Random assignment to groups helps to clearly establish the third condition for causality (lack of alternative explanation condition). Random assignment does this by equating the groups on all known and unknown extraneous variables at the onset of the experiment.

11.7. On which of the three necessary conditions for cause and effect is nonexperimental research especially weak? On which one of the three necessary conditions is nonexperimental research strong?

Nonexperimental research is especially weak on condition three because it is always possible that an observed relationship is a spurious (i.e., non-causal) relationship (i.e., a spurious relationship is due to the operation of a third variable). Nonexperimental research is very strong on condition one; that is, it is very good at showing that two variables are related.

11.8. Explain why you cannot make a defensible “causal claim” based on an observed relationship between two variables (e.g., gender and achievement) in nonexperimental research.

Just because two variables are related does not mean that changes on one variable CAUSE changes in the other variable. Remember the three necessary conditions for establishing cause and effect? You know that showing a relationship is only the first of the three necessary

conditions. Many simple relationships are actually spurious relationships; for example, the following variables are positively but spuriously related: number of fire trucks responding and amount of fire damage, ice cream consumption and deaths by drowning, number of police officers and number of crimes, teachers salaries and the price of liquor.

11.9. What is the purpose of the techniques of control in nonexperimental research?

The overriding purpose is to “control for” potentially confounding or third variables identified by the researcher. These techniques are used to improve the two simple cases that we discussed above (see question 11.5). The aim of the control techniques is to help with “condition three” (the lack of alternative explanation condition) of the three necessary conditions for establishing cause and effect.

- The different approaches to control discussed are matching (i.e., selecting participants or forming comparison groups so that the independent variable and the extraneous variable are uncorrelated), holding the extraneous variable constant (i.e., turning an extraneous variable into a constant by limiting the study to one level of the extraneous variable), and statistical control (i.e., using statistical procedures such as partial correlation, analysis of covariance, and multiple regression to control for variables).

11.10. Which form of nonexperimental research tends to be the best for inferring cause and effect: cross-sectional research, trend studies, panel studies (i.e., prospective studies), or retrospective research studies? Why?

The panel study (one of the types of longitudinal research) tends to be the best because use of this design helps the researcher establish proper time order which is not possible in cross-sectional research. Panel studies are best when done in combination with one or more of the control techniques (e.g., statistical control, matching) which helps with the third necessary condition for cause and effect. Carefully done causal-modeling (i.e., developing a hypothesized theoretical model and then empirically testing it) can also provide moderately good evidence of causality (e.g., not nearly as good as a strong experiment but much better than the simple cases of nonexperimental research where only the relationship between two variables is examined).

11.11. Explain the difference between a direct effect and an indirect effect.

A direct effect is the effect of the variable at the origin of an arrow on the variable at the receiving end of the arrow (e.g., in the diagram $X \text{-----} Y$, X is hypothesized to affect Y). An indirect effect is an effect occurring through an intervening variable (e.g., in the diagram $X \text{-----} I \text{-----} Y$, X is presumed to affect Y indirectly through, or by way of, the intervening variable labeled I).

11.12. List an advantage and a disadvantage of causal modeling.

An important advantage is that it requires the researcher to make explicit his or her theoretical model (which usually includes direct and indirect relationships) and then to collect data to empirically test the model. A disadvantage is that theoretical models of this sort are usually tested with nonexperimental data (i.e., in studies without manipulation or random assignment), which makes it difficult to establish conditions two and three or the three necessary conditions.

Here is one more study question that I think is real important:

11.13. What are the two dimensions used to classify nonexperimental research into nine designs?

Here are the two dimensions:

1. Research objective: descriptive, predictive, or explanatory.
2. Time dimension: retrospective, cross-sectional, and longitudinal.

These two dimensions are crossed to form a matrix showing nine nonexperimental research designs in Table 11.3:

■ **TABLE 11.3** Types of Research Obtained by Crossing Research Objective and Time Dimension

Research Objective	Time Dimension		
	Retrospective	Cross-Sectional	Longitudinal
Descriptive	retrospective, descriptive study. (type 1)	cross-sectional, descriptive study. (type 2)	longitudinal, descriptive study. (type 3)
Predictive	retrospective, predictive study. (type 4)	cross-sectional, predictive study. (type 5)	longitudinal, predictive study. (type 6)
Explanatory	retrospective, explanatory study. (type 7)	cross-sectional, explanatory study. (type 8)	longitudinal, explanatory study. (type 9)

Source: Adapted from Johnson (2001).