

Chapter 4: Theory

In theory there is no difference between theory and practice. In practice there is.

-Yogi Berra

The birth of science as we know it arguably began with Isaac Newton's formulation of the laws of gravitation and motion. It is no exaggeration to say that physics was reborn in the early 20th-century with the twin revolutions of quantum mechanics and the theory of relativity. -Paul Davies

In the following paragraph, researchers Sherlock Campbell and James Pennebaker describe a remarkable statistical relationship.

Multiple laboratories have demonstrated that people who are asked to write about traumatic experiences subsequently exhibit better physical health than people who are asked to write about superficial topics. In these studies, individuals are randomly assigned to write about either emotional or non-emotional topics for 15 to 20 min per day for 3 to 5 consecutive days. In the past 15 years, dozens of replications have demonstrated that emotional writing can influence frequency of physician visits, immune function, stress hormones, blood pressure, and a host of social, academic, and cognitive variables. These effects hold up across cultures, ages, and diverse samples. (Campbell & Pennebaker, 2003, p. 60) ^[1]

In other words, researchers have answered the interesting and important question of whether engaging in what has come to be called “expressive writing” improves people’s health. It does. But there is a second question that is equally interesting and important: Why? What psychological and biological variables, structures, and processes are involved, and how do they connect the act of expressive writing to improved health? Several ideas have been proposed. For example, people who write about traumatic experiences might habituate to them. That is, the more they think about them, the less negatively they react both psychologically and physiologically—leading to improvements in mental and physical health (Lepore, Greenberg, Bruno, & Smyth, 2002). ^[2]

This example illustrates that, like all scientists, researchers in Human Services distinguish between two sorts of knowledge: their systematic observations and their explanations or interpretations of those observations. Typically, the former are called phenomena and the latter are called theories. Up to this point in the book, we have focused on phenomena. In this chapter, however, we focus on the equally important role of theories. We begin by exploring the distinction between phenomena and theories in more detail. We then look at the wide variety of theories that researchers construct. Finally, we consider how researchers use theories, and we present some strategies for incorporating theory into your own research.

[1] Campbell, R. S., & Pennebaker, J. W. (2003). The secret life of pronouns: Flexibility in writing style and physical health. *Psychological Science*, 14, 60–65.

[2] Lepore, S. J., Greenberg, M. A., Bruno, M., & Smyth, J. M. (2002). Expressive writing and health: Self-regulation of emotion-related experience, physiology, and behavior. In S. J. Lepore & J. M. Smyth (Eds.), *The writing cure: How expressive writing promotes health and emotional well-being* (pp. 99–117). Washington, DC: American Psychological Association.

4.1 Phenomena and Theories

LEARNING OBJECTIVES

- Define the terms phenomenon and theory and distinguish clearly between them.
- Explain the purposes of scientific theories.
- Explain why there are usually many plausible theories for any set of phenomena.

Phenomena

A tornado is a phenomena. The theory behind them is the meeting of warm, moist air from the Gulf of Mexico and cool, dry air from Canada.

A **phenomenon** (plural, phenomena) is a general result that has been observed reliably in systematic empirical research. In essence, it is an established answer to a research question. Some phenomena we have encountered in this book are that expressive writing improves health, women do not talk more than men, and cell phone usage impairs driving ability. Some others are that dissociative identity disorder (formerly called multiple personality disorder) increased greatly in prevalence during the late 20th century, people perform better on easy tasks when they are being watched by others (and worse on difficult tasks), and people recall items presented at the beginning and end of a list better than items presented in the middle.

Some Famous Phenomena from Psychology

Phenomena are often given names by their discoverers or other researchers, and these names can catch on and become widely known. The following list is a small sample of famous phenomena in psychology.

