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John D. Cone and Steven C. Hayes
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PART I

THE NATURE OF ENVIRONMENTALLY RELEVANT BEHAVIORAL SCIENCE

Part I of this book deals with the biases of the authors. Put more gently, the first two chapters establish a context within which to understand the rest of the book by conveying our own perspective on the role of behavioral science in the solution of environmental problems.

As you read Part I, you will encounter a distinction between physical technological solutions and behavioral technological ones. The importance of both and the relative neglect of the second are emphasized. We attempt to remedy some of this neglect by calling attention to the various environmentally relevant behaviors (that is, human activities that influence the nature or extent of physical environmental problems) and by showing ways in which those behaviors can be increased or decreased (behavioral technology).

In Chapter 1 we distinguish between two major classes of environmentally relevant behaviors: protective and destructive. An important problem is to find ways of increasing the first while decreasing the second. A conceptual orientation toward the development of an effective behavioral technology is shown to be very useful, and one based on the principles of the experimental analysis of behavior is suggested in Chapter 1 and elaborated on in Chapter 2. We also describe the advantages of examining environmental problems in terms of the conflict between short-term and long-term effects of behavior. Effective solutions are often the product of a greater congruence between the two.

Chapter 2 provides a more specific listing of environmentally protective and destructive behaviors, together with the major categories of environmental problems (for example, aesthetic, health related, resource related) to which the behaviors apply. We show that although many human activities are relevant to the quality of the physical environment, some are more directly relevant than others. Thus, picking up trash along a highway or in a public park is more directly related to the problem of litter than is a verbal statement on one's feeling or attitude about trash. Our bias toward the more relevant behaviors is clearly evident in Chapter 2.

However, within the general field of environmental psychology our point of view is a minority one. A review of recent literature documents the extent to

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which the majority view is primarily concerned with the effects of environment on behavior rather than with the effects of behavior on environment. Some reorientation is needed if we are all to develop an adequate understanding of environmental problems and their solutions.

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Chapter 1

BEHAVIORAL SCIENCE AND ENVIRONMENTAL PROBLEMS

> . . . the "doomsday" predictions of demographers (Ehrlich, 1968; Meadows, Meadows, Randers, & Behrens, 1972), the shrinkage of natural resources . . . and the deterioration of environmental quality prompted widespread concern about the constraints of the ecological environment. Suddenly, psychologists "rediscovered" the large-scale physical environment and, in collaboration with architects and planners, became increasingly involved in studying its impact on behavior [Stokols, 1978, pp. 255–256].

The year 1970 appears to have been a landmark one for the populist environmental movement. It was also the beginning of a clearly definable behavioral-science involvement in problems of the physical environment. On "Earth Day" in that year, demonstrations in nearly every major U.S. city called immediate and alarming attention to the deteriorating condition of our environment. At the same time major position papers emerged (Craik, 1970; Wohlwill, 1970) on the embryonic study of behavior/environment relations from a psychological perspective.

Of course, concern with the physical environment as it affects behavior was not first articulated in 1970. That interest had been around for at least 35 years, especially among early Gestalt psychologists (for example, Koffka, 1935). However, behavioral scientists seriously concerned with human/environment relations (ecological psychologists, for example) were few before the 1970s, with most of the formal investigation of human/environment interaction confined to the work of Barker and his colleagues at the University of Kansas (see Barker, 1963, 1968). With widespread trumpeting of a coming disaster for the ecosphere during the later 1960s and early 1970s, enough behavioral scientists became involved in the study of environment/behavior relationships to produce a burgeoning field of inquiry. The result of this rediscovery is a rather loose collection of books, articles, theoretical statements, and empirical studies all having something to do with behavior/environment interaction.

In spite of increased activity in the area, though, a clear definition of environmental study from a psychological perspective has proved elusive. After all, if you view behaviors as natural phenomena, then they must be the result of both past (for example, evolution, experience) and present conditions in the

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environment and the organism. In that sense, all of behavioral science is involved in the study of behavior/environment interrelations. But environmental psychology is distinguishable from other areas of behavioral science, as the following analysis will show.

Stokols (1978) has recently differentiated environmental psychology from other areas of behavioral science on the basis of three major dimensions: (1) an ecological perspective, (2) an emphasis on scientific strategies for solving community/environment problems, and (3) an interdisciplinary approach. In an exhaustive review of research characterized by these dimensions, Stokols concluded that the field is "more than an assortment of loosely-defined problem areas but less than a comprehensive, coherent paradigm" (p. 257). He summarized research to date in eight topical areas within the field. These are cognitive representation of the spatial environment, personality and the environment, attitudes toward the environment, environmental assessment, experimental analysis of ecologically relevant behavior, movement of humans through space, impact of the physical environment on behavior, and ecological psychology.

Our book deals with only one of these areas, the experimental analysis of ecologically relevant behavior. We are concerned with human actions as they relate to problems in the physical environment. Simply put, our goal is to encourage the development of a behavioral technology adequate for the solution of environmental problems.

