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**RICHARD M.  
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≡ The Oxford Handbook of  
**HUMAN  
MOTIVATION**

# The Oxford Handbook of Human Motivation

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# The Oxford Handbook of Human Motivation

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Richard M. Ryan

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Peter E. Nathan  
Editor-in-Chief  
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Richard M. Ryan, Ph.D., is a widely published researcher and theorist in the areas of human motivation, development, and well-being, with over 250 articles, chapters, and books. He is codeveloper (with Edward L. Deci) of Self-Determination Theory, an internationally researched theory that has been applied in hundreds of studies within areas such as development, education, work, relationships, medicine, psychical activity, and cross-cultural psychology. Ryan is also an award-winning teacher and researcher who has given addresses in over 60 universities worldwide. He is a Fellow of several professional organizations, including the American Psychological Association and the American Educational Research Association, and is an Honorary Member of the German Psychological Society. He has been a visiting scientist at the Max Planck Institute, a James McKeen Cattell Fellow, a Leverhulme Fellow, and recipient of other grants and awards. Recent research interests include the effects of intrinsic and extrinsic life goals on well-being; mindfulness and self-regulation; vitality; motivation in health care, education, and virtual environments.

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# Introduction

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# Motivation and the Organization of Human Behavior: Three Reasons for the Reemergence of a Field

Richard M. Ryan

## Abstract

The fact that behavior is typically active, organized, and goal oriented represents one of the wonders of animate nature. Nonetheless, the organization and integrity of behavior can be disrupted by social contexts, implicit primes and motives, or by biological factors. There has been a strong resurgence in empirical research on these topics, as well as recognition of the potency of psychological factors. Three reasons for this resurgence of interest in the psychology of human motivation are reviewed in detail: (1) the theoretical depth and interdisciplinary nature of the field; (2) methodological innovations that have opened up new avenues of inquiry, and (3) the practical importance of motivation research as a translational science and for improving individual and community wellness through empirically supported interventions. Contributions within this volume are illustrative of all these factors, manifesting interdisciplinary depth, sophisticated methods, and practical applicability.

**Key Words:** motivation, organization, goals, regnant causes, implicit motives

The most salient and noteworthy feature of the behavior of animate entities is that it is *organized*. The actions of living things reflect a directed coordination of functions and processes toward specific ends. That behavior sequences are typically coherent and internally regulated, and thus demonstrate equifinality and adaptability is one of the great wonders of our science. It is also the central focus of the field of motivation.

This *Oxford Handbook of Motivation* is concerned in particular with human motivation, with all the complications that topic entails. Like that of other organisms, human behavior betrays an internal organization, actively operating within its environment, and employing layered, interacting functions and processes. Humans are clearly motivated, goal-directed, creatures. They seek out specific ends, ranging from concrete goals such as obtaining food and shelter to abstract ones such as developing a sense of meaning or attaining aesthetic ideals. Sometimes

people's motivation is explicit and conscious; at other times behavior is clearly energized and directed by nonconscious, implicit aims and attitudes. Finally, whether motives are implicit or explicit, the behavior organized by them will be variously successful. Effective motivation requires not only arousal or energy but also guidance by an affective and cognitive system that, at least for most of us, is susceptible to distraction or depletion. The authors represented in this handbook collectively address all of these facets and dynamics of human motivation, grappling with the multiple ways in which the integral organization of motivated action is maintained, as well as how *akrasia*, or motivational breakdowns, occur.

This timing of this *Handbook* is particularly apt, given that human motivation is being more intensively studied today than ever before. Broad, empirically based theories of motivation (many of the major ones represented within this volume) are again on the ascendance, influencing thinking

across disciplines, domains, and applications of the behavioral sciences. I say “again” because the field of motivation has seen some rises and falls in its brief history.

In the early 20th century, motivational theories were the major organizing forces within both experimental and applied psychologies. Theorists of motivation such as Tolman (1932) and Hull (1943) on the behavioral side, and the formulations concerning motivation within psychodynamic camps (e.g., Freud, 1962/1923; Hartmann, 1939) spawned considerable empirical research that was integrated and interpreted through these paradigms. Yet following White’s (1959) seminal review of the inadequacies of both behavioral and psychodynamic drive theories to explain active exploration, curiosity, and other phenomena associated with motivation, learning, and development, some major shifts happened within the discipline, and for many experimentalists, motivation faded as a focus of inquiry.

On the behavioral side, even before drive theories were stumbling, the cognitive revolution was beginning to supplant them. Indeed, Hilgard (1987) argued that cognitive approaches had presented a worldview in which questions of motivation as posed within drive theories were effectively “dead.” In the cognitive tradition issues of motivation could be addressed in terms of acquired valences or preferences, attributions, and expectancies, all used to predict the direction and persistence of behavior. Indeed, I believe if Tolman were alive today he would feel vindicated in seeing the reliance of behavioral theorists on those “hypothetical” intervening variables that stand between the environment and manifest behavior.

Without tracing the history of this movement, it is no accident that this volume contains a very significant set of contributions that derive from the cognitive traditions within psychology, in particular the chapters on the topic of goals. As discussed by Murayama, Elliot, and Friedman (Chapter 12, this volume), *goals* can be defined as a form of regulation that guides behavior in the service of specific aims. Goals, they argue, help the individual to focus attention and to protect responses compatible with one’s motives. This definition suggests how closely goals and motivation can be tied, insofar as goals are in many ways the servants of motives. For example, in Chapter 13, Gollwitzer and Oettingen demonstrate how explicitly set goals, especially when accompanied by specific implementation plans, enhance the likelihood that one’s intentions reach fruition. In contrast, Aarts and Custers (Chapter 14) marvel at

the power of motivated but nonconscious goals to entrain and direct behavior. Freund, Hennecke, and Mustafić (Chapter 16) distinguish between process and outcome-focused goals and the differential dynamics and influence of these goals across the life span. In all these cases motivation and goals are distinguished but interactive.

Alongside these cognitive/goal theories, frameworks concerned with fundamental motivations have also rearisen in the past two decades to be among the most actively researched topics in psychological science. These motivational theories replace, in a certain sense, the old drive theory accounts of Hull and Freud with a different set of “drivers.” Rather than tracing motives to drive reduction these theories look to the evolved and acquired psychological needs and motives of individuals. Thus, within terror management theory (TMT; see Kesebir & Pyszczynski, Chapter 4, this volume) the dynamic driver of most behavior is *anxiety reduction*. People are motivated to pursue cultural goals and projects that help them feel esteemed and avoid awareness of vulnerability and mortality. Self-determination theory, on the other hand, focuses on intrinsic motivations and the basic psychological needs that support them as being fundamental to active behavior (see Deci & Ryan, Chapter 6). Sedikides and Alicke (Chapter 17) argue for self-esteem as a central motivational force, driving behaviors across cultures. These and other broad theories within this book thus look to psychological needs as giving rise to cognitive goals and the actions they guide.

As the examples illustrate, there is clearly a renewed energy surrounding the study of goals and motivation. There are many reasons for this, but three are especially worth elaboration: (1) the theoretical and multidisciplinary depth of motivational questions; (2) the methodological innovations in both quantitative and experimental tools that have facilitated exploration of motivational phenomena; and (3) the obvious practical and social importance of motivation research, with its utility as a translational, applicable science. Each shall be considered in turn.

### **Reason 1: The Theoretical Depth and Interdisciplinary Nature of Motivation Studies**

The study of motivation drills at core foundational issues in the science. As stated earlier, what is most amazing about the behavior of organisms is the fact that it is spontaneously organized: It is both energized and directed. This is evident in what

Tolman (1932) understood to be the purposive nature of organisms, as they evidence effort, equifinality, and adaptive intelligence toward specific ends. The principles and mechanisms through which this occurs, as well as the conditions that support or thwart these spontaneous capabilities, are critical problems for scientists at all levels of behavior analysis, from physiological to cultural. Motivation is a problem unique to life scientists. Indeed it is the organized nature of actions that separates the life sciences from the physical sciences, where organized, purposive, behavior does not occur, and where entropy is the dominant force (Mayer, 1997). Instead, in the life sciences, and in the understanding of human behavior, the core interest is in discovering the bases of the negentropic, coherent, and integrated efforts of individuals as they pursue specific goals and outcomes.

Within this *Handbook* we see the problem of motivated, organized behavior viewed through multiple perspectives, including evolutionary (see Bernard, Chapter 22), physiological (e.g., Gendolla, Wright, & Richter, Chapter 24), neurological (Reeve & Lee, Chapter 21), cognitive (e.g., Carver & Scheier, Chapter 3), phenomenological/experiential (e.g., Jackson, Chapter 8), and cultural (e.g., Sedikides & Alicke, Chapter 17), among others. At each level of analysis there are basic scientific questions concerning the processes that instigate and support versus disrupt or deplete motivational processes. In fact, the volume illustrates that motivation can be meaningfully studied through multiple levels of description and causal models.

Speaking of multiple levels or types of causality might give some scientists pause, particularly if they view the issue of causation reductively or narrowly. But it is clear that when it comes to motivation there is rarely if ever a singular cause at work. Rather, actions can be depicted best as outcomes of a set of determinative processes that can be described through various levels of analysis and theoretical models. One level of inquiry does not supplant or have epistemological priority over the others, but each has a different type of explanatory power and relevance to specific concerns and questions. Moreover, motivation is itself a phenomenon that resists simple reductionism, because an inventory of components and their functions does not by itself explain their emergent orchestration and directedness.

What shifts in scientific and practical discourse is not the plausibility, but the relevance, of different levels of analysis as explanations, making some causal analyses more regnant than others (Ryan & Deci, 2006). Regnant causes are those deemed most

significant or functionally relevant to a problem, thus providing the most satisfying explanation of events. Many causally relevant analyses can be “correct” without being pertinent, or regnant in this sense. Indeed, rather than competing, each type of explanation and analysis must coordinate, even as some rightfully predominate because of their pragmatic utility or value.

### *The Unique Place of Psychological Theory*

Causal explanations can operate at the level of physical/material causes, as well as at the level of cognitive, emotional, and social constructs as theorized and measured with the tools of psychology. Although some scientists early in the 20th century eschewed abstract or formal variables like those so frequently used in psychology, most all contemporary philosophers of science embrace them and acknowledge their necessity (Curd & Cover, 1998).

Psychological models of motivation, which make up the bulk of the current volume, operate on the level of inferred constructs, intended to capture the forces at work in energizing and directing action. Causal models at this level of analysis can be a particularly important point of entry into describing and predicting motivated behaviors. If one wants to intervene in intentional behaviors (e.g., dietary habits, work practices, physical activity and exercise), knowing the types of feedback, significant cognitions, meanings, and perceived social contexts that support or thwart these behaviors provides considerable leverage. Because the sources of variance accounting for molar behavior are so readily captured by the constructs and “causes” studied by psychologists, they represent among the most regnant levels of analysis for many human behaviors.

James (1892) clearly recognized this special power and utility of psychological theory, describing it as a science of “practical prediction and control” which when realized would represent “an achievement compared with which the control of the rest of physical nature would appear comparatively insignificant” (p. 148). Ok, perhaps astrophysicists would not agree! Nonetheless, the extent to which psychological interventions can impact important behaviors, from health maintenance to learning, is impressive. It is perhaps for this reason that psychological variables such as needs, goals, attributions, and perceptions even supply the target or criterion variables upon which other levels of analysis are often focused.

In addition to considerations of prediction and control, the psychological analysis of actions is also semantically meaningful in a way mere physical



descriptions could never be. As Kauffman (2000) underscored, “compared to a hypothetical ‘complete’ physical description, the action-and-doing description picks out the relevant features with respect to the goals of the autonomous agent” (p. 126). Kaufmann further maintained that, once we are at the level of creatures that can have internal models of, and plans for, the future, we “seem to have arrived at a level of organization in which action and goal talk becomes essential” (p. 126). This is just to say again that reductionism is often a misplaced language game, in which the most important features of a situation are obscured rather than highlighted. In this regard, psychological explanations are not only often the most causally regnant, they also often make the most sense among explanations.

The fact that in this field we can plumb multiple levels of analysis from the molecular to the social and seek to coordinate them with psychological phenomena reflects the dynamic nature and complexity of motivation. The field thus befits the scientific ideal of *consilience* (Wilson, 1999) in which multiple levels of analysis mutually inform and constrain the problems in focus. Because science is inherently systematic, and totalizing, coordination between levels of analysis, or consilience, is logically demanded. Furthermore, in this reciprocal coordination the constraints, contours, and limits of prediction within any given level of analysis become apparent.

*Theoretical depth leads to a richness and diversity of frameworks.* The volume opens with chapters summarizing what are among the most vibrantly researched and integrative theories of human motivation on the current stage. They collectively attest to the multiple deep psychological accounts of human motivation that are supported by empirical research. Each of these theories was in fact selected for this volume because it represents a framework that is organizing significant scientific and scholarly inquiries around the globe, and often in multiple disciplines.

For example *social cognitive theory*, as developed by Bandura (1986) and described in this volume by Schunk and Usher (Chapter 2) emphasizes the idea that human learning and behavior are largely shaped by social environments, including the reactions and approval of others. As they observe and interact within social-cultural contexts, individuals learn about their own efficacy as well as the contingent consequences of specific behaviors. They then act in accordance with their beliefs about their capabilities and the expected outcomes of actions. Social cognitive theory is thus a broad and widely applied

view, which depicts human nature as relatively open to social and cultural conditioning and learning. It also emphasizes the importance of feelings of efficacy and competence, and how any factors that diminish that psychological experience undermine the subsequent probability of motivated action.

*Control theory* is presented in Chapter 3 by Carver and Scheier. They would likely not, when speaking technically, call their framework a theory of motivation, but rather a cybernetic model of behavior regulation. Yet in the editor’s view, it needed to be included here anyway. Their influential perspective has generated more than three decades of careful research on goals and their successful, and unsuccessful, enactment. In terms of motivation, control theory interprets goal-directed action as reflecting a hierarchy of feedback processes that regulate behavior. In this model, affect and emotions are understood as both generated and intensified or dampened as an aspect of regulation, providing another set of feedback processes. This model leads to both expected and surprising predictions—among them that when we are feeling particularly good we are more likely to reduce effort on a task and “coast.”

In Chapter 5 Scholer and Higgins discuss *regulatory focus theory*, first introduced by Higgins (1997), and consider two fundamental motivational systems: the promotion system and the prevention system. The theory is introduced largely in terms of individual differences—of the benefits and trade-offs faced by people who are *prevention oriented* (i.e., vigilant and security focused) versus *promotion oriented* (i.e., eager and accomplishment seeking). The former are highly sensitive to change and more oriented to “oughts” and “shoulds”; the latter are more interested in change and growth, and are oriented toward pursuing ideals. These distinct orientations have different adaptive value as a function of context, as Scholer and Higgins review, and each can mobilize approach or avoidance behaviors. The theory also assumes an underlying motivation for people to experience *regulatory fit*—that is, behavior that is consistent with their prevention or promotion orientation. Regulatory focus theory thus presents intersecting principles that afford a specificity of predictions concerning people’s emotions and motivation in different situations.

