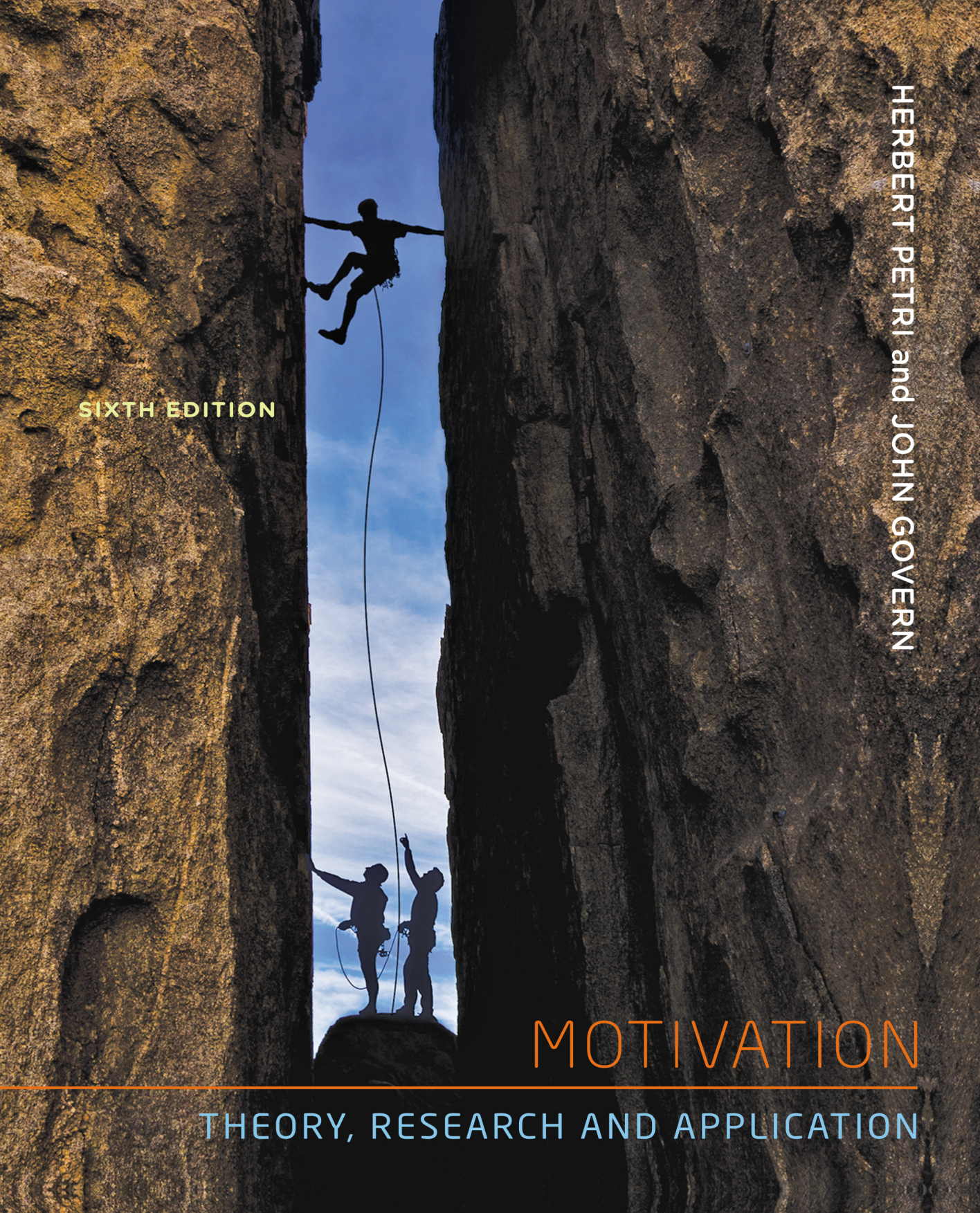
HERBERT PETRI and JOHN GOVERN
SIXTH EDITION
MOTIVATION
THEORY, RESEARCH AND APPLICATION

Motivation

THEORY, RESEARCH AND APPLICATION

SIXTH EDITION

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Herbert L. Petri, John M. Govern

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This book is dedicated to Jan
(HLP)
and
Monica, Mom, and Dad
(JMG)

About the Authors

Courtesy of Author, Herbert L. Petri

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Herbert L. Petri received his B.A. degree from Miami University, Oxford, Ohio, and M.A. and Ph.D. degrees from Johns Hopkins University. He has taught at Towson University since receiving his doctorate and has been recognized on five separate occasions for his excellent teaching. He retired from Towson University in May 2011. Dr. Petri is Adjunct Professor in the Psychological and Brain Sciences Department at Johns Hopkins University where he teaches courses in Motivation and Evolutionary Psychology.

