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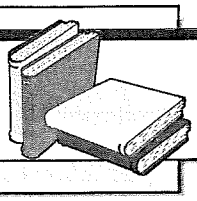

READING 2

Falsifiability

Directions: Read the following selection, then answer the questions that follow.

Psychology, like other sciences, is advanced when psychologists propose new theories. The theories are tested by various research methods. The results of the tests may support or refute the theory. A theory that is supported by one study will be examined and tested by other researchers. These additional studies may provide additional confirmation of the theory or may find flaws in the original theory. Testable theories, then, are stated in such a way that they can be proved false.

In 1793 a severe epidemic of yellow fever struck Philadelphia. One of the leading doctors in the city at the time was Benjamin Rush, a signer of the Declaration of Independence. During the outbreak Rush was one of the few physicians who were available to treat literally thousands of yellow fever cases. Rush adhered to a theory of medicine that dictated that illnesses accompanied by fever should be treated by vigorous bloodletting. He administered this treatment to many patients, including himself when he came down with the illness. Critics charged that his treatments were more dangerous than the disease. However, following the epidemic, Rush became even more confident of the effectiveness of his treatment, even though several of his patients had died. Why? . . .

Theories and the Falsifiability Criterion

Benjamin Rush fell into a fatal trap when assessing the outcome of his treatment. His method of evaluating the evidence made it impossible to conclude that his treatment did not work. If the recovery of a patient meant confirmation of his treatment (and hence his theory of medicine), then it only seems fair that the death of a patient should have meant disconfirmation. Instead, he rationalized away these disconfirmations. By interpreting the evidence as he did, Rush violated one of the most important rules regarding the construction and testing of theories in science: he made it impossible to falsify his theory.

Scientific theories must always be stated in such a way that the predictions derived from them can potentially be shown to be false. Thus the methods of evaluating new evidence relevant to a particular theory must always include the possibility that the data will falsify the theory. This principle is often termed the *falsifiability criterion*. . . .

The falsifiability criterion states that, for a theory to be useful, the predictions drawn from it must be specific. The theory must go out on a limb, so to speak, because in telling us what should happen, the theory must also imply that certain things will not happen. If these latter things do happen, then we have a clear signal that something is wrong with the theory: it may need to be modified, or we may need to look for an entirely new theory. Either way, we shall end up with a theory that is nearer to the truth. In contrast, if a theory does not rule out any possible observations, then the theory can never be changed, and we are frozen into our current way of thinking, with no possibility of progress. Thus a successful theory is not one that accounts for every possible happening because such a theory robs itself of any predictive power.

The Theory of Knocking Rhythms

A hypothetical example will show how the falsifiability criterion works. A student knocks at my door. A colleague in my office with me has a theory that makes predictions about the rhythms that different types of people use to knock. Before I open the door, my colleague predicts that the person behind it is a female. I open the door and, indeed, the student is a female. Later I tell my colleague that I am impressed, but only mildly so because he had a 50 percent chance of being correct even without his "theory of knocking rhythms." He says he can do better. Another knock comes. My colleague tells me it is a male under 22 years old. I open the door to find a male student whom I know to be just out of high school. I comment that I am somewhat impressed since our university has a considerable number of students over the age of 22. Yet I still maintain that, of course, young males are quite common on campus. Thinking me hard to please, my colleague proposes one last test. After the next knock, my colleague predicts, "Female, 30 years old, 5 feet 2 inches tall, carrying a book and a purse in the left hand and knocking with the right." After opening the door and confirming the prediction completely, I have quite a different response. I say that, assuming my colleague

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did not play a trick and arrange for these people to appear at my door, I am now in fact extremely impressed.

Why the difference in my reactions? Why do my friend's three predictions yield three different responses, ranging from "So what?" to "Wow"? The answer has to do with the specificity and precision of the predictions. The more specific predictions made a greater impact when they were confirmed. Notice, however, that the specificity varied directly with the falsifiability. The more specific and precise the prediction was, the more potential observations there were that could have falsified it. For example, there are a lot of people who are not 30-year-old females who are 5 feet 2 inches tall.

Good theories, then, make predictions that expose themselves to falsification. Bad theories do not put themselves in jeopardy in this way. They make predictions that are so general that they are almost bound to be true (for example, the next person to knock on my door will be less than 100 years old) or are phrased in such a way that they are completely protected from falsification. . . .

Not All Confirmations Are Equal

The principle of falsifiability has important implications for the way we view the confirmation of a theory. Many people think that a good scientific theory is one that has been repeatedly confirmed. They assume that the amount of confirming evidence is critical in the evaluation of a theory. But falsifiability implies that the number of times a theory has been confirmed is not the critical element. The reason is that, as our example of the "theory of knocking rhythms" illustrated, not all confirmations are equal. Confirmations are more or less impressive depending on the extent to which the prediction exposes itself to potential disconfirmation. One confirmation of a highly specific, potentially falsifiable prediction (for instance, a female, 30 years old, 5 feet 2 inches tall, carrying a book and a purse in the left hand knocking with the right) has a greater impact than the confirmation of 20 different predictions that are all virtually unfalsifiable (for instance, a person less than 100 years old).

Thus we must look not only at the quantity of the confirming evidence, but also at the quality of the confirming instances. Using the falsifiability criterion as a tool to evaluate evidence will help the research consumer resist the allure of the nonscientific, all-explaining theory that inevitably hinders the search for a deeper understanding of the nature of the world and the people who inhabit it. Indeed, such theoretical dead ends are often tempting precisely because they can never be falsified. They are islands of stability in the shifting ocean of the modern world.

Source: **Stanovich, K.E.** (1996). *How to Think Straight About Psychology.* New York: HarperCollins, 21–8.

Understanding the Reading

Directions: Answer the following questions in the space provided.

1. Why did Benjamin Rush believe his treatment worked?

_____

_____

2. What is the falsifiability criterion?

_____

_____

3. What types of predictions can be made using good theories?

_____

_____

4. What is the most important characteristic of confirming evidence?

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Thinking Critically

Directions: Answer the following questions in the space provided.

5. The theory states: "Hypnosis will help you 'remember' things from your childhood that never occurred." Is the theory stated in such a way that it can be proved false? Why or why not?

6. How can theories that are proved to be false still be useful in advancing psychology?