*Terror management theory*, presented here by Kasebir and Pyszczynski, is a broad theory of human meaning and values derived from both existentialist reflections on death anxiety and the work of Ernst Becker, who once argued that the task of a unified science should be “the incessant implementation of

human well-being” (Becker, 1968, p. xiii). TMT argues that our personal goals and cultural activities are mainly focused on self-esteem maintenance, which in turn serves as a buffer from awareness of mortality. Defense against the anxiety associated with death is thus in the TMT view a principal driving force of symbolic and cultural activities, and the generation of meanings and purposes. TMT has harnessed experimental techniques to assess attitudes and motivations following mortality salience events, with results that suggest that people are indeed often acting out of nonconscious defensive attempts to stave off existential threat. TMT challenges the view of humans as conscious and rational beings, showing instead that underlying ultimate concerns can in some individuals automatically activate complex, and sometimes defensive, behaviors and attitudes.

This *Handbook* also contains a chapter on *self-determination theory* (SDT). Although presented here by Ed Deci and myself, the theory represents the efforts of a diverse yet cohesive community of scholars from around the world with interest in this perspective. SDT envisions an active, assimilative, and dynamic human nature, supported or thwarted in its basic psychological needs. In fact, SDT posits a specific human nature, one that thrives under conditions of support for competence, autonomy, and relatedness, and yet becomes defensive, reactive, and compliant under conditions of need deprivations or thwarts. The assumption of universal basic needs has been both descriptively and experimentally generative, addressing phenomena such as the undermining effect of controlling rewards, the characteristics that make an activity intrinsically motivated, the processes that facilitate greater internalization and integrated regulation of extrinsic motivation, and the reasons materialism leads to unhappiness. SDT has thus been broadly applied in domains from work, education, psychotherapy, and medicine to sport, play, and entertainment.

Outside of broad-based theories this volume also contains reviews of theory and research on specific motivational processes and phenomena that have big implications. For example, Chapter 7 by Muraven addresses a phenomenon that has captured the interests of dozens of experimental social psychologists for over a decade—namely *ego depletion*. Muraven, who is an originator of the ego-depletion concept and model, examines the myriad factors associated with the self-control of behaviors that require effort and drain human energies. Ego-depletion effects bear on the multiple ways that the human intentions and goal pursuits are vulnerable to *akrasia*, and

thus his chapter has broad relevance to both theories and practical models of motivation.

In Chapter 10, Silvia tackles that most important of motivational forces for development and learning, namely *curiosity*. He discusses curiosity as both an evolved feature of human nature, and as a motivational process that is strongly affected by social contexts and supports. Similarly, Renninger and Su take on the topic of personal *interests*—reviewing both the development of those abiding passions and investments that define us as individuals, and the factors that sustain them. Patall, in Chapter 15, reviews and integrates the vast literature on choice as it relates to motivation. She looks at the evidence that choice facilitates sustained motivation over time through enhancing commitment to actions; and how choice can entail costs, from cognitive load to cultural conflicts. Finally, in a quite unique chapter (Chapter 18) Roberts and Waters consider the issue of gender as it relates to motivation and interpersonal relationships. They specifically are concerned with objectification as an influence on women, and its costs for both their motivated performance and well-being. These topical reviews integrate an array of empirical findings on motivational processes and raise critical questions for continued research.

In short, the theoretical chapters in this volume represent some of the most important organizing frameworks in the science of motivation today. Each of these explanatory frameworks shifts out a distinct yield of predications, laws, and applications that are broadly influencing the scientific and applied communities. Looking across this collection, I am reminded here of the words of pioneer psychologist Robert S. Woodworth, who once stated about psychological schools of thought that: “Every school is good, though no one is good enough” (Woodworth, 1948, p. 255).

## **Reason 2: Methodological Innovations and the Resurgence in Motivation Studies**

Although the romantic view of the development of new knowledge is that it is the product of individual insight and genius, many of the recent insights in the field of motivation were made possible less by individual genius and more by new and better tools for exploration. Explorers in a dark cave get farther when someone provides a better headlamp.

Among these new tools, several deserve to be highlighted as playing particularly strong roles in advancing the science of human motivation: Statistical advances in structural equation modeling, multilevel modeling, and growth-curve analysis;

experimental advances in the measurement and priming of implicit motivational processes; and new interfaces linking biology and neuropsychology to psychological models of behavior.

### ***Changes in Statistical Methods***

One of the characteristic features of behavioral science is its frequent use of statistical inference in the development of laws and principles. Although there are clearly limits to inductive-statistical explanations of events (see classic work by Hempel, 1965), the probabilistic and multidetermined nature of human behavior makes such methods essential tools of behavioral science. Yet these statistical tools themselves have traditionally had limitations in what they could describe, and what covariances and patterns could be detected. For example, the classical ANOVA approach to data restricts our imagination to what accounts for mean changes in a given variable, rather than trajectories, patterns, or intra-individual variability in change.

Recent methodological advances in quantitative analysis have thus lent new excitement to the field. In particular, *multilevel modeling* methods (e.g., Raudenbush & Bryk, 2002) have allowed investigators to look not only at how individuals differ from one another in motives and goal, but also at how and why an individual waxes and wanes in various motives and behavioral regulations across time or situations. Most every classical question in the field was originally posited as a “between persons” issue; yet for most of us personally and practically the core concern is at a “within-person” level of analysis, or what leads to rises and falls in motivation within individuals over time, settings, or events. Describing change over time, and what components of motivation remain stable or vary intra-individually becomes increasingly critical as we examine trajectories during or following critical events or planned interventions. These new tools have thus allowed us to at least begin to overcome the limitations of a cross-sectional psychology (see Lazarus, 2003) that hampered the study of motivation for so long.

### ***New Experimental Methods and the Study of Implicit Motivation***

Current experimental methods are allowing researchers to investigate previously underexplored phenomena, including the ubiquitous influence of nonconscious motivations. Clearly a great deal of human behavior is not consciously driven. We have many habitual and overlearned behaviors that can be performed without intention or conscious control.

But beyond habits, research suggests that much of the time our actions are being selected or sustained based on motivational dynamics of which we are unaware. Our attitudes and motives can be, to different degrees, *implicit*. Of course, as Westin (1998) points out, this is something long clear within psychodynamic circles, but there is a new vigor in experimental studies regarding this topic.

Many of the methods underlying recent research on nonconscious motivational processes build off of the idea of accessibility, in which reaction times are used to estimate how activated a motive or attitude is for a person. Related to the issue of activation are priming methods, in which motives or attitudes are potentiated by exposure to, or “priming” of, strongly associated constructs, thereby enhancing the accessibility of, and thus the likelihood of enacting, specific motives or goals (e.g., see Aarts, Custers, & Holland, 2007). Activating or priming a motive or goal can set in motion a rich network of cognitive, affective, and behavioral processes that provide both energy and direction (i.e., motivation) outside of conscious awareness. In fact, people’s behavior can frequently be prompted by goals primed by situational elements of which they are not aware but that nonetheless make certain motives more accessible than others. Chapter 14 by Aarts and Custers in this volume provides an excellent review of some of these methods, along with considerable evidence that well-organized behaviors not only can be, but frequently are, under “unconscious control.”

This strong renewed interest in nonconscious motivation has also opened up a dynamic new area of investigation where we can look not just beyond self-report, but at the interface of conscious (and reportable) and nonconscious motives, as Chapter 9 by Thrash, Maruskin, and Martin in this volume reviews. As they point out, as methodological refinements have occurred, correlations between implicit and explicit measures of motives and attitudes have increased, and these refinements have helped clarify more systematic individual and situational variations in implicit/explicit discrepancies. Such discrepancies, in turn, appear to be related to both developmental and proximal factors, and to predict well-being and motivational outcomes.

At the same time as studies impress us with the potential of nonconscious processes to organize intentional behaviors, the same methods allow researchers to demonstrate how individuals can exert tremendous regulatory control over their own actions. Thus, research has shown, for example, how people high

in mindfulness and autonomy (see Deci & Ryan, Chapter 6, this volume), or in an implemental rather than deliberative phase of action (see Gollwitzer & Ottengren, Chapter 13) are more resilient in the face of depletion effects, threats, and challenges as they pursue goals. This is true even with respect to regulating implicit processes, which some can manage through volitional processes (e.g. Legault, Green-Demers, Grant, & Chung, 2007; Niemiec et al., 2010). Ironically, it seems, the very focus on the influence of non-conscious motivations over behavior has made salient the specific strengths and resources that allow some individuals to override such influences and more effectively pursue consciously endorsed goals.

### ***Toward a Life Science: Beyond Reductionism to Coordinated Analyses***

Robust advancements in methods have also been evident in a new synergism between biological and psychological inquiry. Methods such as functional magnetic resonance imaging (fMRI) allow us to link brain processes with specifically activated motives and inhibitions, clarifying the mechanics behind behavioral dynamics (see Chapter 21 by Reeve and Lee). More accurate physiological models of cardiovascular functioning allow better gauging of effort, and thus the study of its dynamics and determinants (e.g., Gendolla, Wright, & Richter, Chapter 24). In the area of coping, assays of cortisone and other biologic indicators also allow us to better gauge human reactivity, stress resources, and estimate the likelihood of goal success as a function of different sources of motivation. Finally, studies of how the physiological effects of diet and activity impact mood and motivation (see Chapter 23 by Thayer) show the import of biological factors on vitality and functioning.

As with statistical enhancements, these observational advances in the biological sphere, especially as they are linked with constructs of psychological interest, have tremendous promise for refining theory. The fact of the matter is that psychological processes are themselves *embodied*. The different constructs studied within social sciences must therefore map to distinct patterns of activation (Ryan, Kuhl, & Deci, 1997). Such mapping is not an acceptance of physicalism, but rather reflects integrative science rather than reductionism, and helps pave the “two-way street” that Reeve and Lee depict between neurosciences and psychology. More important, it facilitates tests of theory, harnessing biology to advance relevant psychological models, providing new avenues for examining covariations with external, social, and

genetic influences. This is again congruent with the idea of consilience and the principle that all levels of analysis must be capable of coordination.

### **Reason 3: Practical Importance of Motivational Science as a Core Translational and Applied Discipline**

Perhaps just as crucial to the resurgence of the field of motivation as these scientific advances is a renewed appreciation of its practical importance. As any good dialectical materialist might have predicted, it is probably more because motivation matters on the bottom line—for productivity at work, learning in schools, and adherence within clinics—than because it is of inherent intellectual or scientific interest that it is at the forefront of our thinking. Given that the most important societal goals require human energy and commitment to be actualized, motivation may in fact be the most critical applied topic of our field. Indeed, even for discoveries in other sciences to be applied, motivation represents a core *translational science*, because it addresses what must occur for new knowledge, products, or inventions to be adopted and actively used.

Chapters in this *Handbook* speak to myriad important applications of motivation theory. Indeed, reviewed in this volume are chapters on topics where motivation is clearly a central concern, including work (Grant & Shin, Chapter 28), education (Wigfield, Cambria, & Eccles, Chapter 26), psychotherapy (Holtforth & Michalak, Chapter 25), and exercise and sport (Hagger, Chapter 27; Weis, Ambrose, & Kipp, Chapter 29). Moreover, because motivation is so richly an interpersonal matter, also included is a section on motivation in relationships, which contains work on parenting (Pomerantz, Cheung, and Qin, Chapter 19), close relationships (Gable & Prok, Chapter 20), gender and objectification (Roberts & Waters, Chapter 18), and self-protection in the context of social comparisons (Sedikides & Alicke, Chapter 17). What one sees in each of these review chapters is a generative framework that not only is advancing the basic science but is also helping to translate that science into practices that yield better human outcomes from the workplace to the playground. These chapters, applied to everyday concerns and settings, make clear the extent to which motivation theories and research are organizing and informing significant practical activities and interventions in multiple fields of human endeavor.

The word *motivated* is not a complex term. It simply means “to be moved.” Although human bodies can be physically moved by many forces, it is those

animating energies that organize purposive action that are illuminated by the authors in this volume. And they are shedding light on phenomena that are not only of great practical concern to most of us but also represent one of the central scientific mysteries in our universe.

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PART 2

General Theories of  
Human Motivation

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# Social Cognitive Theory and Motivation

Dale H. Schunk and Ellen L. Usher

## Abstract

Social cognitive theory is a theory of psychological functioning that emphasizes learning from the social environment. This chapter focuses on Bandura's social cognitive theory, which postulates reciprocal interactions among personal, behavioral, and social/environmental factors. Persons use various vicarious, symbolic, and self-regulatory processes as they strive to develop a sense of agency in their lives. Key motivational processes are goals and self-evaluations of progress, outcome expectations, values, social comparisons, and self-efficacy. People set goals and evaluate their goal progress. The perception of progress sustains self-efficacy and motivation. Individuals act in accordance with their values and strive for outcomes they desire. Social comparisons with others provide further information on their learning and goal attainment. Self-efficacy is an especially critical influence on motivation and affects task choices, effort, persistence, and achievement. Suggestions are given for future research directions.

**Key Words:** social cognitive theory, vicarious processes, symbolic processes, self-regulatory processes, goals, self-evaluations of progress, outcome expectations, values, social comparisons, self-efficacy

## Introduction

*Motivation* refers to the process whereby goal-directed activities are energized, directed, and sustained (Schunk, Pintrich, & Meece, 2008). Contemporary cognitive theories of motivation postulate that individuals' thoughts, beliefs, and emotions are central processes that underlie motivation. These cognitive perspectives stand in contrast both to early views that linked motivation with individual differences in instincts and traits and to behavioral theories that viewed motivation as an increased or continued level of responding to stimuli caused by reinforcements or rewards.

In this chapter we provide an account of motivation from the perspective of social cognitive theory. *Social cognitive theory* emphasizes the idea that much human learning and behavior occur in social environments.

By interacting with others, people learn knowledge, skills, strategies, beliefs, rules, and attitudes. Through their observations and interactions with others, individuals also learn about the appropriateness, usefulness, and consequences of behaviors. People act in accordance with their beliefs about their capabilities and the expected outcomes of actions.

Although there are different social cognitive perspectives on motivation, this chapter focuses on Bandura's (1977b, 1986, 1997, 2001) social cognitive theory of psychological functioning. Bandura's theory underscores the key roles of vicarious, symbolic, and self-regulatory processes in human learning and behavior. This social cognitive framework often is employed by researchers to explore the operation and outcomes of cognitive and affective processes hypothesized to underlie motivation.



The next section describes the conceptual framework of social cognitive theory to include the key roles played by vicarious, symbolic, and self-regulatory processes. Some key social cognitive motivational processes are discussed, including goals and self-evaluations of progress, outcome expectations, values, social comparisons, and self-efficacy. A separate section is devoted to discussing *self-efficacy*, or one's perceived capabilities for learning or performing actions at designated levels (Bandura, 1977a, 1997), given its centrality to learning and motivation. We conclude the chapter with suggestions for future research.

**Conceptual Framework**

This section discusses the conceptual framework of social cognitive theory. Of particular importance are the following: reciprocal interactions among personal, behavioral, and social/environmental factors; the differences between enactive and vicarious learning; the distinction between learning and performance; and the roles of vicarious, symbolic, and self-regulatory processes in psychological functioning.