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John M. Govern earned a B.S. in Psychobiology from Albright College and a Ph.D. in Social Psychology from Temple University. Dr. Govern's primary research interest is in social cognition. He has enjoyed teaching at Towson University since 1989.

Brief Contents

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Preface

We have found the study of motivation to be one of the most fascinating and complex topics in psychology. It is fascinating because people want to know why they behave the way they do—to understand the processes that activate their behavior. It is complex because it cuts across many specialty areas within psychology and draws from each of them. Thus you will find in this book physiological, learned, and cognitive explanations of behavior.

Our motives for writing this text are also complex. First, we feel that a motivation text should cover in detail the major approaches suggested by theorists of varying specialties and backgrounds. A book designed for a first course in motivation ought to put forward, as far as possible, an unbiased view of motivational theory. Therefore, we have tried to present the material in this text as objectively as possible, including both the advantages and disadvantages of each of the approaches discussed.

It is also our belief that students should be presented with the basic ideas within a given area, as well as some conclusions about those ideas. Students too often become "lost in the data" and miss the major points. For this reason, we have purposely avoided an encyclopedic presentation of the major areas. Instead, we have focused on the kinds of research conducted to test the major ideas; both older "classic" studies as well as newer studies. As we see it, a textbook on motivation should provide the basic information necessary for a good background in motivational processes, while at the same time allowing instructors the freedom to present additional material of their own choosing related to the various areas. This book is intended to provide the basic information instructors can build upon.

Motivational theory is sometimes difficult for students because it requires ways of thinking that are often quite far removed from everyday experience. For this reason, we have strived to use examples drawn from day-to-day life whenever possible. We have also tried to keep the language simple and direct.

This book is divided into three major areas: approaches to motivation that emphasize its biological components, approaches that emphasize its learned components, and approaches that emphasize its cognitive components. Within each of these areas we have tried to present the material in such a way that understanding the later chapters does not depend on having read the earlier chapters. The independence of the chapters allows each instructor to select whichever ones best fit with his or her particular approach to motivation. This independence also means that chapters can be assigned in any order that is deemed appropriate.

It hardly seems possible that more than thirty years have passed since publication of the first edition of this text and yet our understanding of motivational processes has changed greatly during that period of time. The sixth edition represents a refinement of the progression of topics found in the earlier editions. As was the case with earlier editions, the sixth edition has been updated with new information that has become available since the printing of the fifth edition. The sixth edition now contains approximately 1425 references. About 15% of these references are new to the 6th edition and include updated information as well as several new topics that have been added.

Changes in This Edition

There have been many additions to the sixth edition even though the basic flow of topics remains the same. For example, Chapter 1 presents information on research methods in motivation and then provides a rationale for most if not all motives in humans as well as animals. That theme is evolution. An argument is made for the replication of one's DNA as the primary operating principle behind motivated behaviors. Thus motives such as hunger, thirst, and sex as well as the need to achieve, gain power, affiliate, and so forth are seen as adaptive behaviors that increase the chances of successfully replicating one's genes into the next generation. Indeed, one could argue that the things that motivate us to behave exist because they have had survival value.