- **Blindsight.** People with damage to their visual cortex are often able to respond to visual stimuli that they do not consciously see.
- **Bystander effect.** The more people who are present at an emergency situation, the less likely it is that any one of them will help.
- **Fundamental attribution error.** People tend to explain others' behavior in terms of their personal characteristics as opposed to the situation they are in.
- **McGurk effect.** When audio of a basic speech sound is combined with video of a person making mouth movements for a different speech sound, people often perceive a sound that is intermediate between the two. For a demonstration, see <http://www.faculty.ucr.edu/~rosenblu/VSMcGurk.html>.
- **Own-race effect.** People recognize faces of people of their own race more accurately than faces of people of other races.
- **Placebo effect.** Placebos (fake psychological or medical treatments) often lead to improvements in people's symptoms and functioning.
- **Mere exposure effect.** The more often people have been exposed to a stimulus, the more they like it—even when the stimulus is presented subliminally.
- **Serial position effect.** Stimuli presented near the beginning and end of a list are remembered better than stimuli presented in the middle. For a demonstration, see <http://cat.xula.edu/thinker/memory/working/serial>.
- **Spontaneous recovery.** A conditioned response that has been extinguished often returns with no further training after the passage of time.

Although an empirical result might be referred to as a phenomenon after being observed only once, this term is more likely to be used for results that have been replicated. **Replication** means conducting a study again—either exactly as it was originally conducted or with modifications—to be sure that it produces the same results. Individual researchers usually replicate their own studies before publishing them. Many empirical research reports include an initial study and then one or more follow-up studies that replicate the initial study with minor modifications. Particularly interesting results come to the attention of other researchers who conduct their own replications. The positive effect of expressive writing on health and the negative effect of cell phone usage on driving ability are examples of phenomena that have been replicated many times by many different researchers.

Sometimes a replication of a study produces results that differ from the results of the initial study. This could mean that the results of the initial study or the results of the replication were a fluke—they occurred by chance and do not reflect something that is generally true. In either case, additional replications would be likely to resolve this. A failure to produce the same results could also mean that the replication differed in some important way from the initial study. For example, early studies showed that people performed a variety of tasks better and faster when they were watched by others than when they were alone. Some later replications, however, showed that people performed worse when they were watched by others. Eventually researcher Robert Zajonc identified a key difference between the two types of studies. People seemed to perform better when being watched on highly practiced tasks but worse when being watched on relatively unpracticed tasks (Zajonc, 1965).^[1] These two phenomena have now come to be called social facilitation and social inhibition.

What Is a Theory?

A **theory** is a coherent explanation or interpretation of one or more phenomena. Although theories can take a variety of forms, one thing they have in common is that they go beyond the phenomena they explain by including variables, structures, processes, functions, or organizing principles that have not been observed directly. Consider, for example, Zajonc's theory of social facilitation and social inhibition. He proposed that being watched by others while performing a task creates a general state of physiological arousal, which increases the likelihood of the dominant (most likely) response. So, for highly practiced tasks, being watched increases the tendency to make correct responses, but for relatively unpracticed tasks, being watched increases the tendency to make incorrect responses. Notice that this theory—which has come to be called drive theory—provides an explanation of both social facilitation and social inhibition that goes beyond the phenomena themselves by including concepts such as “arousal” and “dominant response,” along with processes such as the effect of arousal on the dominant response.

Outside of science, referring to an idea as a theory often implies that it is untested—perhaps no more than a wild guess. In science, however, the term theory has no such implication. A theory is simply an explanation or interpretation of a set of phenomena. It can be untested, but it can also be extensively tested, well supported, and accepted as an accurate description of the world by the scientific community. The theory of evolution by natural selection, for example, is a theory because it is an explanation of the diversity of life on earth—not because it is untested or unsupported by scientific research. On the contrary, the evidence for this theory is overwhelmingly positive and nearly all scientists accept its basic assumptions as accurate. Similarly, the “germ theory” of disease is a theory because it is an explanation of the origin of various diseases, not because there is any doubt that many diseases are caused by microorganisms that infect the body.