**Reciprocal Interactions**

A central tenet of Bandura's (1977b, 1986, 1997, 2001) social cognitive theory is that human behavior operates within a framework of *triadic reciprocity* involving reciprocal interactions among three sets of influences: personal (e.g., cognitions, beliefs, skills, affect); behavioral; and social/environmental factors. This reciprocal network is illustrated in Figure 2.1.

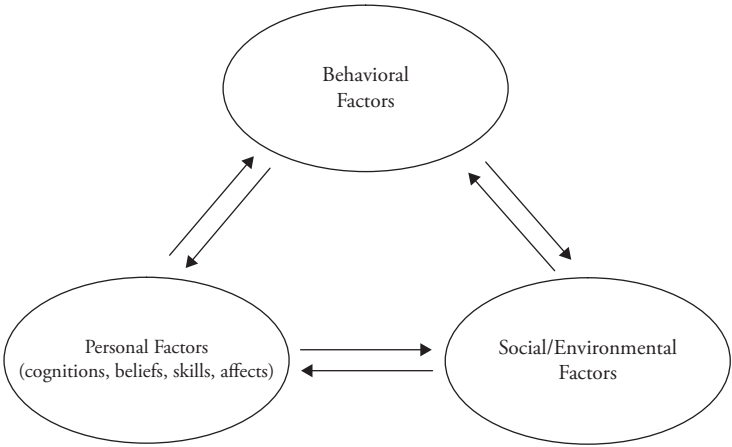
These reciprocally interacting influences can be demonstrated using self-efficacy as the personal

factor. With respect to the interaction of self-efficacy and behavior, much research shows that self-efficacy influences achievement behaviors such as task choice, effort, persistence, and use of effective learning strategies (person → behavior; Schunk & Pajares, 2009). These behaviors also affect self-efficacy. As students work on tasks and observe their learning progress, their self-efficacy for continued learning is enhanced (behavior → person).

The link between personal and environmental factors can be illustrated with students with learning disabilities, many of whom hold low self-efficacy for performing well (Licht & Kistner, 1986). Instructors in such environments may base their reactions to these students on perceived attributes about the students (e.g., low skills) rather than on students' actual capabilities (person → social/environment). In turn, environmental feedback can affect students' self-efficacy, such as when a teacher tells a student, "I know you can do this" (social/environment → person).

The link between behaviors and environmental factors is seen in many instructional sequences. Environmental factors can direct behaviors, such as when a teacher points to a display and says, "Look here," which students do without much conscious effort (social/environment → behavior). Students' behaviors can alter their instructional environments. When teachers ask questions and students give incorrect answers, teachers are apt to reteach the material rather than continue with the lesson (behavior → social/environment).

Social cognitive theory reflects a view of human *agency* in which individuals are proactively engaged in their own success and development (Schunk &



**Fig. 2.1.** Reciprocal interactions in social cognitive theory.

Pajares, 2005). These beliefs allow individuals to exert a large degree of control over their thoughts, feelings, and actions. In reciprocal fashion, people affect and are influenced by their actions and environments. But the scope of this reciprocal influence is broader than individuals because they live in social environments. *Collective agency* refers to people's shared perceived capabilities of accomplishing tasks as a group. As is true with individuals, groups also affect and are influenced by their actions and environments.

### ***Enactive and Vicarious Learning***

In social cognitive theory, learning occurs *enactively* through actual doing and *vicariously* through observing modeled performances (e.g., live, filmed, symbolic; Bandura, 1977b). Enactive learning involves learning from the consequences of one's actions, which can inform and motivate. Actions convey information about the accuracy or appropriateness of one's behaviors. People rewarded for their actions typically understand that they are performing well, whereas punishments signal behavioral inappropriateness. Individuals tend to be motivated to learn and perform behaviors that they believe will have desirable consequences and to avoid learning behaviors that they believe will be punished.

Much human learning occurs vicariously and therefore does not require actual performance by learners. Vicarious learning offers an efficient alternative to learning via direct experience. Humans would be hopelessly inefficient if their involvement were required for all learning. Vicarious learning also saves people from undesirable consequences. Observing or reading about safety techniques saves individuals from acting in potentially dangerous ways. As with enactive learning, observers are motivated to learn actions that lead to successes. People attend to successful models who demonstrate actions that they believe will benefit them (Schunk, 1987).

Learning of complex skills typically occurs both enactively and vicariously. By observing teacher models, students may learn some aspects of a complex skill. As students practice the skills, teachers provide feedback and corrective instruction as needed. Through observation, practice, and feedback, students learn skills and enjoy greater success.

### ***Learning and Performance***

Unlike older behavioral theories, social cognitive theory distinguishes new learning from performance of previously learned actions (Bandura, 1977b). The

distinction is not apparent with enactive learning because persons demonstrate what they have learned. But vicarious learning may not be demonstrated until sometime after the modeled behavior occurs. Whether learning results in changed performances depends on factors such as learners' motivation, interests, incentives to perform, perceived needs, physical conditions, social pressures, and competing activities.

Students learn many new skills, strategies, and behaviors, only some of which they may demonstrate at the time of learning. Because teachers are responsible for ensuring that students learn, they assess student learning in various ways (e.g., tests, quizzes, assignments, homework). The assumption is that students will demonstrate what they have learned; however, this may not always happen. Able students who are motivated to be socially accepted by their peers may not demonstrate the full range of their learning so that they appear more in line with their classmates' competencies. Authentic assessments that take various forms can help teachers accurately gauge students' learning.

### ***Vicarious, Symbolic, and Self-Regulatory Processes***

Bandura's (1986) social cognitive theory stresses the idea that people possess capabilities that distinguish them as humans and motivate them to strive for a sense of agency. Among the most prominent of these are vicarious, symbolic, and self-regulatory processes.

#### ***Vicarious Processes***

The capability for learning vicariously allows individuals to acquire beliefs, cognitions, affects, skills, strategies, and behaviors, from observations of others in their social environments. As noted earlier, this capability saves people time over what would be required if all learning had to be demonstrated at the time of learning. This capability also allows people to regularly shape their lives, because they select environmental features (e.g., individuals, materials) to which they want to attend. Thus, students who want to become teachers enroll in education programs and put themselves in situations where they can learn vicariously, such as by attending classes, observing and working with classroom teachers, and reading books and other materials. The models in individuals' environments serve as important sources of information and motivation. This section discusses the relevance of vicarious processes for learning and motivation.

TYPES OF VICARIOUS PROCESSES

Bandura (1986) distinguished three types of vicarious processes: response facilitation, inhibition and disinhibition, and observational learning (Table 2.1). *Response facilitation* refers to modeled actions that serve as social motivators for observers to act in the same fashion. Response facilitation effects are common in everyday life. An individual walking down a street who encounters a group of people looking in a store window may be motivated to stop and look in the window.

Response facilitation effects do not represent learning because people already know how to perform the actions. The behaviors of others motivate observers' actions. There is evidence that response facilitation effects can occur without conscious awareness (Chartrand & Bargh, 1999).

*Inhibition and disinhibition* effects result from models strengthening or weakening observers' tendencies to act in given ways. Inhibition can happen when models are punished for their actions, whereas disinhibition can result when models perform threatening or prohibited actions without negative consequences. Classroom misbehavior may be disinhibited when students observe other students misbehaving without being reprimanded by the teacher; a sudden reprimand may inhibit further misbehavior.

Like response facilitation, inhibition and disinhibition represent motivational effects on behavior, not new learning. A difference between these two categories is that, whereas response facilitation involves behaviors that are socially acceptable, inhibition and disinhibition typically involve actions that have moral or legal implications (e.g., breaking rules) or involve strong emotions (e.g., fears).

*Observational learning* through modeling occurs when observers perform behaviors that they had not learned prior to exposure to the models (Bandura, 1969). Observational learning has four component processes: attention, retention, production, and motivation.

Observational learning requires that observers attend to relevant features so that they can be perceived. Certain features of models and situations

command better attention. Observers are more motivated to attend to models who have status and credibility, such as teachers. Task features can affect attention, such as when teachers use bright colors, oversized features, and interactive materials. Attention also is affected by observers' beliefs about the functional value of the modeled behaviors. Modeled activities that observers believe are important and likely to lead to desirable outcomes motivate them to pay attention. Students' attention should be raised when teachers provide verbal markers, such as when they announce that the material they are about to cover will be on a test.

Retention involves cognitively organizing, rehearsing, coding, and transforming information for storage in memory. Relative to the other processes of observational learning, social cognitive theory devotes less attention to this process. Theorists and researchers in the information processing tradition have addressed this aspect in depth (Matlin, 2009).

The third process—production—involves translating cognitive conceptions of modeled actions into behaviors. Especially with complex behaviors, it often is the case that observers will learn only some features. Learners refine their skills through practice and feedback that may include additional modeling.

Motivation is a key process in observational learning because onlookers are more apt to attend to, retain, and produce those modeled actions that they believe are important. People are selective; they do not learn or perform everything that they observe. Rather, they attempt to learn those actions that they believe will lead to desirable outcomes and help them attain their goals, and they avoid those actions that they believe will result in dissatisfying outcomes. As they observe the actions of others, people form expectations about different outcomes, which are based on their observations of models and their own experiences. Their learning and performances are based in part on these expectations.

MODEL CHARACTERISTICS

Researchers have investigated the characteristics of effective models. For example, perceived similarity between models and observers can affect modeling (Schunk, 1987). Similarity in important ways serves as a source of information for determining behavioral appropriateness, forming outcome expectations, and assessing one's self-efficacy. Age similarity between model and observer is important for gauging behavioral appropriateness but

Table 2.1. Types of Vicarious Processes

• Response facilitation
• Inhibition/disinhibition
• Observational learning

less so for actual learning, which is enhanced more by models whom observers believe are competent. When competence and age similarity do not match (e.g., younger model is more competent than a same-age model), children are swayed more by the competent model. Peers can be effective models when children hold self-doubts about their learning or performance capabilities. Viewing a similar peer successfully perform a task may raise observers' self-efficacy and motivate them to learn because they are apt to believe that if the model could learn, they can as well (Schunk, 1987).

Model gender can influence modeling by conveying information about task appropriateness. In general, observing a same-gender peer model perform a behavior without negative consequences conveys that the action is appropriate. Model gender is less important in learning academic skills and strategies (Schunk, 1987).

Researchers have also explored the effects of exposing students to mastery and coping models (Schunk, 1987). Mastery models demonstrate faultless performance from the outset. Coping models initially have difficulty learning skills but through effort gradually improve their skills and eventually perform as well as mastery models. Research shows that children who have experienced previous learning difficulties may benefit more from observing coping models (Schunk & Hanson, 1985). Such children may perceive themselves as more similar in competence to coping models, which can raise their self-efficacy and motivation for learning.

Viewing one's own performances, or *self-modeling*, can facilitate learning and motivation. In a study by Carroll and Bandura (1982), adults viewed models performing a motor skill, then attempted to reproduce it. Performances of some learners were taped and learners were allowed to watch this concurrent visual feedback while performing. Visual feedback given before learners had formed a mental model of the skill had no effect on performance; however, once learners had formed such a mental model, the visual feedback enhanced their production of the skill. The self-modeled feedback presumably helped to reduce discrepancies between learners' mental models and actual performances.

Observational learning is enhanced when modeled displays contain explanations and demonstrations (*cognitive modeling*). Schunk (1981) compared the effects of cognitive modeling with those of didactic instruction on children's long-division self-efficacy and achievement. Children who lacked division skills received instruction and practice over

sessions. Cognitive-modeling children observed an adult model explain and demonstrate division solution strategies while applying them to problems. Didactic-instruction children received written instructional material that explained and demonstrated the operations. Compared with didactic instruction, cognitive modeling promoted division achievement and accuracy of perceived division capabilities (i.e., self-efficacy was better aligned with actual skills).

### ***Symbolic Processes***

In addition to their capability for vicarious learning, individuals possess the capacity for symbolic representations, which involve language, mathematical and scientific notation, iconography, and cognition, and which help people adapt to and alter their environments (Bandura, 1986). They use symbolic processes to interpret actions and outcomes in their lives and to guide their future actions. Because of the human capacity to symbolize, people do not simply react to events in their lives but rather generate new courses of actions for solving problems. Symbolic processes also foster communications with others (e.g., in person, on the phone, electronically, in writing), which lead to further learning.

### ***Self-Regulatory Processes***

Social cognitive theory assigns a prominent role to self-regulatory processes (Bandura, 1986; Zimmerman, 2000). *Self-regulation* refers to the processes that individuals use to personally activate and sustain behaviors, cognitions, and affects, which are systematically oriented toward the attainment of goals (Zimmerman, 2000). Prior to embarking on a task, people set goals and determine which strategies to use. They then regulate their behaviors to conform to their internal standards and goals. As they work on tasks, they assess their progress toward their goals and decide whether to continue or alter their strategies. During breaks and when tasks are complete, they reflect on their experiences, seeking to make sense of them and to determine what their next steps should be. As they reflect on what they have done, their beliefs that they have learned and made progress strengthen their self-efficacy and motivate them to continue learning. We elaborate on these motivational processes next.

### **Motivational Processes**

The preceding sections show how observational, symbolic, and self-regulatory processes can have motivational effects on individuals. Among the most

**Table 2.2. Key Social Cognitive Motivational Processes**

• Goals and self-evaluations of progress
• Outcome expectations
• Values
• Social comparisons
• Self-efficacy

critical are goals and self-evaluations of progress, outcome expectations, values, social comparisons, and self-efficacy (Table 2.2). These processes are covered in the following sections.

**Goals and Self-Evaluations of Progress**

*Goals*, or what people are consciously trying to attain, involve important symbolic and self-regulatory processes that people use to instigate and sustain actions. Initially, people must make a commitment to attempt to attain goals because goals do not affect behavior without commitment (Locke & Latham, 2002). As persons work on a task, they compare their current performance with their goals. Positive self-evaluations of progress strengthen self-efficacy and sustain motivation. A perceived discrepancy between present performance and the goal may create dissatisfaction, which can raise effort. Goals motivate people to expend effort necessary and persist at the task (Locke & Latham, 2002). Greater effort and persistence typically lead to better performance. Goals also help to direct people’s attention to relevant task features, behaviors to be performed, and possible outcomes, and they can affect how people process information.

Although goals are important motivational processes, their effects depend on their properties: specificity, proximity, and difficulty. Goals that include specific performance standards are more likely to activate self-evaluations of progress and enhance motivation and learning than are general goals (e.g., “Do your best;” Bandura, 1986). Specific goals indicate the amount of effort needed to succeed, and evaluating progress toward specific goals is straightforward. Goals also are distinguished by how far they project into the future. Proximal, short-term goals enhance motivation and learning better than do distant, long-term goals, because it is easier to determine progress toward goals that are closer at hand (Bandura & Schunk, 1981).