Chapter 2, while retaining most of the earlier information on the genetics of motivation, examines newer information from the burgeoning field of Evolutionary Psychology such as innate attraction signals in humans. Chapter 3 on Arousal updates the information on sleep and stress and includes new information on why we dream (e.g., Threat Simulation Theory and Virtual Rehearsal Theory). New to this chapter are data showing that the brain transitions from waking to sleep and from non-rapid eye movement sleep to rapid eye movement sleep much as a flip/flop switch operates. New evidence also provides strong support for the role of sleep in memory formation. Also new to this chapter is a section devoted to examining the role of placebo effects on behavior. Chapter 4 on Physiological Mechanisms of Regulation updates research on hunger, thirst, sex, and aggressive motives covering such recent topics as the role of ghrelin in signaling hunger, and the role of the pancreatic signals of insulin and amylin in glucose availability. Much new information is also noted concerning the role of hypothalamic neurotransmitters in the control of food intake. A new section on the role of habituation processes in obesity has also been added, as has a new section on the role of stress in obesity. Chapter 5 on the role of learning in motivation includes many of the classic studies that have shown how learning influences motivation, and, in addition, examines information about the role of learning in sexual motivation and aggressive motivation. Chapter 6 on incentive motivation adds a new section on the role of pheromones in incentive motivation and new research on sexual attraction signals. Chapter 7 on hedonism includes new research on gender and pain, the modulating effects of both learning and emotion on pain, and the role of endogenous opiates in pain. Chapter 8 updates research on locus of control, social learning theory, achievement motivation, and a new section on the Theory of Planned Behavior. New research on social loafing under various conditions is also explored. Chapter 9 on cognitive consistency and social motivation has been updated and the two major concepts presented in reverse order from that in the fifth edition. They were switched because some have explained many of the social motivation topics (e.g., conformity, compliance) using a motive for cognitive consistency. Thus, it made sense to discuss consistency motivation first and then show how the motive for consistency is related to social motivation. Chapter 10 updates research on attribution (e.g., self-serving bias, false consensus effect, the actor–observer effect, fundamental attribution error). Finally, new information is included on attribution and achievement, and research showing how an entity versus incrementalist approach can explain some social behaviors. Chapter 11 presents a new hierarchy of needs proposed by Kenrick et al. (2010) that updates and revises Maslow's original model. Bandura's concept of personal efficacy is shown to be related to the development and maintenance of healthy behaviors, and a fuller discussion of positive psychology theory and research is included. In the last several years, there has been a renewed interest in the topic of emotion, and Chapter 12 reflects this new interest. In particular, progress has been made in understanding how the brain integrates the components of an emotional response. Updated coverage of the importance of the amygdala and the prefrontal cortex in this

integration can be found in the sixth edition as well as an updated version of Izard's Differential Emotions Theory and the most recent circumplex model of emotions.

The sixth edition builds upon the structure of the fifth edition. Thus the instructor familiar with the fifth edition will find the sequence and topics of the sixth edition similar but updated with more recent research.

A unifying concept added in the fifth edition was the role of evolution in motivation. That approach is maintained and strengthened in the sixth edition. We have refined this thematic approach, suggesting that most (and perhaps all?) motivation can be ultimately understood as promoting the survival of all animals, including humans. An additional concept carried over from earlier editions is that many motives are best understood as complex interactions among processes that then produce behavior. For example, sexual behavior is best understood as having genetic, arousal, regulatory, incentive, and learned components. Attempting to study sexual behavior without considering this combination of factors leads to an incomplete understanding of sexual motivation. Therefore, information about sexual motivation is found in several chapters. Aggressive behaviors, and ultimately all motives, are probably also best understood as resulting from a similar interaction of factors.

As in the fifth edition, key terms are boldface in the text and summarized at the end of each chapter with the page number where that particular term was explained. Thus, the major ideas within the chapter are readily available to the student and can aid in studying, while the page numbers provide easy access to those parts of a chapter where that key idea was discussed, providing a context for learning the material.

The sixth edition also encourages exploration of motivational topics beyond those found in the text itself. Suggestions for further reading are found at the end of each chapter, often on topics that students will find of interest. Additionally, for most chapters, there are Web Resources with addresses to Web sites that provide additional information on some of the topics related to that chapter.

Acknowledgments

As is the case with any endeavor of this size, many people have contributed time, effort, and expertise to this project. We would particularly like to thank the reviewers for this and previous editions for their constructive and thought-provoking suggestions. These reviewers are Terry F. Pettijohn, Ohio State University; Steve Bounds, Arkansas State University; Samuel Clay, Brigham Young University—Idaho; Nicolle Matthews, Northeastern, University of Phoenix, Curry College and University of Massachusetts—Dartmouth.

We are also grateful to Towson University for supporting this project and providing the necessary materials for developing the manuscript of the sixth edition. To the many students in our classes who have been subjected to varying renditions of this material, we say thank you. You helped us determine what would work and what would not. Many colleagues have shared books, articles, and expertise. We thank all of them for their help.

