Instructor’s Manual

# Chapter 1: How Do We Know?

**Chapter Summary**

This chapter focused on how human beings attempt to understand the physical and psychological world. After briefly reviewing the history of how human beings have tried to understand their world (e.g., by comparing **animism, mythology and religion,** and **astrology**), we discussed how psychology evolved out of such disciplines as **philosophy** and **physiology**. Next, we discussed the **four canons of science**, that is, the four basic assumptions about the world that virtually all scientists take as a given (**determinism, empiricism, parsimony,** and **testability**). Finally, we discussed four distinct “**ways of knowing**,” that is, four ways of trying to figure out what the world is like. We point out, for example, that whereas political and religious systems place great emphasis on **authority** and **intuition** as ways of knowing, scientific systems place more stock in **logic** and **observation**. This explains, for instance, why scientific beliefs are revised much more frequently than religious beliefs. Although the basic rules of science are highly stable, this stable system of methods and procedures facilitates the revision of beliefs based on new observations and discoveries.

**Sample Answers for the Study Questions from the Textbook**

1. What are positivism and empiricism? Why would a typical research psychologist (i.e., a scientist) view these philosophical traditions as progress away from metaphysical ways of knowing?

*Positivism is a principle that states that human behavior should only be based on observations that can be made with absolute certainty. Empiricism is the idea that the best way to learn about the world is by making observations. A typical research psychologist would view positivism and empiricism as progress away from metaphysical ways of knowing because they are not based on assumptions. Metaphysical ways of thinking are not objective, but making observations is an important step in engaging in a science such as research psychology.*

2. Raphael has a theory that adults who grew up as firstborn children are more likely to be outgoing than those who grew up as later-born children. To test his theory, he gives a questionnaire to 200 students at his college and asks them to report (a) whether they were firstborn children or later-born children and (b) the degree to which they consider themselves outgoing. Is Raphael’s approach to acquiring knowledge scientific? In answering this question, consider each of the four canons of science and evaluate how Raphael’s approach measures up on each of these dimensions. Can you think of any ways for Raphael to make his birth-order analysis more scientific?

*Raphael’s approach is not very scientific. It violates all of the four canons of science. First, his study does not make use of the assumption of determinism. To say that firstborns are likely to behave in a different way than later-borns makes use of causality, which is not objective in nature. Second, although Raphael attempts to measure the degree to which people identify themselves as outgoing, his methods lack empiricism. He is not making direct observations of their behavior, so it is unknown how accurate the students’ responses are. Third, although Raphael’s theory is simple, it does not explain why firstborns would be more outgoing than later-borns. It lacks parsimony because it does not explain why personalities should depend on birth order. Finally, Raphael’s theory is not very testable. The main item that is lacking is the operational definition of “outgoing.” Since he is asking students to indicate to what degree they believe they are outgoing, this is a subjective type of measurement. “Outgoing” to one student may mean something different than it does to another. It is impossible to make comparisons unless the degrees of outgoing are the same for everyone.*

*Raphael can make his birth-order analysis more scientific in several ways. Without knowing each student’s birth order position, he should observe them interacting in groups and make notes on their behaviors. He can define “outgoing” by recording the number of times a person contributes an idea to the group, engages in a conversation, and so on. Rather than administer a questionnaire that asks for the student’s own ranking of how outgoing he or she is, he could use a personality test that asks questions about how often one sees friends each week, how many times one makes phone calls to friends, and so on.*

3. Gloria has a theory that people who are born between July 23 and August 22 (i.e., “Leos”) are more likely to be outgoing than people who are born at other times of the year. In support of her theory, she notes (a) that most of the Leos she knows are outgoing and (b) that she is very good at correctly guessing the astrological sign of Leos when she meets them. Is Gloria’s approach to knowledge acquisition scientific? In answering this question, consider each of the four canons of science and evaluate how Gloria’s approach measures up on each of these dimensions. Can you think of any ways for Gloria to make her astrological analysis more scientific?