Goal difficulty, which refers to the level of task proficiency required as assessed against a standard,

influences the amount of effort that people expend. In general, people work harder to attain goals perceived to be difficult than goals thought to be easier; however, perceived difficulty and motivation do not bear an unlimited positive relation to one another. Goals that people believe are overly difficult do not motivate because people hold low self-efficacy for attaining them. The opposite may also be true. Although people may feel efficacious for attaining goals perceived as very easy, these goals may not motivate because people often procrastinate in attempting them.

Another distinction can be made between learning and performance goals. A *learning goal* refers to what knowledge, behavior, skill, or strategy students are to acquire; a *performance goal* refers to what task students are to complete. These goals can have differential effects on achievement behaviors (Anderman & Wolters, 2006). Learning goals focus students’ attention on processes and strategies that help them acquire competence and improve their skills. Focusing on knowledge and skill acquisition motivates behavior and sustains attention to important features. Students in pursuit of a learning goal are apt to feel self-efficacious for attaining it and be motivated to expend effort, persist, and use effective learning strategies. Self-efficacy is substantiated as they work toward their goal and assess their progress (Schunk, 1996).

In contrast, performance goals focus attention on completing tasks. They may not highlight the importance of the processes and strategies underlying task completion or raise self-efficacy for learning. As students engage in a task, they may be less likely to determine their progress by comparing their present and past performances. Performance goals can lead to social comparisons with the work of others to determine progress. These comparisons can lower self-efficacy among students who experience learning difficulties, which adversely affects motivation and learning.

Research supports these hypothesized effects of learning and performance goals (Anderman & Wolters, 2006). For example, Schunk (1996) conducted two studies in which elementary children with low fraction skills received instruction and practice on fractions over sessions. Children worked under conditions involving either a goal of learning how to solve problems or a performance goal of merely solving them. In the first study, half of the students in each goal condition completed a self-evaluation at the end of each instructional session in which they evaluated their progress in



learning to solve the types of problems covered during that session. The learning goal with or without self-evaluation and the performance goal with self-evaluation led to higher motivation, self-efficacy, and achievement. In the second study, all students evaluated their learning progress at the end of the last instructional session. The learning goal led to higher motivation and achievement outcomes than did the performance goal.

Schunk and Ertmer (1999) conducted two studies with college undergraduates as they worked on computer projects over sessions. Students received a goal of learning computer applications or a goal of performing them. In the first study, half of the students in each goal condition evaluated their learning progress midway through the instructional program. The learning goal led to higher self-efficacy, self-judged progress, and self-regulatory competence and strategy use. The opportunity to self-evaluate progress promoted self-efficacy. In the second study, students in the self-evaluation condition assessed their progress after each instructional session. Frequent self-evaluation produced comparable results when linked with a learning or performance goal. These results suggest that infrequent self-evaluation of one's progress complements learning goals, but multiple self-evaluations can outweigh the benefits of learning goals and raise motivation and achievement outcomes.

### **Outcome Expectations**

*Outcome expectations* are beliefs about the expected outcomes of actions. They can refer to external outcomes, such as "If I study hard, I should do well on the test." They also can refer to internal outcomes (e.g., "If I study hard, I will feel good about myself"), and to progress in learning (e.g., "If I study hard, I will learn more"). People form outcome expectations about the likely consequences of given actions based on personal experiences and observations of models (Bandura, 1986; Schunk & Zimmerman, 2006). Outcome expectations are a source of motivation. Individuals act in ways they believe they will be successful and attend to models whom they believe will teach them valued skills.

Outcome expectations can sustain behaviors over long periods when people believe their actions will eventually produce desired outcomes. Students who hold a sense of self-efficacy for succeeding and believe that their actions will result in positive outcomes are motivated to continue working even when progress occurs slowly. Conversely, those whose self-efficacy is weaker may, when they encounter difficulties,

work lackadaisically or give up readily. This situation can be demotivating; students may believe that positive outcomes will result but that they personally lack the self-efficacy to motivate themselves to continue. For example, they may believe that if they studied hard they would do well on the test, but they may doubt their self-efficacy to study hard.

Shell, Murphy, and Bruning (1989) obtained evidence of the influential role of outcome expectations. College students completed measures of self-efficacy and outcome expectations for reading and writing, as well as reading and writing achievement tests. For the self-efficacy assessment, students judged their competencies for performing various reading and writing tasks. For the outcome expectation measure, students judged the importance of reading and writing skills for achieving life goals, such as getting a job, being financially secure, and being happy.

Self-efficacy and outcome expectations related positively to achievement in both domains, although the relations were stronger for reading than for writing. In both domains, self-efficacy related more strongly to achievement than did outcome expectations, although the latter results were significant and added to the prediction of achievement. This study also found that self-efficacy and outcome expectations in each domain related significantly to achievement in the other domain, which suggests that improvements in students' self-efficacy and outcome expectations in one literacy area may generalize to other areas.

### **Values**

*Values* are individuals' perceptions of the importance and utility of learning and acting in given ways. The role of values in motivation has been explored extensively by achievement motivation researchers (Eccles, 2005; Wigfield & Eccles, 2002; Wigfield, Tonks, & Eccles, 2004). Values enter prominently in a social cognitive account of motivation (Bandura, 1997). People who value attaining a sense of agency believe that they can exert a significant degree of control over important elements in their lives and are motivated to do so.

Individuals act in ways to bring about the outcomes they value and avoid actions leading to outcomes that are inconsistent with their values. They are motivated to learn when they deem that learning in a given area is important. Students who value mathematics may do so for various reasons, such as because they want to become mathematics teachers or because they believe that mathematics has many

uses in everyday life. Valuing mathematics may lead them to take more mathematics courses and expend greater effort to succeed.

Investigations by achievement motivation researchers have shown that values and expectancy beliefs such as self-efficacy relate positively to students' achievement. When both expectancy beliefs and values are used to predict achievement, expectancy beliefs are significant predictors, whereas values are not. In contrast, values are better predictors of students' intentions to take future courses and actual enrollment in those courses than are expectancy beliefs (Wigfield & Eccles, 2002). Thus, values seem most important as contributors to individuals' choices, which are key motivational outcomes.

### ***Social Comparisons***

Given its emphasis on learning from the social environment and reciprocal interactions among personal, behavioral, and social/environmental variables, social cognitive theory underscores the importance of *social comparisons*, which refer to the process of comparing ourselves with others (Wheeler & Suls, 2005). Although people often compare their performances with objective standards, they also socially evaluate their capabilities, especially when objective standards are unclear or unavailable. Comparisons indicating that one is improving or more competent than others can raise self-efficacy and motivation; comparisons that result in negative self-evaluations can diminish these outcomes.

The most accurate self-evaluations arise from comparisons with others whom people believe are similar to themselves in the particular ability or characteristic being evaluated. The more alike observers are to models, the greater the probability that similar actions by observers will produce comparable results (Schunk, 1987). Model-observer perceived similarity in competence can improve learning (Braaksma, Rijlaarsdam, & van den Bergh, 2002). Observing similar others succeed can raise observers' self-efficacy and motivate them to try the task. Similarity may be especially influential with persons who have experienced difficulties and possess self-doubts about performing well.

Although social comparisons can motivate individuals, their effects are not automatic. Among elementary school children, Schunk (1983a) found that providing children with social comparative information about how their performances compared with those of others promoted their motivation but that pursuing goals enhanced their self-efficacy. Giving children both goals and comparative information led

to the best learning. Schunk (1983b) showed that difficult goals raised children's academic motivation more than easier goals, that persuasive self-efficacy feedback (e.g., "You can work 25 problems") raised self-efficacy more than feedback indicating how children's performances compared to those of peers, and that difficult goals plus persuasive feedback led to the highest achievement.

The effects of social comparisons on self-efficacy and motivation depend on the abilities of the comparison peers. Guay, Boivin, and Hodges (1999) found that the relation between children's perceived competence (analogous to self-efficacy) and achievement was stronger when best friends' achievement was low than when it was high. Students' social comparisons with close friends' achievement may make students' own performances look worse than they really are. In contrast, children may assess their capabilities more accurately when they have low-achieving friends because they rely less on social comparison and more on objective assessments of their progress and performances.

Thus, it seems that social comparisons can enhance motivation but not necessarily self-efficacy or learning. Social comparisons that focus students on the accomplishments of similar and average peers imply that they, too, are average and therefore have no reason to feel highly self-efficacious. Self-efficacy may decline when students socially compare themselves to high-achieving peers. Self-efficacy and motivation may benefit more from providing students with objective information indicating that they are making learning progress without referring to peers' accomplishments.

### ***Self-Efficacy***

Self-efficacy is a critical variable affecting learning and motivation (Bandura, 1997). This section discusses how individuals develop and alter their self-efficacy, the consequences of self-efficacy, research on self-efficacy in achievement situations, and collective self-efficacy.

### ***Sources of Self-Efficacy Information***

People acquire information to assess their self-efficacy from four primary sources: their mastery experiences (interpretations of actual performances), vicarious (modeled) experiences, forms of social persuasion, and physiological indexes (Bandura, 1997; Table 2.3). One's actual performances constitute the most reliable information because they typically are interpreted as tangible indicators of one's capabilities (Schunk & Pajares, 2009; Usher & Pajares, 2008b).

**Table 2.3. Informational Sources of Self-Efficacy**

• Mastery experiences (interpretations of actual performances)
• Vicarious (modeled) experiences
• Forms of social persuasion
• Physiological indexes

Successful performances raise self-efficacy, whereas failures may lower it, although an occasional failure or success after many successes or failures should not have much impact.

The influence of actual performances on self-efficacy depends on numerous circumstantial factors such as task difficulty, effort expended, aid received, and preconceptions of one’s capabilities (Bandura, 1997). Consequently, the cognitive interpretations of the results of one’s actions, not the actions themselves, determine the influence of past performances on efficacy judgments. For example, meeting the minimum requirements for passing geometry may not boost the mathematics self-efficacy of a student who holds extraordinarily high personal standards and who longs to be an engineer. For another student, whose values and interests lie elsewhere, an average performance in geometry may boost self-efficacy and lead to continued motivation in mathematics classes. Failures can also serve an important function when they lead to better strategies that make self-efficacy more robust.

Individuals acquire much information about their capabilities through social comparisons with others (Bandura, 1997). Similarity to others is a cue for gauging one’s self-efficacy (Schunk, 1987). Observing similar others succeed can raise observers’ self-efficacy and motivation when they believe that if others can perform well, they can too. But a vicarious increase in self-efficacy can be negated by subsequent failure. Persons who observe similar peers fail may believe they lack the competence to succeed, which can negatively affect motivation.

In their daily school environments, students likely compare themselves to particular classmates who are engaged in similar learning activities. Surpassing one’s peers builds self-efficacy, whereas inferior performances lower it. Despite these tendencies, the influence of peer models on one’s self-efficacy cannot be reliably predetermined. A high-achieving, competitive student might get a self-efficacy boost from being outperformed by a classmate (Usher, 2009). On the other hand, a student who stands out

for superior performance among classmates might make external attributions (e.g., “I did well because the test was easy”) that leave self-efficacy relatively unchanged. Whether a vicarious experience raises or lowers self-efficacy depends on the models one selects for comparison, how similar the models are perceived to be, the models’ attitudes, and disparities between the observers’ and models’ achievement and progress.

Teaching practices can also increase the frequency with which students compare their performances to those of others. Schools create comparative structures when they group students according to academic ability levels as measured by achievement test scores or similar criteria. Such practices can send students a public message of their (in)efficacy. And because exposure to multiple skilled models sustains learning self-efficacy, students who find themselves among highly talented peers may reap long-term self-efficacy benefits, whereas those surrounded by less-skilled peers may harbor similar self-doubts. Students who internalize personal standards may be less prone to making unfavorable comparisons (Pajares, 2006).

Because of the human capacity for symbolism and forethought, people are capable of cognitively generating events that can serve as guides for action. Students are, therefore, partial creators of their modeled experiences. Through cognitive self-modeling, people are able to visualize themselves confronting and overcoming challenges (Bandura, 1997). Envisioning one’s academic success can raise self-efficacy, whereas imagining oneself failing lowers self-efficacy and can ensure the feared failure. The fact that this mode of cognitive influence has not been extensively examined need not suggest its impotence in changing self-efficacy. As William James remarked over a century ago, “The reaction due to things of thought is notoriously in many cases as strong as that due to sensible presences. It may be even stronger” (James, 1905, p. 53).

The third source of self-efficacy information on which individuals rely comes from the persuasive messages of others (e.g., “I know you can do this”; Bandura, 1997). But social persuasions must be credible for people to believe that success is attainable. Although positive feedback can raise individuals’ self-efficacy, the increase will not endure if they subsequently perform poorly (Schunk & Pajares, 2009). Factors that influence the persuasory punch of a message include source credibility, valence of the message, and frequency. A youngster’s self-efficacy is likely to suffer more from disparaging remarks than



from positive ones (Bandura, 1997). Students who hear frequent messages from multiple sources that they are incapable may come to believe that to be the case.

People are more likely to attend to social messages about their capabilities when they lack adequate knowledge of what is required to succeed in a particular domain. To be most effective and motivating, persuasive messages from others must be matched to the individuals' current skill level. Students are quick to dismiss lofty praise or empty inspirational mantras. Those who are most skilled at building students' self-efficacy couple positive feedback about students' capabilities with scaffolded tasks that build mastery (Evans, 1989).

Individuals also can acquire self-efficacy information from physiological and emotional reactions such as anxiety and stress (Bandura, 1997). Strong emotional reactions provide cues about anticipated success or failure. For example, a student who feels a crippling fear when heading to advanced chemistry may interpret that fear as a sign of personal inefficacy. When people experience negative thoughts and fears about their capabilities (e.g., feeling nervous when thinking about taking a test), those affective reactions can lower self-efficacy. On the other hand, positive affect or excitement in learning can motivate. A student who feels energized by challenging academic work likely enjoys a sense of self-efficacy for succeeding. When people notice their stress abating (e.g., feeling less anxious while taking a test), they may experience higher self-efficacy for performing well.

As we noted earlier, informational sources related to one's abilities do not affect self-efficacy automatically (Bandura, 1997). Individuals interpret the results of events, and these interpretations provide the impetus for upward or downward shifts in one's self-efficacy (Schunk & Pajares, 2009). People weigh and combine information from the various sources to form self-efficacy judgments. Many factors influence the ways in which students interpret and integrate this information when forming their self-efficacy and motivation-related beliefs. For some individuals, the accumulation of informational sources enhances self-efficacy. Other people tend to rely on information from one source more than from others. For example, in a study of the sources of academic self-efficacy among middle school students, girls and African American students seemed more attuned to social persuasions when forming their self-efficacy than did boys and White students (Usher & Pajares, 2006).

The influence of these sources of self-efficacy might also be multiplicative, in that two sources combine interactively. Students who have had few mastery experiences in a given domain may be more likely to rely on what others tell them than would students who have had ample opportunities for mastery (Usher, 2009). Beliefs in one's personal efficacy for learning might also follow a transformational experience. A meaningful individual encounter with a caring teacher might have a more profound influence on one's self-efficacy than a year's worth of school. A disparaging remark can also leave a lasting bruise on one's sense of efficacy and undermine subsequent motivation. We now turn to the many outcomes that are influenced by these important self-beliefs.