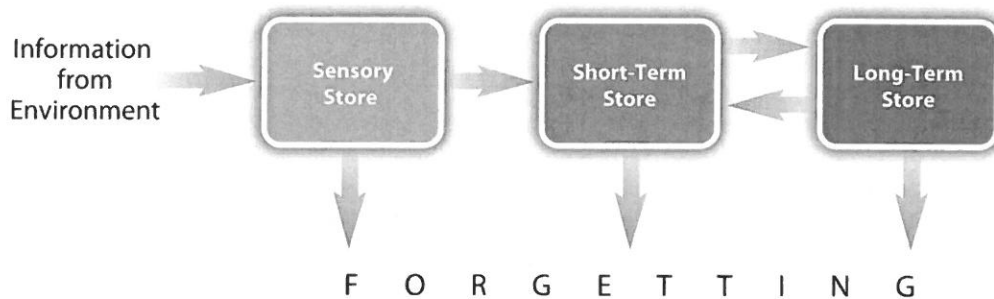
In addition to theory, researchers use several related terms to refer to their explanations and interpretations of phenomena. A **perspective** is a broad approach—more general than a theory—to explaining and interpreting phenomena. For example, researchers who take a biological perspective tend to explain phenomena in terms of genetics or nervous and endocrine system structures and processes, while researchers who take a behavioral perspective tend to explain phenomena in terms of reinforcement, punishment, and other external events. A **model** is a precise explanation or interpretation of a specific phenomenon—often expressed in terms of equations, computer programs, or biological structures and processes. A **hypothesis** can be an explanation that relies on just a few key concepts—although this term

more commonly refers to a prediction about a new phenomenon based on a theory (see Section 4.3 "Using Theories in Psychological Research"). Adding to the confusion is the fact that researchers often use these terms interchangeably. It would not be considered wrong to refer to the drive theory as the drive model or even the drive hypothesis. And the biopsychosocial model of health—the general idea that health is determined by an interaction of biological, psychological, and social factors—is really more like a perspective as defined here. Keep in mind, however, that the most important distinction remains that between observations and interpretations.

What Are Theories For?

Of course, scientific theories are meant to provide accurate explanations or interpretations of phenomena. But there must be more to it than this. Consider that a theory can be accurate without being very useful. To say that expressive writing helps people "deal with their emotions" might be accurate as far as it goes, but it seems too vague to be of much use. Consider also that a theory can be useful without being entirely accurate. Figure 4.2 "Representation of the Multistore Model of Human Memory" is a representation of the classic multistore model of human memory, which is still cited by researchers and discussed in textbooks despite the fact that it is now known to be inaccurate in a number of ways (Izawa, 1999). [2] These two examples suggest that theories have purposes other than simply providing accurate explanations or interpretations. Here we look at three additional purposes of theories: the organization of known phenomena, the prediction of outcomes in new situations, and the generation of new research.

FIGURE 4.2 REPRESENTATION OF THE MULTISTORE MODEL OF HUMAN MEMORY. INFORMATION FROM THE ENVIRONMENT GOES INTO THE SENSORY STORE, THEN THE SHORT-TERM STORE, AND THEN THE LONG-TERM STORE. IT CAN BE FORGOTTEN IN ANY OF THOSE THREE STORES. IN ORDER TO BE RETRIEVED, MEMORY IN THE LONG-TERM STORE MUST BE RECALLED BACK IN THE SHORT-TERM STORE FOR IT TO BE "REMEMBERED."



In the multistore model of human memory, information from the environment passes through a sensory store on its way to a short-term store, where it can be rehearsed, and then to a long-term store, where it can be stored and retrieved much later. This theory has been extremely successful at organizing old phenomena and predicting new ones.

Organization

One important purpose of scientific theories is to organize phenomena in ways that help people think about them clearly and efficiently. The drive theory of social facilitation and social inhibition, for example, helps to organize and make sense of a large number of seemingly contradictory results. The multistore model of human memory efficiently summarizes many important phenomena: the limited capacity and short retention time of information that is attended to but not rehearsed, the importance of rehearsing information for long-term retention, the serial-position effect, and so on. Or consider a classic theory of intelligence represented by Figure 4.3 "Representation of One Theory of Intelligence". According to this theory, intelligence consists of a general mental ability, *g*, plus a small number of more specific abilities that are influenced by *g* (Neisser et al., 1996). [3] Although there are other theories of intelligence, this one does a good job of summarizing a large number of statistical relationships between tests of various mental abilities. This includes the fact that tests of all basic mental abilities tend to be somewhat positively correlated and the fact that certain subsets of mental abilities (e.g., reading comprehension and analogy completion) are more positively correlated than others (e.g., reading comprehension and arithmetic).