The staff at Wadsworth provided excellent support in the production of the sixth edition. In particular, Tim Matray, Acquisitions Editor; Nicole Richards, Editorial Assistant; Jessica Alderman, Assistant Editor; Pam Galbreath, Art Director; Michelle Clark, Production Manager; Mary Noel, Media Editor and others on the Psychology team have been extremely helpful and supportive throughout the entire project. Finally, we must express our greatest appreciation to our families, who have now endured the writing process yet another time. For Herbert Petri, his wife Jan has always been there to provide support and encouragement when called upon. For John Govern, Monica Greco has done the same. It is our hope that both students and faculty alike will find the sixth edition of this text interesting and informative.

Herbert L. Petri
John M. Govern

PART I OVERVIEW

CHAPTER 1
Overview: Conceptualizing and Measuring Motivation and the Role of Evolution in Motivation

CHAPTER 1

Overview: Conceptualizing and Measuring Motivation and the Role of Evolution in Motivation

CHAPTER PREVIEW

This chapter is concerned with the following questions:

1. What is motivation?
2. What are the philosophical and physiological roots of motivation?
3. How is motivation studied?
4. What is evolution, and how is it related to motivation?
5. How do the sexual strategies of men and women differ?
6. What features do we find desirable in a mate?
7. What is the plan of this book?

Introduction

Each of us has an intuitive understanding of what it means to be motivated. We know that at some times we want to do something and at other times we do not. Essentially we know what it feels like to be motivated. Subjectively, we often talk about our motives as wants, needs, drives, or desires.

In our day-to-day living we also often talk about being unmotivated, that is, not wanting to do something. However, when one examines these situations carefully, it usually appears that it is not so much that we are unmotivated (although it sometimes feels that way) as it is that we do not *want* to behave in a particular way. For example, a student might say "I'm totally unmotivated. I can't force myself to open the book and read the chapter tonight." If 10 minutes later the same student is asked by friends to go out for pizza and beer, the formerly unmotivated student may now be motivated to engage in this alternative to study. Even though we feel totally unmotivated, it is actually the case that we are motivated to do something other than what we need to do (such as studying). So, the concept of motivation would seem best understood not as an on-again, off-again mechanism but rather as a constant flow of behavior that can be directed in many different ways (Birch, Atkinson & Bongort, 1974). Such an analysis suggests that we should be more interested in how motivation is directed first toward one behavior, then toward another than to try to analyze it as present or absent.

But from what do we derive our motivation? Let's use as a working example the hypothetical behavior of a person we will call Angie.

Angie's Problem

Angie has a problem. She is constantly anxious. As a young child, she used to get stomachaches before she performed on stage at dance recitals. As a teenager, she was moody and anxious about how others saw her. Her self-esteem could be crushed by minor comments made by friends about her looks. In college she began developing panic attacks that came on suddenly out of the blue. She became fearful that she would have an attack when she had to give presentations in class. As a result, she avoided classes that required presentations. Angie's problem is more common than you might think. Anxiety disorders are among the most common problems seen by therapists. Fortunately, today there are good ways of dealing with the kinds of problems that Angie experiences.

From a motivational point of view, we can ask what produces the kinds of anxiety experiences that people like Angie have. Research on the biology of behavior suggests that some people may have a genetic predisposition to develop certain kinds of disorders like Angie's. However, whether or not such a predisposition does get expressed often depends upon the kinds of experiences one has had. In other words, learned factors also play an important role in the development of many motives. Finally, the way in which we interpret events around us will also influence our motives. Angie's problems with self-esteem may reflect a misinterpretation on her part of how people feel about her. Given the considerations previously mentioned, a therapist might prescribe medication to alleviate some of the anxiety she constantly feels and at the same time help her relearn and reinterpret events around her by using cognitive-behavioral therapy.

The biological, behavioral, and cognitive aspects of behavior previously mentioned are a reoccurring theme throughout this text. Some motives seem best explained biologically, others appear to be primarily learned, while still others are best viewed as cognitive in nature. In addition, many motives appear to result from a combination of biology, learning, and cognition. Let us look, then, a little more closely at the concept of motivation.