### *Effects of Self-Efficacy*

Within a social cognitive system of triadic reciprocity, self-efficacy is hypothesized to influence behaviors and environments and in turn be affected by them (Bandura, 1986, 1997). Self-efficacy exerts its influence through cognitive, motivational, affective, and selection processes. Students who feel efficacious about learning should engage in thoughts and actions that improve their learning, such as setting goals, using effective learning strategies, monitoring their comprehension, evaluating their goal progress, and creating effective environments for learning. In turn, self-efficacy is influenced by the outcomes of one's behaviors (e.g., goal progress, achievement) and by input from one's environment (e.g., feedback from teachers, social comparisons with peers; Schunk & Pajares, 2009).

Despite its benefits, self-efficacy is not the only influence on behavior. No amount of self-efficacy will produce a competent performance when individuals lack the needed skills to succeed (Schunk & Pajares, 2009). Discussed earlier was the importance of other motivating factors such as outcome expectations and values (Bandura, 1997; Wigfield et al., 2004). Even learners who feel highly efficacious about their mathematical skills will not become mathematics majors in college if they do not value a career as a mathematician, and they typically engage in activities that they believe will result in positive outcomes and avoid actions that they believe may lead to negative outcomes. Nonetheless, given requisite skills, positive values, and outcome expectations, self-efficacy is a key determinant of individuals' motivation, learning, self-regulation, and achievement (Schunk & Pajares, 2009).

Self-efficacy can have diverse effects in achievement contexts (Bandura, 1997; Pajares, 1996; Schunk & Pajares, 2009; Table 2.4). It can influence various motivational outcomes, including choice of tasks, effort, and persistence. Individuals are apt to select tasks and activities at which they feel competent and avoid those at which they do not. Self-efficacy can affect how much effort people expend on an activity, how long they persist when they encounter difficulties, and their levels of learning and achievement. People with high self-efficacy tend to set challenging goals, work diligently, persist in the face of failure, and recover their sense of efficacy after setbacks. As a consequence, they develop competence. On the other hand, those with low self-efficacy may set easier goals, expend little effort to succeed, give up readily when they experience difficulties, and feel dejected after they encounter failure, all of which negatively affect skill acquisition.

Self-efficacy also influences one's level of self-regulation (Schunk & Pajares, 2009; Zimmerman & Cleary, 2009). Those with higher self-efficacy for learning set challenging goals, employ what they believe are effective strategies, self-monitor their learning goal progress, make strategy adjustments and seek help as needed, and create an effective work environment. As formal and informal learning environments become increasingly technological, one's capabilities to minimize distractions and find reliable information are at a premium. In turn, these activities result in better performance and higher self-efficacy for continued improvement. We next highlight some specific research findings on the effects and sources of self-efficacy.

**Research Evidence**

Researchers have explored the operation of self-efficacy in various domains (e.g., education, health, business) and among individuals differing in age, developmental level, and cultural background. This research has shown that self-efficacy is a strong predictor of individuals' motivation, achievement,

self-regulation, and life decisions in diverse contexts (Bandura, 1997; Klassen & Usher, 2010; Multon, Brown, & Lent, 1991; Pajares, 1997; Schunk & Pajares, 2009; Stajkovic & Luthans, 1998).

For example, much research shows that self-efficacy correlates with motivation, learning, and achievement (Schunk & Pajares, 2009). Using meta-analysis, Multon et al. (1991) found that self-efficacy was related to academic performance and accounted for 14% of the variance. Stajkovic and Luthans (1998) found that self-efficacy resulted in a 28% gain in work performance. Using path analysis, Schunk (1981) found that self-efficacy exerted a direct effect on children's mathematics achievement and persistence. Pajares and Kranzler (1995) found that mathematics self-efficacy had a direct effect on mathematics performance and mediated the influence of mental ability. Self-efficacy for self-regulated learning also predicts academic motivation, achievement, and continuation in school (Caprara et al., 2008; Usher & Pajares, 2008a).

Self-efficacy relates not only to task choice but also to career choice (Betz & Hackett, 1983). Social cognitive career theorists have demonstrated that basic social cognitive variables, including self-efficacy, outcome expectations, and goals, help explain career decision making and development (Brown & Lent, 2006). As learners grow and are given more choices over their decisions and activities, they are apt to select activities that involve capabilities they believe they can develop and turn away from areas in which they have doubts. The influence of self-efficacy on career development is partly mediated by perceived effort and persistence (Schunk & Pajares, 2009).

The relation of self-efficacy to effort and persistence is not always linear. In novel learning situations, students initially do not possess skills and must expend effort and persist to succeed. As skills develop, however, students should be able to attain the same level of performance with less effort in a shorter time. When this does not happen, self-efficacy may decline. Thus, if an advanced student believes she is capable in science but suddenly must exert a herculean effort to pass physics, she might begin to rethink her pursuit of a science-related career.

In addition to documenting the effects of self-efficacy, researchers have examined the influence of the four hypothesized sources on self-efficacy development. Mastery experiences have been shown to be the most powerful and consistent predictor of self-efficacy across academic domains and age levels

**Table 2.4. Effects of Self-Efficacy**

• Motivational outcomes (task choices, effort, persistence)
• Learning
• Achievement
• Self-regulation

(Usher & Pajares, 2008b). Scaffolding instruction to provide for frequent successes offers learners many opportunities to build a sense of self-efficacy in their capabilities. The relative predictive power of the other three sources has been variable across studies. For example, in their study of the sources of academic and self-regulatory efficacy beliefs of sixth-grade students, Usher and Pajares (2006) found that girls and African American students relied on the social persuasions of others when forming their confidence, whereas this source was not a significant predictor of boys' or White students' self-efficacy. Klassen (2004) also found that Indo-Canadian students reported greater reliance on vicarious experiences and social persuasions than did Anglo-Canadian students. Investigating the importance of social messages, whether transmitted through vicarious enactment or verbal persuasion, for various groups of learners remains an important area of inquiry for understanding how efficacy beliefs take root.

Experimental research has shown that instructional and social processes that convey information to students that they are making learning progress and becoming more competent raise self-efficacy, motivation, and achievement (Schunk & Pajares, 2009). Other instructional strategies for building students' self-efficacy include having students pursue proximal and specific goals, using social models in instruction, providing social comparative information indicating competence, and having students self-monitor and evaluate their learning progress (Schunk & Ertmer, 2000). A noncompetitive classroom climate can lower students' anxiety, which can lead to a more favorable evaluation of their own capabilities (Bandura, 1997).

### ***Collective Efficacy***

Researchers have explored the operation of *collective efficacy* beliefs, or individuals' beliefs about their collective capabilities to learn or produce desired actions (Bandura, 1997). Collective efficacy perceptions are not simply the sum or average of the self-efficacy of individual group members; rather, they reflect individuals' perceptions of the capabilities of the group as a whole. In educational settings, collective teacher efficacy denotes the perceptions of the faculty as a whole to influence student outcomes (Goddard, Hoy, & Woolfolk Hoy, 2000; Henson, 2002).

The role of collective efficacy beliefs on group motivation may depend on the level of organizational coupling (Henson, 2002). In units that are

loosely knit, collective efficacy beliefs may not predict outcomes well; rather, individual self-efficacy may be a better predictor. Conversely, in more tightly knit units—such as many elementary schools—the collective efficacy beliefs of teachers may be a better predictor of the efforts of the faculty as a whole to affect student learning (Henson, 2002).

The same four sources are important for the development of collective self-efficacy: performance attainments, vicarious experiences, social persuasion, and physiological indicators. Group members rely on what they know about the capabilities of each group member, as well as the group's collective capacity, when evaluating what they can do together (Bandura, 1997). When members work together successfully to implement changes, learn from one another and from other successful groups, receive encouragement for change from supervisors and others, and work together to cope with difficulties and alleviate stress, their beliefs about what they can do will be raised (Goddard, Hoy, & Woolfolk Hoy, 2004). Individuals who believe in their group's collective capabilities will be more motivated to work on the group's behalf, implement innovative ideas, and enact systemic change.

Educational research shows that collective self-efficacy is important for teachers' job satisfaction and motivation to remain in teaching. Researchers have found that teachers' collective self-efficacy bears a significant and positive relation to their job satisfaction in various contexts (Caprara, Barbaranelli, Borgogni, & Steca, 2003; Klassen, Usher, & Bong, 2010). Relatively less research attention has been given to the collective efficacy beliefs of students. Klassen and Krawchuk (2009) showed that the collective efficacy beliefs of early adolescents working in small groups became more strongly related to the group's success on an interdependent task over time. Perceived collective efficacy also depends on group members believing that others are working on their behalf. Consistent with Bandura's (1997) contention, however, even high self-efficacy will not lead to performance changes unless the environment in which groups function provides appropriate avenues for success.

### **Future Directions**

Social cognitive theory offers a viable account of motivation, and researchers continue to test its predictions. But there remain several questions that should be addressed by investigators. In particular, research is recommended on the benefits of modeled observations, developmental appropriateness, and cross-cultural relevance.

### ***Benefits of Modeled Observations***

Individuals learn new skills and strategies by observing models. Modeled observations also motivate observers to improve their skills. In educational settings, use of models is apt to save instructional time as teachers or others can explain and demonstrate skills and strategies to be acquired. This also prevents students from learning inaccurately, as might happen if there were less structure.

Although models are important, their effects on students' self-efficacy and motivation are weaker than are those resulting from actual performance accomplishments. Researchers might explore how best to combine modeled demonstrations with learner practice to optimize motivational effects. In some situations, relatively little practice may be needed, but more is likely when skills to be learned are complex. Such research would contribute to clarifying how learners weigh and combine sources of self-efficacy information to arrive at self-efficacy judgments. For example, how is self-efficacy affected if models perform successfully but students then have difficulty when they practice? This type of research also would have instructional implications because it would suggest ways to effectively use instructional time to promote self-efficacy and motivation.

Technological innovations might facilitate this line of research. Computers and handheld devices make it possible for modeled experiences to be at students' fingertips. For example, researchers could use video recordings of models at varying skills levels to examine their influence on a diverse group of learners. An experimental design would enable varying of model characteristics such as similarity, proficiency, and degree of shared coping. Video playback of one's own performances could enhance students' ability for cognitive self-modeling as well. The changing nature and availability of technology make possible new and diverse modeling opportunities. If such videos of modeled skills prove to be effective, teachers could benefit from developing their own library of vicarious experiences for their students.

### ***Developmental Appropriateness***

Social cognitive theory emphasizes complex interactions among personal, social/environmental, and behavioral factors. This complexity leads to questions about the applicability of the theory to learners of all ages and developmental levels. For example, when assessing self-efficacy, individuals must weigh and combine information from the environment, their prior experiences, and their

perceptions of the present situation. Such complex cognitive processing may be beyond the capabilities of young children, which can diminish the predictive utility of self-efficacy. Furthermore, mentally processing information conveyed by models can be complex, as when models demonstrate problem-solving strategies.

Children can learn from observing models and make reasonably valid self-efficacy judgments (Bandura, 1986). Models for children are effective when their explanations and demonstrations are brief and restricted to specific skills. Self-efficacy assessments typically contain a restricted range of choices, and children are given practice to ensure that they understand the nature of the judgment process. Thus, although social cognitive principles are assumed to apply to learners at different developmental levels, researchers might explore what constraints developmental factors place on applying these principles.

Longitudinal designs that track changes in learners' self-efficacy and motivation over time would help researchers understand the influence of developmental stages on efficacy appraisals. Such designs could also target changes in the efficacy-related information that students perceive. Multi-level modeling techniques could help document how self-efficacy levels fluctuate among groups of students (e.g., between grades 3 and 5) and could examine predictors of individual students' self-efficacy growth trajectories. Despite the costs of conducting longitudinal research, such designs will be able to clarify important questions related to developmental shifts in the sources and effects of self-efficacy that have not been clearly answered by cross-sectional designs.

### ***Cross-Cultural Relevance***

Pajares (2007) called for a careful consideration of cultural context in the investigation of academic motivation in general and self-efficacy in particular. Because the relation between self-efficacy, other motivation variables, and achievement varies in important ways across cultural groups, researchers should use caution when generalizing research results to other contexts. As Pajares (2007) noted, "Research findings must be carefully understood as being bounded by a host of situated factors" (p. 30), which limit what is known about a given variable.

Most social cognitive research relevant to motivation has been conducted with individuals in Western societies (Klassen & Usher, 2010). Fortunately this situation is changing as researchers are testing social cognitive ideas in settings globally.



As a research topic, self-efficacy has much international appeal, with the resulting increase in research in different cultures. While cross-cultural research has yielded differences (McInerney, 2008), overall the principles espoused by social cognitive theory have shown themselves to be cross-culturally relevant. Additional investigations will determine whether the motivational processes postulated by social cognitive theory operate consistently in diverse societies.

## Conclusion

Social cognitive theory stresses learning from the social environment. The conceptual focus of Bandura's (1986) social cognitive theory postulates reciprocal interactions among personal, behavioral, and social/environmental factors. Social cognitive researchers have investigated the operation of vicarious, symbolic, and self-regulatory processes, in the various ways that individuals interact with their environments and one another.

A key point underlying social cognitive theory is that persons are motivated to develop a sense of agency for being able to exert a large degree of control over important events in their lives. Among the influential variables affecting motivation are goals and self-evaluations of progress, outcome expectations, values, social comparisons, and self-efficacy. Important questions remain to be addressed by researchers, which will further refine social cognitive theory and expand its applicability to motivation.

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# Cybernetic Control Processes and the Self-Regulation of Behavior

Charles S. Carver and Michael F. Scheier

## Abstract

This chapter describes a set of ideas bearing on the self-regulation of action and emotion that has been given labels such as cybernetic and feedback control processes. The ideas have roots in many sources, including the concept of homeostasis and attempts to create mechanical devices to serve as governors for engines. With respect to motivation, these ideas yield a viewpoint in which goal-directed action is seen as reflecting a hierarchy of feedback control processes and the creation and reduction of affect are seen as reflecting another set of feedback processes. The portion of the model devoted to affect is of particular interest in that it generates two predictions that differ substantially from those deriving from other theories. The first is that both approach and avoidance can give rise to both positive and negative feelings; the second is that positive affect leads to coasting, reduction in effort regarding the goal under pursuit. The latter suggests a way in which positive affect is involved in priority management when many goals are in existence at the same time. Recent interest in dual-process models, which distinguish between top-down goal pursuit and reflexive responses to cues of the moment, has caused us to reexamine some of our previous assumptions and to consider the possibility that behavior is triggered in two distinct ways. The chapter closes with a brief consideration of how these ideas might be compatible with other viewpoints on motivation.

**Key Words:** cybernetic, feedback loop, control theory, affect

This chapter describes several aspects of a viewpoint on the guidance of behavior that we have used throughout our careers in psychology. This viewpoint has roots in several places. One of them is the broad conception of homeostatic mechanisms, mechanisms that regulate diverse aspects of the body's physiological functioning (Cannon, 1932). Another source is ideas about mechanical governors and computing machines (e.g., Ashby, 1940; Rosenblueth, Wiener, & Bigelow, 1943; Wiener, 1948). In the middle of the 20th century, Wiener (1948) coined the term *cybernetic* (from the Greek word meaning "steersman") to characterize the overall functioning of this type of system. Cybernetic systems (whether mechanical, electronic, or living

systems) regulate some current condition so as to stay "on course." The idea that such systems underlie overt, intentional behavior as well as homeostatic self-regulation is the theme of this chapter. We amplify on this idea shortly, but first we'll provide a little more background.