What do you think of when you hear the word *technology?* Most people are reminded of such things as machines, labor-saving devices, or industrialization. Technology includes these, of course, but it has a wider meaning. The root of the word is a Greek term that means "art, craft, or skill"—in other words, knowing how to do something. In this book we will explore the question "What do we need to know how to do in order to solve environmental problems?" Put another way, "What kind of technology do we need to develop?" Because this is a book about behavior, we will direct most of our attention to the kind of technology behavioral scientists can create.

PHYSICAL VERSUS BEHAVIORAL TECHNOLOGY

Attempts to solve environmental problems have followed several distinct courses. One of the most popular tactics has been the development of new *physical* technology. Enormous amounts of money have been spent in such areas as nuclear energy, solar energy, insulation technology, antipollution technology, and so on, with the view that if we only had appropriate physical technology, our environmental problems would disappear. The popularity of this approach to environmental problems does not mean that it is the only, or even potentially the most successful, avenue. Development of new methods of insulating houses is hardly important unless people actually use these methods. Building smaller and more efficient automobiles will not solve our resource or pollution problems if

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more and more people drive more and more cars more and more often. Under such conditions, having smaller, more efficient cars may delay or prevent more serious problems from developing, but that is not the same as a solution.

The point is that the impact of physical technology on environmental problems always depends on whether and how it is used. Put another way, environmental impact usually depends most directly upon people's *behavior* and only indirectly on physical technology. Social scientists are concerned with the understanding of behavior, and, hopefully, they have something to say about how to influence the proper use of physical technology. Unfortunately, although physical technology (for example, cars, TV, missiles, electricity production) has expanded incredibly during the past century, developments in *behavioral* technology have lagged far behind.

The term *behavioral technology* refers to the science, art, skill, or craft of influencing socially important human behavior. Many institutions in society —for example, politics, religion, advertising, and education—use various forms of behavioral technology. Only quite recently, however, have social scientists begun to study and develop a technology of behavior that has a sound scientific footing. The state of behavioral technology can be compared to the state of physical technology in the early stages of the Industrial Revolution: we are just beginning to approach the subject systematically.

The imbalance of physical and behavioral technology seems to be at the root of many of society's difficulties, and none more so than environmental problems. It is not that physical technology itself is bad or dangerous; it is that without knowing how to control it we are in danger of its controlling us. Behavioral technology can help us put physical technology to appropriate use.

In addition to contributing to the best use of physical technology, behavioral technology can be useful in solving or alleviating environmental problems for which helpful physical technology is not available or effective. For example, litter is a problem that is currently impossible to control fully through physical technology. Throwing trash on the ground is a human behavior, one that is problematic despite the advances made by physical technologists in developing biodegradable trash, efficient street sweepers, and the like. Behavioral techniques are needed (and as we will show in Chapter 5, are largely available) to help solve this problem. Thus, with or without available physical technology, the development of an adequate behavioral technology seems critical to the solution of environmental problems. In many ways, that sums up the message and purpose of this book.

ENVIRONMENTALLY RELEVANT BEHAVIORS

Seeing the potential importance of a behavioral technology is the first step toward an environmentally relevant psychology. The second is to decide what behaviors need to be influenced. Environmentally relevant behaviors are those

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human activities that influence, in a positive or negative fashion, the nature or extent of physical environmental problems (Cone & Hayes, 1976). There are at least two broad classes of such activities. The first is *environmentally protective* behaviors. These are actions that improve environmental conditions. For example, picking up litter, buying efficient appliances, and recycling glass are environmentally protective. A major goal of environmentally relevant psychology is to establish and strengthen these activities. The second class consists of *environmentally destructive* behaviors. These are actions that worsen environmental conditions. Examples would include throwing down trash, turning up the thermostat on the furnace, and driving a gas-guzzling automobile. A second major goal of environmentally relevant psychology here is to eliminate or decrease the strength of these behaviors.

The distinction between environmentally protective and destructive behaviors is an important one. Litter, for example, is often thought of as a single problem behavior. It is not. Many behaviors influence the amount of trash on the ground. These behaviors are both protective (for example, buying products packaged in recyclable or returnable containers, picking up litter) and destructive (for example, disposing of litter improperly). As will be discussed in Chapter 5, recent evidence shows that programs that lead to a decrease in the environmentally destructive behaviors involved in littering do not lead automatically to an increase in the environmentally protective behaviors involved and vice versa. Thus, it is important to identify both types of behaviors that relate to a given environmental problem.

A FRAMEWORK FOR EXAMINING BEHAVIOR

As indicated by its title, this book is about behavioral solutions to environmental problems. As such, it is not primarily focused on ways in which human behavior is affected by various aspects of the context in which it occurs. Instead, the book is concerned with the reverse—that is, with ways in which behavior affects the physical environment so as to contribute to its future well-being or demise.