The Concept of Motivation

Motivation is the concept we use when we describe the *forces acting on or within an organism to initiate and direct behavior*. We also use the concept of motivation to explain differences in the **intensity** of behavior. More intense behaviors are considered to be the result of higher levels of motivation. Additionally, we often use the concept of motivation to indicate the **persistence** of behavior. A highly motivated behavior will often be persistent even though the intensity of the behavior may be low. For example, a hungry monkey occasionally rewarded with a piece of banana for pressing a lever on a variable interval (VI) schedule (a VI schedule "rewards" a response unpredictably, constantly changing the amount of time between one reward and the next) will press the lever very presistently but at a low rate of responding. Fast responding does not pay off, but persistence does.

Does the study of behavior need a concept of motivation? One reason often suggested by both casual and scientific observation is that "something" triggers behavior. Sometimes we behave in a certain way and at other times we do not. What was different from the one time to the others? Presumably motivation was present when we behaved, but was absent (or, more correctly, a different motive was active) when we did not. The concept of motivation helps to explain why behavior occurs in one situation but not in others. To the extent that such a concept increases our ability to understand and predict behavior, the concept is useful. As readers will discover throughout this book, many psychologists have found the concept of motivation useful.

The Measurement of Motivation

As scientists, we almost never measure motivation directly. Instead we manipulate some stimulus (S) condition and then measure some behavior in the

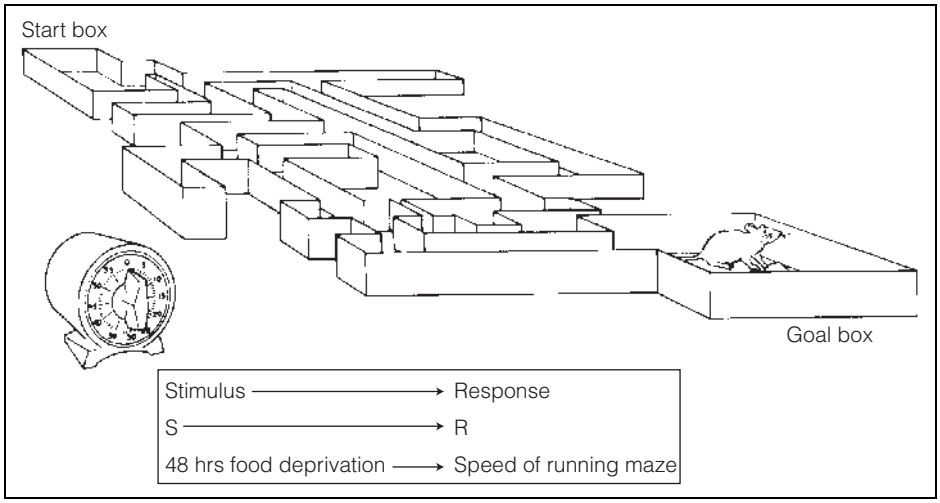

FIGURE 1.1 Stimulus-response analysis for motivation. Motivation is inferred when changes in responding follow from changes in stimulus conditions.

form of a response (R). Suppose, for example, that we take food away from a rat for 48 hours (a form of **deprivation**) as our stimulus change (S) and observe how fast that rat subsequently runs in a maze (R) in order to get food at the goal box (see Figure 1.1.). Further, suppose we observe that our rat runs faster after 48 hours of deprivation than when not deprived. In this hypothetical experiment we manipulated hours without food and measured speed of running, neither of which is motivation. Motivation, however, can be *inferred* from the change in behavior that occurred, and an indication of its strength can be observed in the rat's speed of responding in the maze. Thus the concept of motivation helps us understand the change in the animal's behavior (assuming that some other alternative cannot better explain the change), and we might label the inferred motivational state as *hunger*. The concept of motivation in this example serves as an intervening variable.* An **intervening variable** is a concept developed by a researcher that serves to link a stimulus and a response and helps to relate the two. Thus, the concept of motivation serves to link the stimulus change (deprivation) to the behavior change (increased speed of running) and provides one possible explanation for the relationship between the stimulus and response, as shown in Figure 1.2.

