1

Introduction and Plan

Throughout our careers we've been interested in the structure of behavioral self-regulation. Sometimes when relatives or acquaintances ask us what we do for a living, we use that phrase. Often enough, what we get in return is a blank look. In truth, it's a pretty abstract phrase. It's hard to know what it means unless you already know what it means. The term *self-regulation* in itself says more than we intend. After all, control of such qualities as body temperature, blood pressure, and blood chemistry all represent self-regulation. But these aren't what we're interested in.

Even adding the qualifier *behavioral* to self-regulation doesn't entirely solve the problem. This leaves a door open to a large body of work on the regulation of physical action – motor control. There are links between the processes of motor control and the processes we focus on (to carry out any kind of behavior, you somehow have to translate the intent to act into actual movement). Yet the topics are different enough to draw a line between them. For the most part, movement control is outside our focus.

Behavioral self-regulation in this book concerns mostly behavior at the level of interest to personality–social (and health, organizational, clinical, and counseling) psychologists. The question we're interested in is how behavior – at that level of abstraction – happens. This restricts the topic a little. In another sense, though, we're using the word *behavior* broadly. We're interested both in action and in emotion. Both of these aspects of the human experience are important to behavioral self-regulation, and we've tried to bring them together in a way that's internally consistent.

WHAT MAKES BEHAVIOR HAPPEN?

What are the processes that underlie behavior? There are many ways to answer this question – indeed, many paths to take in *approaching* it. The concept of motivation owes its existence to the effort to understand

2   On the Self-Regulation of Behavior

how and why behavior happens. From the vantage point of this concept, people act in various ways because they're "motivated" to do so. This is a start, but it leaves a lot unsaid. To say that motives underlie behavior says nothing about the processes referenced by (or following from) the term *motive*. It implies only that some such processes exist, somewhere, in some form.

What's the nature of these processes? Wildly diverse answers have been proposed over the decades. Human behavior is sometimes seen as reflecting internal energy systems competing for ascendence (Freud, 1949/1940; Hull, 1943). Another view holds that behavior emerges directly from a set of needs (Murray, 1938). Another is that behavior reflects patterns coded into human genes over eons of evolution (e.g., Buss, 1991, 1994; Wilson, 1975). Behavior has been seen as reflecting patterns of childhood relationships carried in symbolic form into adulthood (e.g., Bowlby, 1988; Fairbairn, 1954), and as reflecting deeply rooted traits (e.g., Costa & McCrae, 1992; Digman, 1990; Eysenck, 1967). It's also been argued that the concept of motive is irrelevant and misleading – that human behavior is the product of a history of external events coming together to form a pattern of reinforcement contingencies (Skinner, 1938).

In this book we argue that human behavior is a continual process of moving toward, and away from, various kinds of mental goal representations, and that this movement occurs by a process of feedback control. This view treats behavior as the consequence of an internal guidance system inherent in the way living beings are organized. The guidance system regulates a quality of experience that's important to it. For that reason, we refer to the guidance process as a system of *self-regulation*.[1] In the chapters to come, we describe aspects of this view, which has long been central in our thinking about human behavior (Carver, 1979; Carver & Scheier, 1981a). The overall goal of the book is to create a sense of how such a model of behavior can be fit to various aspects of the human experience.

Some Limitations and Some Grandiosity

Before we begin, we should note a couple of further limitations. One is that the model is incomplete. Many motivational theorists would

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[1] Block (1996) has argued that it's preferable to call this *autoregulation*. In his view, that label does a better job of evading the implication that the *self* is always involved in the regulatory process, an implication that often isn't intended. For example, most people wouldn't want to argue that processes such as blood pressure control are managed by the self. Although Block's point is well taken, the term self-regulation has by now become so well entrenched in the literature that we continue to use it here.

not see what we describe here as a complete picture of motivation or even self-regulation (cf. Kuhl, 1984, 1994a; see Ford, 1987, for an even broader perspective). We won't examine every issue that might be raised. Doing that would require a longer book, and more answers than we have. Our aim isn't to paint a complete picture but rather to create a sense of the importance of certain kinds of ideas in thinking about human functioning.