Cybernetic ideas had a brief heyday in motivational psychology (broadly defined) in the 1950s through 1970s. Probably the best known example of this viewpoint was an engaging book by Miller, Galanter, and Pribram (1960). This book introduced into the psychological lexicon the acronym TOTE, which stands for test-operate-test-exit, a sequence of events that take place in a cybernetic control system. Miller et al. were not the only

people to use cybernetic concepts during this period (ideas with a similar character were proposed, for example, by MacKay, 1956, 1966; for review see Miller et al., 1960), but Miller et al. received the most attention from psychologists. To some extent this may be attributable to the fact that the operation of a TOTE unit paralleled the operation of the basic element of a computer. Computers (which were fairly new at the time) were starting to influence people's thinking about the nature of cognition. Thus, Miller et al.'s book was very much in the spirit of its time.

Today when people use the word *cybernetic*, they generally are referring either to robotics or to the World Wide Web. It is also fairly common to associate the viewpoint we describe here with the discipline of engineering, partly because of its heritage in devices that govern engines and partly because of the usefulness of control theory in engineering applications. It's important, though, to keep in mind that these ideas have ties that extend well beyond engineering. As noted earlier, they pertain additionally to the homeostatic controllers of the body. They also pertain to diverse other complex systems in nature.

Thirteen years after Miller et al.'s (1960) intriguing volume came another book that had a particularly strong impact on our thinking. This book, written by William Powers (1973), was an extremely ambitious undertaking. Powers set out to portray how human behavior might reflect a hierarchy of cybernetic control processes. That is, he tried to account for how the nervous system creates the physical movements by which intentions and even abstract values are expressed in action. At center stage in his account was the feedback loop, the basic unit of cybernetic control. Powers set out to map several layers of postulated feedback processes to aspects of the nervous system. Perhaps even more than Miller et al. (1960), Powers made a compelling case for the idea that the feedback construct was up to the challenge of accounting for the complexity of behavior. He focused not on one single loop, but on an interwoven network of loops, dealing with regulation of diverse properties simultaneously.

We adopted the Powers (1973) model as a conceptual heuristic (Carver & Scheier, 1981). It helped us interpret a literature in personality and social psychology in which we were immersed at the time (see Carver & Scheier, 2112). And it provided a reference point for us for the next 30 years. Indeed, in some ways it serves as the conceptual backbone of this chapter.

## Feedback Control

What are the elements of a cybernetic feedback control system? The term *feedback control* can seem quite forbidding. An easy point of entry into the logic behind it, however, is the goal concept, which is more intuitive. People have many goals, at varying levels of abstraction and importance. Goals energize and guide activities. Most goals can be reached in many ways, leading to the potential for vast complexity in the organization of action. This is a view that is easy and familiar for most people, and it is part of the conceptual landscape of contemporary psychology. From this view, the transition to thinking about cybernetic control is relatively straightforward.

## Feedback Processes

The basic unit of cybernetic control is the feedback loop. A feedback loop has four elements (MacKay, 1966; Miller et al., 1960; Powers, 1973; Wiener, 1948): an input function, a reference value, a comparison process, and an output. Think of the input function as perception. The input function brings in information of some sort about present circumstances. Think of the reference value as a goal. The perceived input is compared to this value, to determine whether a difference exists. A discrepancy that is detected by this comparison creates what is called an "error signal." The output function is a response to any detected error (we treat the output here as equivalent to behavior, but sometimes the behavior is an internal signal rather than a physical movement).

If the comparison detects no discrepancy, the output remains as it was. If the comparison detects a discrepancy, the effect on output depends on what kind of loop it is. There are two kinds. In a discrepancy-reducing loop (also called negative, for negating), the output acts to reduce (or eliminate) the discrepancy. Homeostatic systems are examples of discrepancy-reducing systems. For example, if a person's internal temperature sensors detect that his body temperature is elevated above "normal," processes are engaged that serve to reduce body temperature so that it returns to that reference value. Specifically, sweat would be released, which cools the body as it evaporates. If the sensors detect a deviation below normal, rather than above, the output would be shivering, which generates heat via muscle contractions.

Discrepancy-enlarging feedback loops also exist, in which the output serves not to counter a discrepancy but to enlarge it (these are also called positive feedback loops). One might think of the reference value



in this kind of loop as an “anti-goal.” Discrepancy-enlarging loops are generally believed to be less common in living systems than discrepancy-reducing loops, because they are unstable. Unless overridden, they can enlarge discrepancies without end.

Some people believe that this kind of loop is always problematic and dysfunctional (Powers, 1973). Others believe that positive loops are an important part of complex systems (DeAngelis, Post, & Travis, 1986; Maruyama, 1963; McFarland, 1971), but that in living systems (and other cases in which positive feedback is adaptive), the effect of this loop is limited in some way or other. There may be a natural endpoint (e.g., sexual arousal prompts further increase in arousal to the point of orgasm, which ends the increase). Alternatively, the discrepancy-enlarging function may be constrained by a discrepancy-reducing function. To put it differently, avoidance of one reference point can give way to approach of another reference point.

### ***Feedback Processes in Overt Behavior***

A cybernetic approach to motivation generalizes these principles to behavioral goals, in which discrepancies are reduced by overt actions (Miller et al., 1960; Powers, 1973; Toates, 2006). Negative feedback processes, as applied to overt behavior, represent the engagement of effort to reach a valued goal, maintain a desired condition, or conform to some salient standard. Goal-directed behavior entails knowing (at some level) the desired end one wants to reach, knowing what the present condition is with respect to that desired end, and being able to decide whether the present condition does or does not match the desired end. It is also necessary, of course, to be able to create actions that will cause the present condition to change in appropriate ways. However, that ability would be of little help in itself if the other functions were not also operating.

In a way, this is the essence of what a cybernetic view brings to the motivational table: It forces the realization that all of those functions are necessary for successful goal pursuit, not just the capacity to act. It forces the realization that the action occurs in service to changing the input (Powers, 1973).

The principle of positive feedback can also be applied to overt behavior. What might be called “anti-goals” for behavior are conditions that one wants to avoid. An example would be a feared or disliked possible self (Carver, Lawrence, & Scheier, 1999; Markus & Nurius, 1986; Ogilvie, 1987), which one tries hard to not-be. Another example would be a scene of public humiliation, which most people will try to avoid.

As noted earlier, discrepancy-reducing and discrepancy-enlarging loops may work in concert, and it is fairly easy to point to such compound structures in behavior. An avoidance loop tries to distance from an anti-goal. But there may exist an approach goal that happens to be incompatible with the anti-goal. If the person adopts that approach goal, the tendency to avoid the anti-goal is joined by the tendency to move toward the approach goal. The approach loop pulls the behavior into its orbit. This pattern of dual influence describes what behavioral psychologists call active avoidance. In active avoidance an organism confronting a feared stimulus picks a relatively safe location to escape to and actively approaches that location.

Social and personality psychology also have good examples of discrepancy-enlarging loops being constrained by discrepancy-reducing loops. This pattern seems represented in Higgins’s (1996) concept of the ought self (Carver et al., 1999) and in Ryan and Deci’s (2000) concept of introjected values. In both of these constructs, the initial impetus to behavior is the desire to avoid social sanction of some sort. Thus, the starting point is an effort to create distance from an anti-goal. However, a good way to avoid social sanction is to locate a socially approved value that is different from (or even opposite to) the disapproved value, and move toward it. By homing in on the positive value, one simultaneously escapes the feared or disliked value. Thus, both ought selves and introjects represent positive values to conform to, but the motivational dynamic underlying them is more complex than the dynamic underlying other positive values.

### ***Further Issues***

At least a couple more issues should be noted before we move on. One of them concerns a common misconception about the nature of feedback processes. The other concerns a somewhat disconcerting reality about the nature of feedback processes.

As was described earlier, homeostasis is a common illustration of the feedback principle, because it is so easily understood. Another common illustration is the room thermostat, which senses deviations from a set point and engages devices that counter the deviations. Because of the common use of these illustrations, some people incorrectly infer that feedback loops can act only to create and maintain steady states. Some reference values (and goals) *are* indeed static end states or stable preferred conditions (e.g., to own one’s home, to arrive at the end of the month with a balance above zero in one’s checking

account). But other reference values are dynamic and evolving (e.g., experiencing the pleasures of a month's vacation, raising children to become good citizens). In such cases, the goal for action regulation is the process of traversing the changing trajectory of the activity, not just the arrival at the endpoint. Feedback processes apply perfectly well to such moving targets (Beer, 1995).

Although the feedback loop is an abstract concept, it is not too hard to portray its elements conceptually. In some specific instances of feedback control (e.g., in artificial electronic systems), it is also easy to point to the physical existence of each element. In other instances, however, doing this is harder. In particular, some feedback loops have no explicit representation of a reference value. The system regulates around a value, but the value is not represented anywhere as a goal (Berridge, 2004; Carver & Scheier, 1999b, 2002).

### ***Levels of Abstraction***

Let us return, though, to cases with explicit reference points or goals, inasmuch as these cases are the focus of most of what we have to say. Goals vary quite considerably in how concrete or abstract they are. You can have the goal of being a good citizen, but you can also have the goal of recycling—a narrower goal that contributes to being a good citizen. To recycle entails other, more-concrete goals: placing newspapers or bottles and cans into containers and moving them to a pickup location. The fact that goals have subgoals leads to the idea that goals form a hierarchy (Powers, 1973; Toates, 2006; Vallacher & Wegner, 1987). Abstract goals are attained by the very process of attaining concrete goals that help define the abstract ones (Carver & Scheier, 1998, 1999a, 1999b, 2003).

Goals at different levels of abstraction have different kinds of characterizations. Some kinds of relatively low-level goals are defined by brief sequences of action: for example, picking up a pen or walking across the room. Such *sequences* (Powers, 1973) are fairly simple (though each can also be broken down further into subcomponents of motor control (e.g., Rosenbaum, Meulenbroek, Vaughan, & Jansen, 2001). Sequences have something of a self-contained quality about them, and they require little monitoring once they are triggered.

Such sequences can be organized into more elaborate strings of actions, which Powers (1973) called *programs*. These strings of action are more planful. They often require choices to be made at various points along the way, which depend on conditions

that are encountered at those points. Programs are the level of the Powers hierarchy that most closely resembles Miller et al.'s TOTE construct, because of the sequencing of steps and subroutines that programs contain. There is some blurring between levels, however. Programs can become quite familiar, as a result of repetition. If they become familiar enough that they are executed all at a piece without much monitoring, they probably are no longer programs but instead have become sequences.

Programs are sometimes enacted in the service of broader guiding *principles*. Principles are more abstract qualities. They can provide a basis for making decisions at choice points within programs, and they can suggest that particular programs be undertaken or be refrained from. The term *principle* refers to the sorts of qualities that social psychologists often call values (Schwartz & Bilsky, 1990; Schwartz & Rubel, 2005). What defines a principle as such is its abstractness and broad applicability to diverse behaviors. Being a principle does not in itself imply anything about what behavior results. For example, one principle leads people to support affirmative action, whereas a different principle leads people to oppose it (Reyna, Henry, Korfmacher, & Tucker, 2006).

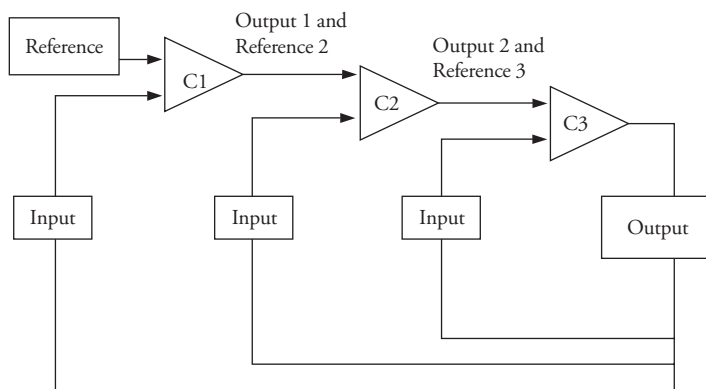
Even individual values are not the end of potential complexity and abstraction, though. Patterns of values coalesce to form the essence of a person's sense of desired (and undesired) self or a person's sense of desired (and undesired) community. These properties are very broad points of reference (goals).

### ***Hierarchy of Processes in Action***

Powers (1973) argued that, in a hierarchical organization, high-level control loops "behave" by setting and changing reference values for loops at the next lower level of control. Those loops, in turn act by setting reference values for lower levels, and so on (Fig. 3.1). At the very lowest level, the output is changes in muscle tensions. Thus, for a person to act in a way that is intended to exemplify a particular principle also requires the simultaneous involvement of all layers of control lower than the principle level.

In his statement about hierarchical organization of feedback processes, Powers (1973) devoted most of his attention to levels of abstraction that are even more basic than sequences. As personality-social psychologists, we have not found those lower levels of much direct interest. On the other hand, the argument that control of behavior relies on a single principle instantiated at multiple levels of

**Fig. 3.1.** Three-level hierarchy of feedback loops. The output from the comparison in a given loop is the reference value for the next lower level, and so on. The final (motoric) output creates a change in input that is (at varying levels of abstraction) relevant to all levels involved.



abstraction is a very interesting one, because it has a high degree of parsimony.

Knowledge of the nervous system has progressed enormously since 1973, of course, and parts of the picture that Powers created are doubtlessly contradicted by later evidence. However, the viability of the core idea that action reflects feedback processes engaged simultaneously at multiple levels of abstraction need not depend entirely on specific details.

From the point of view of personality-social psychology, goals from the ideal self down through sequences can be thought of as common starting points for self-regulation. All of them serve as classes of values to try to approximate or to deviate from. Any of them might be taken as the focal point for a given behavior (that is, the person could try to self-regulate at any of these levels). Once that value is adopted, lower levels are engaged automatically by the engagement of that one. Thus, it is easy to imagine cases in which a person is behaving according to a principle (e.g., a moral or ethical value), and it is easy to imagine cases in which the person is behaving according to a plan or program. It is also easy, however, to imagine cases in which the person is acting impulsively and spontaneously, without regard to either principle or plan. In all of these cases, the physical movements involved are being managed by systems automatically engaged by whichever level of control is in charge. Later in the chapter we reexamine this idea and consider some potentially important differences among these various levels of abstraction.

### ***Approach and Avoidance***

In some ways, the dual concepts of discrepancy-reducing and discrepancy-enlarging loops map nicely onto the general form of approach and avoidance processes. Incentives are approached by systems that close discrepancies between present conditions and

the incentives. Threats are avoided by systems that enlarge discrepancies between present conditions and the threats. The logic of feedback processes thus provides a way to think about this fundamental dichotomy among motivations, a dichotomy that plays a key role in many other ideas about motivation.