The intervening nature of motivational processes is one reason motivation is difficult to study. We can only infer the existence of motivation by observing changes in the relationships between stimulus conditions and responses. A second difficulty stems from the temporary nature of motivation. Psychologists typically describe the temporary nature of motivation by pointing out that motivation is a **performance variable**. When enough motivation is present, behavior is performed; when motivation is too low, behavior is absent. Motivation as a performance variable is often contrasted with learning, where more permanent changes in behavior occur (although learning obviously also influences performance). We learn

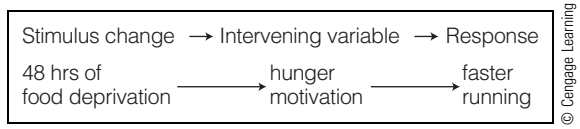

FIGURE 1.2 Motivation as an intervening variable.

*A *variable* is any factor that can have more than one value; for example, we can be a little hungry, moderately hungry, or ravenously hungry.

many things that are not immediately demonstrated in behaviors, but the demonstration of learned behavior depends, at least in part, upon adequate motivation. Indeed every specialty area within psychology analyzes situations that involve the combination of specific processes and the performance of these processes in behavior.

Characteristics of Motivation

We have discussed motivation as if we knew what it is. As noted earlier, each of us has some intuitive feeling for what is called motivation, and yet it has proven rather difficult to define. Kleinginna and Kleinginna (1981), for example, gathered 102 defining or criticizing statements concerning motivation, so it is obvious that theorists differ in their views of motivation. Though textbooks on the topic differ somewhat in their definitions, one commonly held characteristic of motivation is its activating properties.

Activation

The activating property of motivation, or **activation**, is most easily seen in the production of behavior. Is the observed organism behaving in some way? If it is, then at least some minimal amount of motivation is assumed to be present. If no overt behavior is observed, then the motivational level of the organism may be insufficient to trigger behavior. While the occurrence of overt behavior is generally taken as evidence for motivation, its absence does not necessarily mean that no motivation is present. For example, consider a rabbit that freezes when a predator appears. Is the rabbit unmotivated by the presence of this threat? Probably not. In fact, while overt behavior may be virtually absent in this situation, behavioral indexes such as heart rate, adrenaline output, and so forth would probably be high. The moral is clear—though motivation is considered to be behaviorally activating, the behavior activated may not always be overt. We must therefore be very cautious in assuming a lack of motivation when no overt responding is apparent; perhaps we are simply not measuring the response or responses being activated. Fortunately, for many motivational states, changes in motivation do lead to changes in overt behavior.

A second characteristic often mentioned in regard to the activating properties of motivation is persistence. Hungry animals persist in their attempts to get food. Similarly, humans often persist in behaving in particular ways even when the chances of success are vanishingly small. Observation of this continued persistence has led many psychologists to regard it as an index of motivation. This index, however, is also not free of problems. How persistent a behavior is depends at least in part on what alternative behaviors are available. Suppose, for example, that a hungry monkey has been taught to press a lever for food. For several hours each day, the monkey is placed in an experimental chamber that contains only the lever. Of course the monkey does not have to press the lever, but there is little else for it to do, and if lever pressing has been learned, it will tend to persist. On the other hand, suppose the monkey is placed in a chamber where several different responses in addition to lever pressing are possible. If these alternative responses lead to different outcomes (e.g., a peek out a window or a sip of a sweet-tasting fluid), lever pressing may become less persistent. In multiple-response situations (as often occur in naturalistic situations) continued persistence probably does accurately reflect motivational strength, but, as Beck (1983) points out, motivational research has not typically examined persistence in situations where more than one response is possible. Thus, although persistence does seem to be one index of motivation, it is important to realize that other factors may also contribute to the persistence of behavior.

Both casual observation and laboratory research suggest that energetic behavior is more motivated than hesitant behavior. One rat that runs faster than another through a maze may also be more motivated. Such an hypothesis is more likely to be true if we also know that the two rats differ in how hungry they are but not in how well they have

learned to run the maze. **Vigor** of responding, then, is another characteristic typically associated with the presence of motivation. But, as with the other characteristics we have examined, vigorous responses do not always mean high motivation. It is possible, for example, to teach a rat that the correct response to obtain food is to push down a lever with a certain amount of force. Suppose that we designed an experiment where hungry rats had to press the response lever with a good deal of force for food pellets to be delivered. If someone were to observe these "forceful" rats, he or she might conclude that the rats were highly motivated as they banged away at the response lever. However, in this instance the observer would be wrong because the vigorous responding would not index motivation alone; factors such as learning to respond forcefully would also be involved.