Second, we don't necessarily mean to argue that the conceptualization presented here should be adopted *in place of* other ways of thinking. The view we're presenting is separate from – but a ready collaborator with – many other ideas. It's a view of the structure of behavior that can accommodate diverse ways of thinking about which goals matter and why. For this reason, we believe it can be seen as complementing and supplementing a wide variety of other ideas about what goes on when humans live out the moments, hours, and days in their lives (cf. Carver, 1996b; Carver & Scheier, 1996a).

We'll even go a little further. We think that the ideas presented in this book have important and useful things to say to everyone who's interested in the behavior of human beings (at the level of abstraction indicated earlier). These ideas paint a useful picture of what goes on when behavior is rolling smoothly forward, and they also have implications about some of the ways in which self-regulation goes awry.

Observations and Origins

The starting point for some aspects of what we say in this book is an observation that also underlies the writings of the behaviorists: The consequences of behavior are important to the behaving organism. Our view on this observation differs in important ways from that of behaviorists, however. The consequences of behavior have both a short-term effect and a longer-term effect. The longer-term effect is learning. The shorter-term effect is captured in the phrase *feedback process*.

Learning, we believe, isn't about the stamping in of action tendencies through reinforcement, but rather about the linking together of information (cf. Bolles, 1972; Rescorla, 1987; Timberlake, 1993; Tolman, 1932). Sometimes the information that's linked is that particular actions were effective in moving toward a particular goal. Thus, the person learns that the action is potentially good to take when that goal is in place in similar circumstances. In a similar situation later on, the person may well repeat the action. Although this phenomenon is important, we will for the most part disregard this longer-term effect of the consequences of action.

4   On the Self-Regulation of Behavior

Our focus instead is on the shorter-term effect. The consequence of an act informs you about whether or not the act moved you toward a desired end (or away from an undesired end). In the short term, that information is useful in determining whether to continue the action, change the action, or perhaps discontinue the activity altogether. The information conveyed by the act's consequence thus constitutes feedback. This idea lies at the heart of the book.[2]

THE BOOK'S PLAN

The plan we follow in this book is to start simple and add layers of complexity. We begin by talking about the basic elements of our viewpoint on self-regulatory phenomena, in which feedback processes are centrally important. In doing so (in Chapter 2), we use a variety of illustrations, but we generally avoid examples from human behavior. Instead, our treatment in Chapter 2 is abstract, intended to make clear the meanings of key concepts before going on to address behavior.

Goal-Directed Action

The application of these ideas to human behavior begins in earnest in Chapters 3 and 4. There we address a variety of topics within personality and social psychology, indicating how the elements of the feedback loop are embodied in the flow of several kinds of experience. Both negative (goal-seeking) loops and positive (goal-evading) loops are important in human action, and these chapters represent an initial mapping of these concepts to behavior.

In many people's minds the feedback-loop concept has esoteric origins. But it's actually been with psychology for centuries, hidden inside another, perhaps simpler, certainly more familiar concept: the goal (cf. Tolman, 1932). A goal (or something very much like a goal) is inherently embedded in the feedback process. Though not constituting the *whole* of the feedback loop, a goal is *essential* to the feedback loop.

[2] A number of others in psychology have found these concepts to be useful, though the angles they've taken have been somewhat different from the one taken here (e.g., Ford, 1987; Hyland, 1987; Karoly, 1993; Levine & Fitzgerald 1992a, 1992b). Further, although these applications aren't our focus here, we note in passing that feedback models have been found useful in a number of other fields involving human behavior, including sociology, organizational behavior, politics, and economics (e.g., Denning, 1992; Levine, 1992; Maruyama, 1986).

The goal concept is a broad one, useful for many purposes. There's great diversity among human goals, and that diversity has important implications for our story. In Chapter 5 we describe several goal constructs introduced to psychology over the past decade or so and consider aspects of their diversity. One important aspect of this diversity among goals is their breadth or abstractness. One way of thinking about this difference is to think of goals as ordered in a hierarchy, such that very abstract goals subsume many goals that are more concrete. This idea represents one kind of complexity to be layered onto the more basic idea that behavior reflects feedback processes.

The idea that such a goal hierarchy is embedded in behavior has many implications, and it also raises a number of questions. After discussing the goal construct and its diversity in Chapter 5, we take up some of these implications and questions in Chapter 6. In doing so, we begin a pattern that recurs twice more in the book: a chapter of theoretical principles, followed by a chapter on issues that are raised by a close consideration of the principles.