*Gloria’s approach to knowledge acquisition is not scientific. It violates all of the four canons of science. First, she does not use determinism to test her theory. She states that most Leos she knows are outgoing. However, it is possible that most people that Gloria knows overall are outgoing. Correlating group membership (being a Leo) with being outgoing is assumptive in nature and not scientific. Second, Gloria’s way of acquiring knowledge is not empirical. Simply thinking of the Leos that she knows and remembering them as outgoing is not an observation. In addition, although she sometimes observes outgoing behavior and then makes a guess that the person is a Leo, she does not allow her theory to be disproved. She may have met many shy Leos and never realized it because she neglected to ask them if they were a Leo. Third, Gloria’s theory is simple, but it does not explain why Leos would be more outgoing than any other astrological signs; therefore, it lacks parsimony. Finally, Gloria’s methods are not testable. Although she is observing the behaviors of people whom she meets, she does not allow her methods to be falsifiable. Once she observes the outgoing behaviors that she normally finds in Leos, she asks the person if he or she is a Leo. This is not a scientific way to test her theory.*

*There are a few ways in which Gloria can make her methods of testing more scientific. First, she should define what types of behaviors in particular she defines as “outgoing.” She needs an operational definition for the term. Also, she should ask everyone that she meets if they are a Leo. That way, her theory becomes more testable. The possibility of disproving the theory must be available. For example, if most of the non-outgoing people she meets are also Leos, she must abandon the idea that Leos are more outgoing and accept the fact that she just happens to meet many people with July and August birthdays. She should also objectively observe people rather than question them. Gloria should observe how people interact in a group, rate each person’s level of outgoingness, predict who is a Leo, and then ask them for their birth dates.*

4. Although one of the tenets of science is that theories should be based on observable events (empiricism), most of the constructs that psychologists study are not visible to the naked eye. For instance, we can’t directly observe a person’s true attitudes, beliefs, or thoughts. How, then, can psychology be considered scientific? In answering this question, carefully consider the role of logic, theory testing, and operational definitions. (Note: Your answer to this question will become more sophisticated after you read Chapter 2.)

*Although psychologists study many unobservable phenomena, psychology is a science. Psychology relies heavily on operational definitions that define abstract concepts. For example, memory is an abstract psychological concept that has been studied in depth. Depending on the study, “memory” can be defined as the number of words a person can recall from a list, the number of faces one can recognize after being exposed to them, and so on. Logic is also an important factor in psychology. Psychologists often rely on logical beliefs to help them study certain constructs. For example, it is logical to state that a psychologist studying attraction would look at people who are married versus people who have just met. If people are married, it is fair to infer that they are (or were at one time) attracted to each other. Their behaviors toward their spouses would likely be different than the interactions between the two people who have just met. Another way in which psychology is scientific is through the testing of theories. Research psychologists always look to disprove a theory before they accept it as being true. Theories in combination with operational definitions allow studies to be replicated. If the same results are not obtained after repeating an experiment, the theory is discarded.*

**Multiple Choice Questions Test Bank**

Student self-test questions appear first, followed by questions available only to instructors. To minimize any risk of confusion, **student** self-test questions always have an “s” appended to the question number. **Instructor** questions always have an “i” appended to the question number.

**Student Self-testing Questions (questions available to students online.)**

1s. A vague, mildly favorable personality description that most people would consider highly self-descriptive is called \_\_\_\_\_\_.

A) a Rorschach portrayal

B) an intuitive personality portrait

C) an astrological reading

D) a Barnum description

Ans: D REF: Introduction: What This Text Is About

2s. According to the text, which of the following is NOT an example of a metaphysical system?

A) animism

B) mythology

C) astrology

D) philosophy

Ans: D REF: A Brief History of Human Knowledge

3s. Metaphysical explanations violate \_\_\_\_\_\_.

A) common sense

B) established physical laws

C) logical rules of reasoning

D) conversational norms

Ans: B REF: A Brief History of Human Knowledge

4s. As the term metaphysical is used in the text, metaphysical explanations for human behavior are based on \_\_\_\_\_\_.

A) indirect observations of events

B) supernatural phenomena

C) philosophical reasoning

D) the scientific method

Ans: B REF: A Brief History of Human Knowledge

5s. Dr. Rabinowitz believes that the best way to understand the world is through the use of logical reasoning. Dr. Rabinowitz is most likely to be \_\_\_\_\_\_.

A) a psychologist

B) a philosopher

C) a physiologist

D) a political scientist

Ans: B REF: A Brief History of Human Knowledge | Four Ways of Knowing About the World

6s. Based on psychology’s origins in \_\_\_\_\_\_, psychology relies heavily on empirical research methods, but like its origins in \_\_\_\_\_\_ psychology also focuses on questions such as whether people have free will and whether everything we perceive is real.