### **Feedback Processes and Affect**

Motivation is partly about how people move from one place to another. However, it is also partly about the degree of urgency behind the action. A sense of urgency or intensity implies the involvement of affect, feelings that occur in the course of experience.

What is affect? Where does it come from? Affect is positive or negative feelings. Affect is the core of the experience of emotion, though the term *emotion* often incorporates connotations of physiological changes that frequently accompany hedonic experiences. A truism is that affect pertains to whether one's desires are being met (Clore, 1994; Frijda, 1986, 1988; Ortony, Clore, & Collins, 1988). But what is the internal mechanism by which feelings arise?

### ***Mechanism***

Many different kinds of answers to this question have been offered, ranging from neurobiological (e.g., Davidson, 1992) to cognitive (Ortony et al., 1988). We have proposed an answer that focused on what appear to be some of the functional properties of affect (Carver & Scheier, 1990, 1998, 1999a, 1999b). In suggesting this answer, we used feedback control as an organizing principle. Now, however, the control bears on a different quality.

We suggested that feelings arise as a consequence of a feedback loop that operates simultaneously with the behavior-guiding loop and in parallel to it. We regard its operation as automatic. The easi-

est characterization of what this second process is doing is that it is checking on how well the first process (the behavior loop) is doing. The input for this second loop thus is the *rate of discrepancy reduction in the action system over time*. (We focus first on discrepancy-reducing loops, then consider enlarging loops.)

Consider a physical analogy. Action implies change between states. Difference between states is distance. The action loop thus controls the psychological analog of distance. If the affect loop assesses the action loop's progress, then the affect loop is dealing with the psychological analog of velocity, the first derivative of distance over time. To the degree that this analogy is meaningful, the input to the affect loop should be the first derivative over time of the input used by the action loop.

Input (how well you are doing) does not by itself create affect; a given rate of progress has different affective consequences in different contexts. We argued that this input is compared to a reference value (cf. Frijda, 1986, 1988), just as in other feedback loops. In this case, the value is an acceptable or expected rate of behavioral discrepancy reduction. As in other feedback loops, the comparison checks for deviation from the standard. If there is a discrepancy, the error signal causes a change in the output function.

We think the error signal in this loop is manifest subjectively as affect, a sense of positive or negative valence. A rate of progress below the criterion yields negative affect. A rate high enough to exceed the criterion yields positive affect. If the rate is not distinguishable from the criterion, there is no valence. In essence, the argument is that feelings with positive valence mean you are doing better at something than you need to, and feelings with negative valence mean you are doing worse than you need to (for detail see Carver & Scheier, 1998, Chapters 8 and 9). The absence of affect means being neither ahead nor behind.

A couple of clarifications about what we do *not* mean to say here: We are not arguing for a deliberative thinking through of whether rate conforms to the criterion rate. We assume that the testing is continuous and automatic. Nor are we arguing for a deliberative thinking about what the affective valence means. We assume that the meaning (i.e., being ahead versus behind) is intrinsic to the affect's valence, which itself arises automatically.

One implication of this line of argument is that the affects that might potentially exist regarding any given action should fall on a bipolar dimension. That is, it should be the case that affect can be

positive, neutral, or negative for any given goal-directed action, depending on how well or poorly the action seems to be attaining the goal.

### **Reference Criterion**

What determines the criterion? There doubtlessly are many influences. Furthermore, the orientation that a person takes to an action can induce a different framing that may change the criterion (Brendl & Higgins, 1996). What is used as a criterion is probably quite flexible when the activity is unfamiliar. If the activity is very familiar, the criterion is likely to reflect the person's accumulated experience, in the form of an expected rate (the more experience you have, the more you know what is reasonable to expect). Whether "desired," "expected," or "needed" is most accurate as a depiction of the criterion rate may depend greatly on the context.

The criterion can also change, sometimes readily, sometimes less so. The less experience the person has in a domain, the easier it is to substitute one criterion for another. We believe, however, that change in rate criterion in a relatively familiar domain occurs relatively slowly. Continuing overshoots result automatically in an upward drift of the criterion; continuing undershoots result in a downward drift (see Carver & Scheier, 2000). Thus, the system recalibrates over repeated events. A (somewhat ironic) consequence of such recalibration would be to keep the balance of a person's affective experiences (positive to negative, across a span of time) relatively similar, even if the rate criterion changes considerably.

### **Two Kinds of Action Loops, Two Dimensions of Affect**

So far we have addressed only approach loops. The view just outlined was that positive feeling exists when a behavioral system is making more than adequate progress *doing what it is organized to do*. The systems addressed so far are organized to reduce discrepancies. Yet there seems no obvious reason why the principle should not apply to systems that enlarge discrepancies. If such a system is making rapid enough progress attaining its ends, there should be positive affect. If it is doing poorly, there should be negative affect.

That affects of both valences are possible seems applicable to both approach and avoidance. That is, both approach and avoidance have the potential to induce positive feelings (by doing well), and both have the potential to induce negative feelings (by doing poorly). But doing well at *approaching an incentive* is not quite the same experience as

doing well at *moving away from a threat*. Thus, there may be differences between the two positives, and between the two negatives.

Drawing on the work of Higgins (e.g., 1987, 1996), we have argued for two bipolar dimensions of affect, one bearing on approach, the other on avoidance (Carver, 2001; Carver & Scheier, 1998). Approach-related affect includes such positive affects as elation, eagerness, and excitement, and also such negative affects as frustration, anger, and sadness (Carver, 2004; Carver & Harmon-Jones, 2009). Avoidance-related affect includes such positive affects as relief, serenity, and contentment (Carver, 2009) and such negative affects as fear, guilt, and anxiety.

### ***Affect and Action: Two Facets of One Event in Time***

This two-layered viewpoint implies a natural connection between affect and action. That is, if the input function of the affect loop is a sensed rate of progress in action, the output function of the affect loop must be a change in the rate of progress in that action. Thus, the affect loop has a direct influence on what occurs in the action loop.

Some changes in rate output are straightforward. If you are lagging behind, you try harder. Some changes are less straightforward. The rates of many “behaviors” are defined not by pace of physical action but in terms of choices among potential actions, or entire programs of action. For example, increasing your rate of progress on a project at work may mean choosing to spend a weekend working rather than playing with family and friends. Increasing your rate of being kind means choosing to do an act that reflects kindness, when an opportunity arises. Thus, change in rate must often be translated into other terms, such as concentration or allocation of time and effort.

The idea of two feedback systems functioning jointly is something we stumbled into. It turns out, however, that this idea is quite common in control engineering (e.g., Clark, 1996). Engineers have long recognized that having two systems functioning together—one controlling position, one controlling velocity—permits the device they control to respond in a way that is both quick and stable, without overshoots and oscillations.

The combination of quickness and stability in responding is desirable in many of the devices engineers deal with. It is also desirable in human beings. A person with very reactive emotions is prone to overreact and oscillate behaviorally. A person who is emotionally unreactive is slow to respond even to

urgent events. A person whose reactions are between those extremes responds quickly but without behavioral overreaction and oscillation.

For biological entities, being able to respond quickly yet accurately confers a clear adaptive advantage. We believe this combination of quick and stable responding is a consequence of having both behavior-managing and affect-managing control systems. Affect causes people’s responses to be quicker (because this system is time sensitive); as long as the affective system is not overresponsive, the responses are also stable.

Our focus here is on how affects influence behavior, emphasizing the extent to which they are interwoven. However, note that the behavioral responses that are linked to the affects also lead to *reduction of the intensity of the affects*, returning them to the set point. We thus would suggest that the affect system is, in a very basic sense, self-regulating (cf. Campos, Frankel, & Camras, 2004). It is undeniable that people also engage in voluntary efforts to regulate their emotions (e.g., Gross, 2007; Ochsner & Gross, 2008), but the affect system does a good deal of that self-regulation on its own.

### **Affect Issues**

This view of affect differs from most other theories bearing on emotion in at least two ways. One difference concerns the idea of dimensional structure underlying affect (Carver, 2001).

### ***Two Underlying Bipolar Dimensions***

In some theories (though not all) affects are seen as having underlying dimensionality (e.g., Watson, Wiese, Vaidya, & Tellegen, 1999). Our view has this character. It holds that affect generated through approach has the potential to range from positive (joy) through neutral to negative (anger, sadness); affect generated through avoidance also has the potential to range from positive (relief) through neutral to negative (fear, anxiety). Most dimensional models, however, are quite different from this one. They are unipolar. They ascribe affects with positive valence to an approach system and ascribe affects with negative valence to an avoidance system (e.g., Cacioppo, Gardner, & Berntson, 1999; Lang, Bradley, & Cuthbert, 1990; Watson et al., 1999).

There is at least some support for our view. There is evidence, albeit limited, that positive feelings of calmness and relief (as situationally relevant) relate to avoidance motivation (Carver, 2009; Higgins, Shah, & Friedman, 1997). There is far more evidence linking sadness to failure of approach (for reviews,



see Carver, 2004; Higgins, 1996). There is also a good deal of evidence linking the approach system to the negative affect of anger (Carver & Harmon-Jones, 2009). Although it is clear that diverse negative feeling qualities coalesce with one another in mood states (Watson, 2009), the evidence does not make that case with regard to situation-specific affective responses.

This issue is important, because it has implications for any attempt to identify a conceptual mechanism underlying creation of affect. Theories positing two unipolar dimensions assume that greater activation of a system translates to more affect of that valence (or more potential for affect of that valence). If the approach system relates both to positive and to negative feelings, however, this direct transformation of system activation to affect is not tenable. A conceptual mechanism is needed that naturally addresses both valences within the approach function (and, separately, the avoidance function). The mechanism described here does so.

### ***Counterintuitive Effect of Positive Affect***

A second issue also differentiates this model from most other views (Carver, 2003; Carver & Scheier, 2009). Recall our argument that affect reflects the error signal from a comparison in a feedback loop. If this is so, affect is a signal to adjust rate of progress. This would be true whether the rate is above the mark or below it—that is, whether affect is positive or negative. For negative feelings, this is fairly intuitive. The first response to negative feelings about something is usually to try harder. If the person tries harder—and if more effort (or better effort) increases progress—the negative affect diminishes or ceases.

For positive feelings, prediction is counterintuitive. In this model, positive feelings arise when things are going better than they need to. But the feelings still reflect a discrepancy (albeit a positive one), and the function of a negative feedback loop is to keep discrepancies small. Such a system is organized in such a way that it “wants” to see neither negative nor positive affect. Either quality (deviation from the standard in either direction) would represent an “error” and lead to change in output that would eventually reduce it. This view argues that people who exceed the criterion rate of progress (and who thus have positive feelings) will automatically tend to reduce subsequent effort in this domain. They will “coast” a little—ease back. This prediction derives from a consideration of feedback principles, but a similar argument has been made

on other grounds by Izard (1977, p. 257; Izard & Ackerman, 2000, p. 258).

Expending greater effort to catch up when behind, and coasting when ahead, are both presumed to be specific to the goal domain to which the affect is attached, usually the goal from which the affect arises in the first place. We do not argue that positive affect creates a tendency to coast *in general*, but with respect to the activity producing the positive feelings. We should also be clear that we are talking about the current, ongoing episode of action. We are *not* arguing that positive affect makes people less likely to do the behavior later on.

Does positive affect lead to coasting? There is not a great deal of evidence on this question, but there is some. To test the idea requires generating positive affect (or creating the perception of being ahead of one’s reference point) with respect to one behavioral domain and then measuring behavior in the same domain. Many studies have created positive affect in one context and assessed its influence on another task or in another context (e.g., Isen, 1987, 2000; Schwarz & Bohner, 1996). However, that does not test this question.

We know of three sources of evidence. One study found that professional basketball teams were more likely to lose after a playoff victory than after a defeat (Mizuchi, 1991). Although this is consistent with coasting after winning, it is also highly ambiguous. It is impossible to tell whether the pattern reflects coasting after success or renewed effort after failure or both. Less ambiguously, a series of three studies by Louro, Pieters, and Zeelenberg (2007) found consistent evidence that positive affect induces coasting, but only when goal attainment was imminent.

A more recent experience-sampling study had participants make a set of ratings pertaining to each of three goals, three times a day, for 21 days (Fulford, Johnson, Llabre, & Carver, 2010). The ratings included reports of effort toward the goal during the previous time block, perceived progress toward it during the previous time block, and expected progress in the forthcoming time block. Multilevel modeling revealed that instances of progress exceeding expectation were followed by reduction in effort toward that goal in the next time period.

Skepticism about the idea that positive affect (or getting ahead) leads to coasting stems in part from the fact that it is hard to see why a process would be built into the organism that limits positive feelings—indeed, dampens them. We see at least two bases for such an arrangement. The first lies in a basic biological principle: It is adaptive not to spend energy needlessly. Coasting prevents this. Indeed, Brehm built

a motivational theory around the argument that people engage only as much effort as is needed to accomplish a given task—and no more (e.g., Brehm & Self, 1989; Wright & Kirby, 2001).

A second basis for such an arrangement stems from the fact that people have multiple simultaneous concerns. Given multiple concerns, people do not optimize their outcome on any one of them but “satisfice” (Simon, 1953)—that is, they do a good enough job on each concern to deal with it satisfactorily. This permits them to handle the many concerns adequately, rather than just any one of them. Coasting facilitates satisficing. A tendency to coast with respect to some goal virtually defines satisficing regarding that particular goal. A tendency to coast also fosters satisficing for a broader set of goals, by allowing easy shift to other domains at little or no cost (see Carver, 2003, for detail).

### **Affects and Priority Management**

This line of argument brings up a broad function that deserves further attention: the shifting from one goal to another as focal in behavior (Dreisbach & Goschke, 2004; Shallice, 1978). This basic and very important phenomenon is often overlooked. People typically have many goals under pursuit simultaneously, but only one has top priority at a given moment. People need to shield and maintain intentions that are being pursued (cf. Shah, Friedman, & Kruglanski, 2002), but they also need to be able to shift flexibly among goals (Shin & Rosenbaum, 2002).

The issue of priority management was addressed very creatively many years ago by Simon (1967). He proposed that emotions are calls for reprioritization. He suggested that emotion arising with respect to a goal that is out of awareness eventually induces people to interrupt their behavior and give that goal a higher priority than it had. The stronger the emotion, the stronger is the claim that the unattended goal should have higher priority than the goal that is presently focal.

Simon’s discussion focused on cases in which a nonfocal goal demands a higher priority and *intrudes* on awareness. By strong implication, his discussion dealt only with negative affect. However, there is another way for priority ordering to shift: The focal goal can *relinquish its place*. Perhaps positive feelings also pertain to reprioritization, but rather than a call for higher priority, they reflect *reduction* in priority. Positive affect regarding avoidance (relief or tranquility) indicates that a threat has dissipated, no longer requires so much attention, and can assume

a lower priority. Positive feelings regarding approach (happiness, joy) indicate that an incentive is being attained and could temporarily be put on hold because you are doing so well; thus, this goal can assume a lower priority (see Carver, 2003).