Overt responding, persistence, and vigor are characteristics of the activation properties of motivation, assuming that other factors can be ruled out and are, under appropriate conditions, reasonable indexes of the presence of motivation. Activation is usually considered one of the two major components of motivation; however, Birch, Atkinson, and Bongort (1974) suggest that the activation of behavior should not be a major concern of motivational analyses because organisms are continuously active. These researchers propose that motivational analyses should examine the conditions that lead the organism to change from one activity to another. In other words, the *directionality* of behavior is what is important.

Direction

When we are hungry we go to the refrigerator, and when we are thirsty we go to the water faucet. How do we decide to direct our behavior in one way rather than another? Questions of this type involve a consideration of which mechanism (or mechanisms) directs behavior. Although the specific way in which this directionality is achieved is debated by theorists, many psychologists have argued that motivation is involved. **Directionality**, then, is often considered an index of motivational state. The direction that a particular behavior takes is usually obvious, as in going to the refrigerator when we are hungry; however, when several choices are possible, directionality is sometimes not so clear. Suppose that we have two bottles, each filled with a solution of water and sucrose (table sugar) but with different concentrations. Will a rat be more motivated by one of the two concentrations? To determine which is the more motivating, we would run a **preference test**. The rat is given the opportunity to lick fluid from either bottle, and we measure the amount consumed. If we were to conduct such a test, we would discover that the rat preferred the more concentrated sugar solution (Young & Greene, 1953), and we would have some evidence that more concentrated solutions of sucrose are more motivating. In some situations, preference testing is the best way to determine which of several alternatives is most motivating because indexes such as persistence or vigor may not indicate differences. Indeed, Beck (2000) considers preference to be the most basic motivational index.

The Study of Motivation: Categories of Analysis

As you proceed through the chapters of this text, you will discover that motivation has been studied from many different points of view. In general, we can order these views along at least four dimensions, each containing points representing opposing views, as shown in Figure 1.3. Although these dimensions overlap in some respects, the following analysis attempts to provide a framework within which the student can understand these differing points of view. Certainly other frameworks are possible.

Nomothetic versus Idiographic

Research may be classified as falling along a continuum that proceeds from strictly nomothetic approaches at one extreme to strictly idiographic approaches at the other. The **nomothetic approach** involves the development of general or

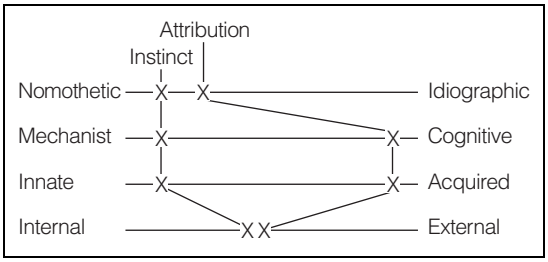

FIGURE 1.3 Categories of analysis. Four dimensions along which analysis of motivation may differ. As shown, motivation from an instinctive perspective is nomothetic, mechanistic, innate, and in response to both internal and external cues. Motivation from the point of view of attribution theory is nomothetic, cognitive, acquired, and also in response to both internal and external cues.

universal laws (*Merriam-Webster Online Dictionary*). Typically, research of this type studies groups of people or animals and determines how they are *similar*. For example, identifying brain structures such as the hypothalamus that are involved in motivation is nomothetic because research has shown that the hypothalamus is involved in motivation not only in a single rat but also in rats in general and people too. Further, it is often assumed that the general rules uncovered by studying one species will also apply to other species. Although this assumption is sometimes incorrect and is always open to critical review, the nomothetic approach attempts to discover general laws applicable to the widest range of situations. In the study of motivation the nomothetic approach predominates. In opposition to nomothetic analyses is the **idiographic approach**, which proposes that we can understand behavior by looking at how people differ from each other, that is, by examining those properties that make each person *unique*. In motivation, the idiographic approach is most clearly seen in the humanist and actualization theorists (see Chapter 11).