A) physiology; philosophy

B) chemistry; ontology

C) anthropology; sociology

D) physics; epistemology

Ans: A REF: A Brief History of Human Knowledge

7s. Fundamental principles that are accepted largely on faith are referred to as \_\_\_\_\_\_.

A) ground rules

B) conjectures

C) canons

D) theologisms

Ans: C REF: A Brief History of Human Knowledge

8s. José believes that all events have meaningful, systematic causes. José is \_\_\_\_\_\_.

A) a determinist

B) an empiricist

C) a scientist

D) a philosopher

Ans: A REF: The Four Canons of Science

9s. Superstitious conditioning refers to \_\_\_\_\_\_.

A) laypeople’s erroneous assumptions about luck and fate

B) bits of folk wisdom that people are rewarded for expressing

C) the false conditioning of random behaviors

D) a learned aversion toward situations people don’t understand

Ans: C REF: The Four Canons of Science

10s. Muriel believes that science should be based solely on things that can be observed with absolute certainty. What school of thought is she likely a member of?

A) the Barnum Society

B) logical positivism

C) parsimony

D) phrenology

Ans: B REF: The Four Canons of Science

11s. The origin of the phrase “I got it straight from the horse’s mouth” is a good illustration of the basic principle of \_\_\_\_\_\_.

A) authority

B) logic

C) logical positivism

D) empiricism

Ans: D REF: The Four Canons of Science

12s. When forced to choose between two machines that perform the same job equally well, engineers will usually prefer the machine that has fewer components. Like physicists and psychological scientists, then, engineers appear to value the scientific canon of \_\_\_\_\_\_.

A) empiricism

B) parsimony

C) efficiency

D) testability

Ans: B REF: The Four Canons of Science

13s. Maxine believes that ingesting the experimental drug theratonin increases aggressive behavior by making aggressive thoughts highly accessible. Sam believes that ingesting theratonin increases aggressive behavior by (1) making aggressive thoughts highly accessible and (2) making people worry less about the consequences of their behavior. If we knew that theratonin does increase aggressive behavior but knew nothing else, which theory should we prefer?

A) Maxine’s theory--because it is more testable than Sam’s theory

B) Maxine’s theory--because it is more parsimonious than Sam’s theory

C) Sam’s theory--because it is more testable than Maxine’s theory

D) Sam’s theory--because it is more parsimonious than Maxine’s theory

Ans: B REF: The Four Canons of Science

14s. “Occam’s razor” and “Lloyd Morgan’s canon” refer to the principle of \_\_\_\_\_\_.

A) parsimony

B) theoretical coherence

C) comprehensiveness

D) testability

Ans: A REF: The Four Canons of Science

15s. The number of hours it has been since a person has eaten is a reasonable \_\_\_\_\_\_.

A) operational definition of hunger

B) proxy for low blood sugar

C) working definition for hunger

D) approximation of food deprivation

Ans: A REF: The Four Canons of Science

16s. Testability is very closely associated with the idea of \_\_\_\_\_\_.

A) operational definitions

B) parsimony

C) logical negativism

D) prelogical operationism

Ans: A REF: The Four Canons of Science

17s. “Batting a pitched ball directly over the outfield fence (without bouncing) within the first and third baselines” is a(n) \_\_\_\_\_\_ of a home run in baseball.

A) operational definition

B) falsifiable description

C) empirical description

D) logical delineation

Ans: A REF: The Four Canons of Science

18s. The four “ways of knowing” emphasized in the text include \_\_\_\_\_\_.

A) authority, intuition, logic, and observation

B) authority, intuition, knowledge, and wisdom

C) perception, intuition, deduction, and application

D) deduction, induction, perception, and sensation

Ans: A REF: Four Ways of Knowing About the World

19s. How would a physicist be likely to rank order the importance of the four “ways of knowing” emphasized in the text? (1 = *most*, 4 = *least important*)

A) 1. logic, 2. intuition, 3. observation, 4. authority

B) 1. observation, 2. authority, 3. logic, 4. intuition

C) 1. logic, 2. observation, 3. authority, 4. intuition

D) 1. observation, 2. logic, 3. intuition, 4. authority

Ans: D REF: Four Ways of Knowing About the World

20s. According to the text, which of the “ways of knowing” emphasized in the text would be ranked most highly (most favorably) by a politician or minister?