There's yet one more distinction that we need to address among the goals that underlie human behavior, a distinction that's particularly important in thinking about social behavior. The distinction is between goals that are personal (taking into account only your own preferences and desires) and goals that in some fashion or other involve other people. The latter goals, whether they're communal or self-presentational, entail the consideration of one's relationships to others, and how others view oneself. Chapter 7 addresses how these classes of goals influence action – how the influences are the same and how they're different.

Emotion

Thus far in the story, discussion focuses on goals, actions, and how actions are managed. No model of human action can go too far, though, without considering emotional experience. Chapters 8 and 9 deal with these experiences. We argue there that the principles of feedback control apply to the understanding of feelings as well as to the understanding of action. Chapter 8 is our conceptual account of the nature and origins of affect, along with results of some research bearing on that view. This account of affect also adds a layer of complexity to the model constructed in early chapters, but it's a layer that's very different from the one added by the notion of hierarchicality.

6　　　　On the Self-Regulation of Behavior

This conceptual analysis of affect is followed by another "issues" chapter. The model of affect we've proposed has a number of implications that go well beyond its basic themes, and the nature of the model raises many questions. Further, important points of contact (both similarities and contrasts) exist between this model and other ideas that are currently prominent in psychology. Chapter 9 takes up a series of these implications, questions, and comparisons among theories. Our goal there is, in part, to show how this model threads together in a coherent fashion a substantial number of points made elsewhere.

Confidence and Doubt, Persisting and Giving Up

Another issue that any analysis of human behavior must address is that people sometimes confront difficulties in trying to reach their goals. Although affect is one response to these difficulties, there are behavioral responses as well. Sometimes people remain fully engaged in the struggle to move ahead. Sometimes they slow down, stop, and give up. Sometimes the behavioral responses seem directly parallel to affective experiences, but sometimes they don't. How are these aspects of behavior to be understood?

Chapter 10 presents theory and data bearing on this set of issues. We argue that the same mechanism that produces affect produces a sense of confidence versus doubt, but that this sense can be superseded in some circumstances by information consolidated in memory that's taken as relevant to the present situation. Thus, whether confidence or doubt prevails is a matter that extends beyond the stimuli of the present moment.

We also argue in that context that confidence (past some threshold) keeps people in the chase toward attainment of their goals, whereas doubt (again, past a threshold) tends to promote abandonment of those goals. Our postulating a threshold or watershed past which persistence gives way to giving up is the first sounding of a broader theme about discontinuity in behavior. This theme emerges in full force later on.

Questions that surround persistence and abandonment of efforts are among the most fundamental to the psychology of human behavior. There are many theories of the processes by which these outcomes are created. Although these theories have a good deal in common, there are also differences among them. These differences are explored in another issues chapter, Chapter 11. Along with discussion of theoretical

distinctions, we also point to a number of literatures where issues of confidence versus doubt appear to play a very important (though often unrecognized) role.

Problems in Behavior

Any approach to understanding normal behavior has implications for understanding problems in behavior. The view on behavior sketched out in the first part of the book is no exception in that regard. Because we think some of these implications are important, we briefly interrupt the layering on of further complexities to describe some of them.

These implications for understanding problems range from the simple and straightforward to the more complex and convoluted. There are enough points to be made here to fill two chapters. Again, we start simple in Chapter 12 and work our way toward matters of greater complexity in Chapter 13. Among the complexities that seem most important is the set of issues surrounding giving up. Sometimes people give up *trying* but can't seem to give up *wanting*. Sometimes people remain *committed* to trying but can't seem to make themselves *really* try. How to conceptualize these problems is a question that we don't think has been well answered. These chapters contain our contributions to the evolving discussion.

Newer Themes: Dynamic Systems and Catastrophes

The conceptual girders of the book up to this point are the principles of feedback processes. Cross-members and framing are provided by extensions and connections to the more typical constructs of personality–social psychology. The extended discussion of problems in Chapters 12 and 13 brings us to something of a point of closure on the principles addressed in the preceding chapters. At this point, we turn to a set of topics that in some ways differ considerably from what came before.