Innate versus Acquired

Psychologists have debated for over l00 years the contribution that innate versus acquired tendencies make to behavior, and motivation, as a specialty area within psychology has not escaped this contention. Early theorists such as McDougall (reprinted in Russell, 1970) and James (1890) saw motivation as primarily controlled by innate motives they termed **instincts**. Although these early approaches did not last, modern research on the innate components of motivation is being pursued by animal behaviorists, ethologists, and evolutionary psychologists. During the mid-20th century, psychology was dominated by research on the factors involved in learning. Theorists and researchers have studied how behavior is acquired, and much of what has been discovered is also applicable to the acquisition of motive states. Perhaps the most important motivational notion to develop from this work was the concept of incentive motivation. We will examine incentive motivation in Chapter 6; suffice it to say here that analyses emphasizing both innate and acquired motives continue today.

Internal versus External

Another dimension along which motivation may be studied concerns the source of the motivation—that is, internal versus external sources of motivation. One prevalent approach has involved the idea that different motive states can be conceptualized as needs that, when active, promote behaviors to reduce those needs. **Needs** are usually viewed as internal sources of motivation that activate and direct behavior to items in the environment that alleviate some state of deprivation. In this context, needs are often couched in physiological terms (e.g., the need for food and water or the avoidance of pain) although some theorists also include social and psychological needs within their frameworks (see, for example, Lewin, 1936, 1938). In contrast to needs theorists, others emphasize external sources of motivation provided by **goals**. These theorists generally examine the motivating effects of either various goal objects or social relationships. According to this point of view, motivation can be activated by changes in the external environment. For example, helping behavior often depends upon the number of other people present.

Research has shown (see Chapter 9) that the presence of other people often inhibits helping responses.

Mechanistic versus Cognitive

How do the processes that control motivation work? Are they blind and mechanical, triggered automatically by changes in internal or external states, or are they controlled by rational, purposive thought? As you can probably guess, theorists have forcefully defended both sides. Some theorists argue that motives such as hunger, thirst, and sex are triggered automatically by changes in factors such as blood sugar level, fluid balance, and hormonal concentrations. Other researchers point out that learned motives may also generate behavior outside of awareness. This mechanistic approach assumes that changes in specific factors activate circuits that in turn motivate the organism to engage in behavior. Neither conscious awareness nor intent on the part of the organism is assumed. Researchers who embrace the mechanistic view are often interested in internal need states and innate patterns of behavior. In contrast, other researchers, more often interested in externally motivated states and acquired motives, believe that motivational processes are cognitive in nature. The cognitive approach assumes that the manner in which information is interpreted influences motive states. For example, attributing failure at a task to its difficulty is likely to have a different influence on future motivation than attributing failure to lack of ability. The complexity of motivation is such that it is probably safe to assume that all approaches mentioned have some validity. In certain situations, behavior seems best understood as motivated by internal states that activate the organism to respond in genetically determined ways. Other behaviors seem clearly the result of external information that is acted upon in light of acquired experiences. Various combinations of approaches fit our observations of still other behaviors. To summarize, at this time *no one approach would appear to be better than any other in explaining motivation in its entirety*. Some approaches explain particular motive states better than others; however, depending on the motive studied, the best explanation may be nomothetic or idiographic, innate or acquired, internal or external, mechanistic or cognitive, or some combination of these.

Levels of Analysis

Before closing this discussion of the ways in which motivation is analyzed, we should mention the different levels at which it may be studied. Because motivation cuts across so many specialty areas within psychology, the number of levels (and sublevels within levels) at which it is studied is quite large. For the sake of brevity, we will group these various levels into the four main categories of physiological analysis, individual analysis, social analysis, and philosophical analysis.

Physiological Analysis

Though physiological analyses of motivation have been conducted using both humans and animals, research with animals is the most prevalent. Typically, this level of analysis is concerned with the brain's control of motivated states. Researchers, for example, are interested in the various brain structures involved in the triggering of motivation, the way in which motivationally important information is processed by groups of cells, and the neurotransmitters within the brain that are involved in the alteration of motivational states. Thus we can identify many sublevels within the physiological analysis of motivation.

Studies of the role of the nervous system in motivation often require electrical, chemical, or surgical manipulation of carefully mapped brain areas. For example, in a now classic study conducted in 1954 by James Olds and Peter Milner, thin wires called **electrodes** were introduced into various parts of a rat's brain. These electrodes were designed so that portions of the brain could be stimulated electrically by the experimenters.

The experimental situation was so arranged that if the rats pressed a lever current would be applied to the electrode. To everyone's amazement,