A) logic

B) intuition

C) authority

D) observation

Ans: C REF: Four Ways of Knowing About the World

**Questions Reserved for Instructors (This question set is NOT available to students online.)**

1i. According to the text, metaphysical belief systems \_\_\_\_\_\_.

A) examine the scientific and philosophical underpinnings of human knowledge

B) incorporate the various “ways of knowing” to generate balanced beliefs

C) came about when classic Greek philosophy gave way to modern science

D) involve assumptions about causes that violate the basic principles of science

Ans: D REF: A Brief History of Human Knowledge

2i. The belief that natural phenomena (e.g., the sun, the wind) are alive is referred to as \_\_\_\_\_\_.

A) animism

B) paleoanthropism

C) primitivism

D) naive realism

Ans: A REF: A Brief History of Human Knowledge

3i. Most psychologists agree that \_\_\_\_\_\_ was the founder of experimental psychology.

A) Gustav Fechner

B) Carl Jung

C) Hermann von Helmholtz

D) Wilhelm Wundt

Ans: D REF: A Brief History of Human Knowledge

4i. The two most important historical precursors (forerunners) of experimental psychology were \_\_\_\_\_\_.

A) philosophy and physics

B) philosophy and physiology

C) anthropology and biology

D) physics and biology

Ans: B REF: A Brief History of Human Knowledge

5i. Your textbook refers to basic principles such as parsimony, determinism, and testability as \_\_\_\_\_\_.

A) axioms

B) foundations

C) canons

D) touchstones

Ans: C REF: A Brief History of Human Knowledge

6i. According to the text, phenomena such as illusory correlation and superstitious conditioning are consistent with the basic idea behind \_\_\_\_\_\_.

A) determinism

B) empiricism

C) parsimony

D) testability

Ans: A REF: The Four Canons of Science

7i. The idea that scientific theories simplify the world rather than making it more complicated is highly consistent with the widely accepted scientific concept known as \_\_\_\_\_\_.

A) testability

B) parsimony

C) empiricism

D) determinism

Ans: B REF: The Four Canons of Science

8i. One could not follow the basic rules of \_\_\_\_\_\_ in the absence of operational definitions.

A) testability

B) parsimony

C) empiricism

D) determinism

Ans: A REF: The Four Canons of Science

9i. Both using a telescope to record the apparent movement of planets and conducting a public opinion poll to decide the likely outcome of an election are good examples of \_\_\_\_\_\_.

A) scientific precision

B) logic

C) logical positivism

D) empiricism

Ans: D REF: The Four Canons of Science

10i. Galileo tried to solve the problem of how gravity works by \_\_\_\_\_\_.

A) dropping a heavy and a light cannon ball from the Leaning Tower of Pisa

B) performing a thought experiment

C) rolling balls down a series of inclined planes

D) performing a thought experiment and rolling balls down a series of inclined planes

Ans: D REF: The Four Canons of Science | Four Ways of Knowing About the World

11i. Which of the following is NOT one of the four canons of science mentioned in the text?

A) determinism

B) empiricism

C) parsimony

D) reliability

Ans: D REF: The Four Canons of Science

12i. Falsifiability is closely associated with the idea of \_\_\_\_\_\_.

A) parsimony

B) theoretical coherence

C) comprehensiveness

D) testability

Ans: D REF: The Four Canons of Science

13i. According to Karl Popper, what, more than anything else, makes a field of study scientific?

A) openness to criticism and revision

B) the use of scientific methods and procedures

C) systematic observation of behavior

D) the formulation of theories

Ans: A REF: The Four Canons of Science

14i. Which of the four “ways of knowing” mentioned in the text is probably the basis of many commonly accepted stereotypes?

A) authority

B) observation

C) intuition

D) culture

Ans: C REF: Four Ways of Knowing About the World

15i. The “Draw-A-Person Test” once used by clinical psychologists is an example of scientists relying on this “way of knowing”: \_\_\_\_\_\_.

A) authority

B) intuition

C) logic

D) observation

Ans: B REF: Four Ways of Knowing About the World

16i. A way in which philosophers and psychologists disagree slightly about the ideal ways of knowing is that philosophers tend to value \_\_\_\_\_\_ a bit more than psychologists do.

A) authority

B) intuition

C) logic

D) parsimony

Ans: C REF: Four Ways of Knowing About the World