Recent years have seen increasing discussion of the themes of dynamic systems theory, and how these themes may relate to the phenomena of psychology. Some of the initial steps taken in these discussions were halting, others were more bold. Today it seems apparent that these ideas raise interesting questions and suggest methodologies that weren't obvious before. More and more, these ideas are beginning to be seen as important elements in the tool kit of the psychological theorist.

8   On the Self-Regulation of Behavior

We are far from the first to consider the relevance of these ideas for understanding behavior, even at the personality–social psychological level of abstraction. In the past few years, however, we've come to find them useful as a conceptual heuristic. In Chapter 14 we lay out some of the basics of dynamic systems thinking and consider how these ideas may integrate with themes presented earlier in the book.

Although some have asserted that these ideas represent a totally new angle on behavior, destined to replace other concepts, we're inclined to disagree. Rather, we see them as complements and supplements to the concepts contained in earlier parts of the book. As do all useful conceptual tools, the ideas of dynamic systems suggest hypotheses that aren't obvious from other angles. But we think these tools add to, rather than replace, the tools already in the kit.

A body of thought related to dynamic systems theory, though distinct in its origins, is catastrophe theory. As is true of dynamic systems theory, catastrophe theory provides a different perspective on understanding experience. Catastrophe theory concerns the topology of surfaces, focusing on surfaces with folds. Thus it bears on the existence of discontinuities in whatever can be mapped onto the surface. Some people believe that aspects of behavior can be portrayed in this way, and this topic provides the basis for Chapter 15.

The ideas of dynamic systems and catastrophe theories create a framework for raising issues in ways that might not have been apparent without those ideas. This is true for issues about behavior that flows smoothly, and also for problems in behavior. Enough implications and issues about problems and their treatment have been identified to fill another chapter. Chapter 16 examines problems from the perspective of these newer conceptual tools.

Control versus Emergence of Behavior

One more side trip in our journey occurs in the penultimate chapter. The model developed throughout the book assumes a kind of top-down regulation of behavior. We've assumed that people take up goals, form intentions, and try to realize those goals and intentions in their actions. However, several literatures question the accuracy of this portrayal. In Chapter 17 we explore the emergence of self-organization in coordinations, the concepts of connectionism, and some work in robotics. Each of these literatures suggests the plausibility of bottom-up control of behavior. A better answer, however, may be that both views are right.

There are reasons to believe that influence on behavior flows both ways, that there are two modes of thinking that have different characteristics. These ideas are also discussed there.

Goal Engagement and Life

In Chapter 18 we consider another broad theme: that goal involvement is critical to life. Without goals, behavior loses form. People's lives fall apart. In discussing that theme, we describe the results of studies – some old, some very new – that seem to imply that life requires engagement. When engagement remains, when people can accept even tragedy and move forward, life retains its vibrancy. When people lose that sense of engagement, they lose a great deal psychologically, and even the physical reality of life is threatened.

This, then, concludes our brief overview of the book's themes. Let us commence.

2

Principles of Feedback Control

This chapter describes a set of basic principles underlying the conceptual analysis presented in the remainder of the book. We describe the principles here abstractly, with examples and illustrations taken mostly from domains other than personality–social psychology. Our goal is to create a clear sense of the nature of particular processes (for a more detailed account see Clark, 1996) without pressing the argument that human behavior embodies them. We move on to that argument in due course.

CYBERNETICS, FEEDBACK, AND CONTROL

Wiener (1948) defined cybernetics as the science of communication and control. *Cybernetics* is one of several terms intertwined with one another – terms such as *control processes, feedback processes*, and *servomechanism*s (or *servos*). These terms have varying origins, they're used preferentially by different people in different lines of work, and they differ in shades of meaning. For our purposes, though, they refer to roughly the same things. Cybernetics is the science of feedback processes; feedback processes involve the control or regulation of certain values within a system (see also Ashby, 1961; Clark, 1996).

Negative Feedback

A negative feedback loop, the basic unit of cybernetic control, is a system of four elements in a particular kind of organization. The elements are an input function, a reference value, a comparator, and an output function (Figure 2.1). An input function is a sensor. It brings information into the loop. In later discussions we'll treat this input function as equivalent to perception. In the abstract, however, it's simply a process by which information of some sort arrives to be used in a particular way.