### ***Priority Management and Feelings of Depression***

One more aspect of priority management must be addressed, concerning the idea that some goals are best abandoned. We have long held that sufficient doubt about goal attainment yields a tendency to disengage from effort, and even to disengage from the goal itself. This is certainly a kind of priority shift, in that the abandoned goal now has an even lower priority than it had before. But how does this case fit the ideas described thus far?

This case seems at first to contradict Simon’s (1967) view that negative affect is a call for higher priority. But there is an important difference between two classes of negative affect related to approach (Carver, 2003, 2004; in this discussion we disregard avoidance). Some of these affects coalesce around frustration and anger. Others coalesce around sadness, depression, and dejection. The former relate to an increase in priority, the latter to a decrease.

Earlier in this section we characterized our view as implying that approach-related affects fall on a bipolar dimension. However, the dimension is not a simple straight line. Progress below the criterion creates negative affect, as the incentive slips away. Inadequate movement gives rise to frustration, irritation, and anger, prompting more effort to overcome obstacles and reverse the inadequate current progress. But efforts sometimes do not change the situation. Indeed, a loss precludes movement forward. In this case, the feelings are sadness, depression, despondency, and hopelessness. Behaviors also differ in this case. The person tends to disengage from—give up on—further effort.

In the first case, feelings of frustration and anger are a call for an upgrade in priority, an increase in effort, a struggle to gain the incentive despite setbacks. In the second case, feelings of sadness and depression accompany *reduction* of effort and a downgrade in priority. As described earlier, both the upgrade and the downgrade have adaptive functions in the appropriate situations.

### **Shifts in the Theoretical Landscape: Two Modes of Functioning**

We now turn to an entirely different issue. During the last two decades, changes have occurred

in how people view cognition and action. The implicit assumption that behavior is generally managed in a top-down, directive way has been challenged. Questions have been raised about the role of consciousness in many kinds of action. Interest has arisen in the idea that the mind has both explicit and implicit representations. These various issues have also influenced how we think about ideas we have been using.

### ***Two-Mode Models***

Several literatures have developed around the idea that there are two somewhat distinct modes of functioning (Carver, Johnson, & Joermann, 2008). In personality, Epstein (e.g., 1973, 1994) has long advocated such a view. He argues that people experience reality through two systems. What he calls a *rational* system operates mostly consciously, uses logical rules, is verbal and deliberative, and thus is fairly slow. In contrast, the *experiential* system is intuitive and associative in nature. It provides a quick and dirty way of assessing and reacting to reality. It relies on salient information and uses shortcuts and heuristics. It functions automatically and quickly. It is considered to be emotional (or at least very responsive to emotions) and nonverbal.

The experiential system is presumably older and more primitive neurobiologically. It dominates when speed is needed (as when the situation is emotionally charged). The rational system evolved later, providing a more cautious, analytic, planful way of proceeding. Operating in that way has important advantages, provided there is sufficient time and freedom from pressure to think things through. Both systems are presumed to be always at work, jointly determining behavior, though the extent of each one's influence can vary by situation and disposition.

A model in many ways similar to this was proposed by Metcalfe and Mischel (1999). Drawing on decades of work on delay of gratification, Metcalfe and Mischel (1999) proposed that two systems influence self-restraint. One they called a "hot" system: emotional, impulsive, and reflexive. The other they called a "cool" system: strategic, flexible, slower, and unemotional. How people respond to difficult situations depends on which system is in charge.

There are also several two-mode theories in social psychology (Chaiken & Trope, 1999). The essence of such a view has existed for a long time in the literature of persuasion. Strack and Deutsch (2004) have recently extended this reasoning more broadly into the range of behavioral phenomena of interest

to social psychologists. They proposed a model in which overt social behavior is a joint output of two simultaneously operating systems that they termed *reflective* and *impulsive*. Again, differences in the systems' operating characteristics lead to differences in behavior. The reflective system anticipates the future, makes decisions on the basis of those anticipations, and forms intentions. It is planful and wide ranging in its search for relevant information. It is restrained and deliberative. The impulsive system acts spontaneously when its schemas or production systems are sufficiently activated. It acts without consideration for the future or for broader implications or consequences of the action. This depiction is very similar in some ways to the ideas of Epstein (1973, 1994) and Metcalfe and Mischel (1999).

Two-mode thinking has also been very influential in developmental psychology. Rothbart and her colleagues have argued for the existence of three temperament systems: two for reactive approach and reactive avoidance, and a third termed *effortful control* (e.g., Derryberry & Rothbart, 1997; Rothbart, Ahadi, & Evans, 2000; Rothbart & Posner, 1985; see also Nigg, 2000). Effortful control concerns (in part) the ability to suppress approach when it is situationally inappropriate. Effortful control is superordinate to approach and avoidance temperaments. The label *effortful* conveys the sense that this is an executive, planful activity, entailing the use of cognitive resources beyond those needed to react impulsively. This view of effortful control has substantial resemblance to depictions of the deliberative mode of the other two-mode models outlined earlier.

### ***Hierarchicality Reexamined***

Thus, several sources of theory suggest that the mind functions in two modes (indeed, the ones described earlier are far from an exhaustive list). All promote the view that a deliberative mode of functioning uses symbolic and sequential processing and thus is relatively slow; all suggest that a more impulsive or reactive mode of functioning uses associationist processing and is relatively fast. Many of the theories suggest that the two modes are semiautonomous in their functioning, competing with each other to influence actions. Indeed, many point to situational variables that influence which mode dominates at a given time.

These kinds of ideas have influenced how we think about the hierarchy of control that was proposed by Powers (1973). We said earlier that programs of action entail decisions. They seem to be managed



top-down, using effortful processing. Planfulness, an element of programs, is also a common characterization of behavior managed by the reflective system. It seems reasonable to map program-level control onto the deliberative, reflective mode of functioning.

In contrast to this deliberative quality, well-learned *sequences* occur in a relatively automatic stream once they are triggered. Sequences (along with lower levels of control) are necessarily called up during the execution of programs. However, perhaps sequences can also be triggered more autonomously, without being specified by efforts toward a higher goal. Sequences may be triggered by the activation of strong associations in memory. In such cases, the operating characteristics would seem akin to those of the reactive mode of functioning.

In the past we have often noted that the level of control that is functionally superordinate can vary by situations and persons (e.g., Carver & Scheier, 1998, 1999a). As we said earlier, it is easy to imagine cases in which a person is behaving according to a principle (e.g., a moral or ethical value), and it is easy to imagine cases in which the person is behaving according to a plan or program. It is also easy, however, to imagine cases in which the person is acting impulsively and spontaneously, without regard to either principle or plan.

In making this case in the past, our emphasis generally focused simply on how sequences and programs differed. Now we are inclined to wonder if this particular differentiation is not perhaps more important than we had realized. Perhaps we have underappreciated the extent to which lower levels of self-regulatory structures can be triggered autonomously and their outputs enter the stream of ongoing action, without oversight from higher levels, and potentially even in conflict with values at higher levels. This seems an important question for further exploration.

### ***Self-Control: Impulse and Restraint***

The idea that conflicts exist between longer term and shorter term goals is also part of a literature on self-control and self-control failure (e.g., Baumeister, Heatherton, & Tice, 1994). This literature focuses on cases in which a person is both motivated to act and motivated to restrain that action. This is essentially the same case as examined by work on children's effortful control, and it is also the same logical structure as is in the delay of gratification paradigm. A difference is that in the self-control literature the intent often is to delay indefinitely rather than temporarily.

Although the self-control situation is often portrayed as pitting longer and shorter term goals against each other, a somewhat different view also seems plausible. The self-control situation may pit the two modes of processing against each other. This would be consistent with the literature on self-control failure, which tends to portray such failures as involving a relatively automatic tendency to act in one way, being opposed by a planful effort to restrain that act. The action being inhibited is often characterized as an impulse, a desire that is automatically translated into action unless it is controlled (often because the action is habitual). The restraint is presumed to be effortful and to depend on limited resources. If the planful part of the mind is able to attend adequately to the conflict, the person can resist the impulse. If not, the impulse is more likely to be expressed. This portrayal seems quite consonant with the two-mode models of functioning.

### **The How Versus the What of Motivation**

The cybernetic approach to motivational issues is primarily about the structure and dynamics of behavior rather than the content of behavior. It is a depiction of relations among processes that occur as people negotiate the psychological and behavioral space of their lives. We think these principles are informative both about adaptive functioning and about problems in functioning. We also believe the ideas described in this chapter represent a viewpoint that is compatible with many other theories that are described in this book, standing alongside them rather than in place of them. In that sense, these ideas may be less a "theory" than a "meta-theory," a very general way of conceptualizing interwoven functions, a declaration of belief about how complex systems work.

However, this is a viewpoint that is primarily about the *how* of motivated behavior rather than the *what*. It bears on control of actions that are selfish as well as control of actions that are well socialized. Those actions differ not in their structure but in the content of the principles and programs (and perhaps the self) that exist in the persons who engage in the actions. This view thus is very different from views of motivation that address (for example) what specific core motives may underlie human growth and optimal functioning (e.g., Ryan & Deci, 2000, 2001). It was never the explicit goal of the feedback approach to speak to those issues.

On the other hand, it is also possible to stretch these ideas a bit more, to speak to at least some of those issues. It is inherent in a hierarchical organization of

values that the values have some degree of compatibility. If there is too much inconsistency among goals, effort toward one of them enlarges discrepancies with respect to another. This is bad enough when the goals are simply in competition for devotion of time and resources to their attainment (for example, when taking extra time to work on a project at the office takes time away from engagement with one's family). It is even more problematic if the goals are intrinsically in conflict (for example, when taking a new job for oneself in a new town requires one's spouse to accept an inferior new job).

To the extent that the biological blueprint of a human being incorporates species-wide imperatives, goals at various lower levels of abstraction must be brought into at least some degree of compatibility with those imperatives. Precisely what species-wide imperatives are contained in that blueprint is a question on which there is a good deal of debate. Clearly the establishment of dominance hierarchies is one of them; relatedness to at least some other humans is another.

The upshot of this set of issues is that a model of hierarchical organization of the self and its goals appears to entail continuing pressure toward compatibility among the values that define the self and one's view of community. The attainment of lower order goals is the process by which higher order goals are realized, all the way to the highest values the person has.

### Where Do New Goals Come From?

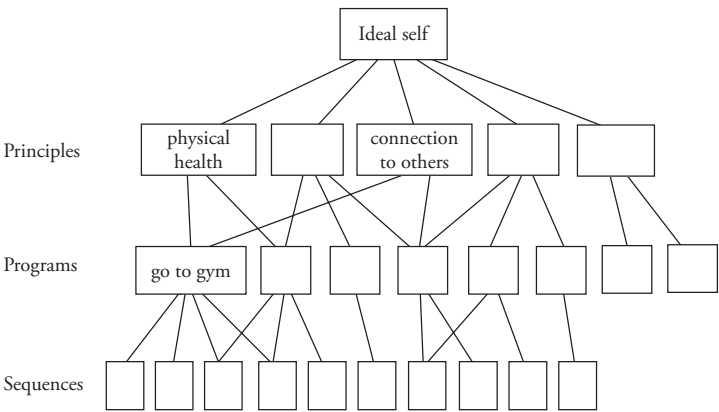
The principle that lower order goals have links to higher order ones also has implications for how new goals arise and are adopted as reference values (for broader treatment, see Carver & Scheier, 1999b).

A person's repertoire of goals changes in many ways over time. Some changes are very simple and restricted; other cases involve the adoption of goals that are very new.

Sometimes the change is limited to shifting one's level of aspiration. Goals that aren't being attained are scaled back to be less demanding. Goals that are attained too easily are raised to be more demanding. Such changes allow the person to continue in the same general domain of activity at a level that is both challenging and attainable. When such a change has been made, however, the goal is not quite the same as it was before.

Another small step in the direction of new goals would be cases in which a person engages in an activity for one purpose (e.g., going to a gym to work out, with the goal of staying healthy), and inadvertently finds that the activity also satisfies a second purpose (making new friends). The activity thereby acquires a second kind of usefulness and becomes connected to a different higher level goal than it was connected to before. This behavior has evolved a new link upward in the goal hierarchy (Fig. 3.2). The activity itself (going to the gym and exercising) already was in place as a goal, and thus it is not new itself. But its broader implications are now different—perhaps quite different—than they were. This change in a goal's connectedness to other aspects of the self structure also implies newness.

In many cases, new activities are undertaken precisely because they have been pre-identified as potentially relevant to a higher order goal in the person's life. For example, a person who is high in openness, who likes to explore diversity in life, may decide to take a vacation tour of Asia, try scuba diving, or experiment with bicycle racing. In such cases, the new activity is



**Fig. 3.2** Attainment of a goal at a relatively lower level of abstraction often can contribute to more than one goal at the next higher level. An example, also discussed in the text, is that going to the gym can contribute to the maintenance of physical health, and it can also be a way of making friends, thus enhancing connection to others.

approached because it is identified as a possible means to satisfy the desire (the goal) of exploration.

Exploration provides an easy illustration, but it certainly is not the only higher level desire that can lead to new activities. Any time someone says, “You ought to try this—I think you might enjoy it,” an inference is being made that the activity will satisfy a broader desire the person has. Anytime people contemplate undertaking new activities, they are considering how the activities might fit into their current patterns of preferences.

In these examples a link is prespecified between the “new” goal and an existing one. Sometimes, though, an activity seems to come together without much forethought or planning, and (when it occurs) is found to be enjoyable. In such cases, the person may actively seek to identify the activity’s essence, so as to make the positive experience repeatable by intention. Thus, it becomes a new goal. That is, in order to make the experience repeatable, the person encodes its nature in memory in a manner that renders it accessible to top-down use later on. In this sort of case, a bottom-up self-assembly (component elements coming together without an explicit higher level reference value) leads to synthesis of a new reference value at the higher level.

What makes an experience unexpectedly enjoyable? Finding an experience enjoyable, we suggest, means that engaging in the experience serves to move the person toward another goal that already is in place as part of the self. The person may have had no idea beforehand that the new activity was going to connect to that already incorporated value. But because it does connect, the experience of the new activity creates positive affect. Thus, a new action, as well as an old one, can fairly quickly acquire an upward link to a higher order goal. A given principle (for example) can be fulfilled in myriad activities, even activities that might at first not have seemed relevant to the principle.

## Closing Comment

We have chosen a rather unusual construct to be interested in for such a long time. We are, after all, personality psychologists, and these ideas are not exactly mainstream personality. We could have focused on goals and left it at that. But, no, we keep dragging in the idea that goal-directed action involves feedback processes. Why?

The answer is fairly simple. Scientists in diverse disciplines see feedback processes as among the basic building blocks of nature. Not of motivation, but of nature. It was suggested many years ago that

feedback loops are embedded in many different kinds of systems, at many levels of abstraction (e.g., Ford, 1987; von Bertalanffy, 1968). The principle of feedback control has been found useful in understanding phenomena as diverse as weather systems, the stability of ecological systems, and homeostasis. The argument that the same fundamental principle underlies even the regulation of overt action asserts a rather astonishing link between human experience and other aspects of nature, parts of nature that could hardly be more different from human life. The possibility that such a link is real is at least part of the fascination.

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