Conceptually, we subscribe to the view that most environmentally relevant behavior can be thought of in terms of the three components of an operant paradigm described by B. F. Skinner (1953). This model is symbolized by the terms S^D–R–S^R. In the model a "discriminative stimulus" (symbolized by the letters S^D), or environmental context, sets the occasion for a response *(R)*. You might think of an S^D as a signal that a particular behavior is called for in a particular context. The response itself often acts upon the environment; that is, the world around us sometimes changes as a function of what we do. These changes (symbolized by S^R) can be either positive (S^{R+}) or negative (S^{R-}). We call the change "reinforcing," or positive (S^{R+}), when it is shown that the future likelihood of that behavior (given that situation, or S^D) increases. If the response

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decreases in frequency in the future, we say the change has been negative, or "punishing" (that is, the response has been followed by a punisher, S^{R-}). We will talk more about these terms in Chapter 3.

To see that this paradigm is a fruitful way to view behavior in relation to the numerous environmental problems presently confronting us, consider the following example. It has long been known that the consequences that are most likely to influence behavior are, other things being equal, those that follow the behavior closely in time (see, for example, Rachlin & Green, 1972). Many environmental problems are seemingly due to this fact about behavior. They often appear to involve conflicts between short-term positive consequences and long-term negative ones. Thus, many environmental problems are the result of what Platt (1973) has referred to as "social traps." In his words, "men or organizations or whole societies get themselves started in some direction or some set of relationships that later prove to be unpleasant or lethal and that they see no easy way to back out of or to avoid" (p. 641).

As an example, Platt describes Hardin's (1968) well-known "tragedy of the commons," in which a grassy square in the center of towns and hamlets would be set aside for the common use. Generally, inhabitants would graze their cows on the grass. Because everyone was free to use the commons, the more cows a person had, the better off he or she would stand to be financially. As might be expected, as individuals increased their herds, more and more grass was consumed until eventually none was left and the cows all perished. What had been individually reinforcing in the short run was collectively punishing in the long run. In terms of the three components of the operant paradigm, we can diagram Platt's notion as follows:

$$S^D - R - S^{R+} \text{ short} \ldots S^{R-} \text{ long.}$$

The diagram shows a discriminative stimulus setting the occasion for a response whose short-term consequence is reinforcing (S^{R+} short). The long-term consequence is punishing (S^{R-} long), however.

The paradigm seems applicable to numerous environmental problems. Consider, for example, the wasteful use of natural gas. Given a cold house (S^D), a person might react by turning the thermostat to 78° *(R)*. The short-term consequence would be increased warmth and comfort (S^{R+} short). The long-term consequences would be likely to be a higher gas bill for the person and depletion of our natural-gas supplies (S^{R-} long) at a faster rate than if a lower thermostat reading had been tolerated. Similarly, consider the hunting and killing of certain species of animals such as the Australian kangaroo. The immediate consequence of killing kangaroos *(R)* is access to valuable hides that can be exchanged for money (S^{R+} short). Of course, the competitive extermination of kangaroos by numerous individuals for short-term gains leads to the eventual long-term situation in which no more are available to kill (S^{R-} long).

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Table 1–1. Environmental Examples of Social Traps Diagrammed Using Three-Term Operant Notation

Activity	*Discriminative Stimulus* *(S^D)* →	*Response* *(R)* →	*Short-Term Consequence* *($S^{R\pm}$ short)* →	. . . *Long-Term Consequence* *($S^{R\pm}$ long)*
Littering	trash	litter	relief from burden of carrying trash "+"	littered environment "–"
Nonlittering	trash	hold	burden of carrying trash "–"	clean environment "+"
Nonlittering	trash	hold	praise or other reward "+"	clean environment "+"
Antilittering	trash	pick up	praise or other reward "+"	clean environment "+"
Water pollution	waste	dump in river	relief from burden of waste "+"	polluted river "–"
Burying wastes	waste	bury	increased cost of production "–"	clean river "+"
Burying wastes	waste	bury	tax incentives "+"	clean river "+"

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As a preliminary example of how this analysis can be applied to the solution of environmental problems, consider the general case of pollution. Quigley (1970) has defined environmental pollution as the "movement of objects by human action from places or conditions where they are natural or unobjectionable to places or conditions where they are unnatural, objectionable, and injurious" (p. 1). Littering can be viewed as a specific instance of the general class of pollution behaviors (Cone, Parham, & Feirstein, 1972). Symbolically, a piece of trash in one's hand (S^D) requires holding *(R)* something that may be mildly unpleasant (S^{R-} short). Littering, or ridding oneself of the trash, is therefore reinforcing, at least in the short run. The alternatives are diagrammed in Table 1–1.

The second row of the table shows that the immediate (short-term) consequence of the alternative to littering is negative; that is, one must remain in contact with (hold) the annoying trash until an appropriate container can be located. Thus, to reduce littering by increasing its alternative will require finding ways of avoiding or overcoming the short-term negative consequences of holding onto trash, an example of which is represented in the third row of the table. Another possibility also exists, that of antilittering, or picking up trash others have discarded. Antilittering is also depicted in Table 1–1. Note from the table that praise has been used to strengthen the response of picking up trash. Other consequences could also be used and indeed have been, as will be shown in Chapter 5.

The present discussion is intended to illustrate the general approach one can take in seeking behavioral solutions to environmental problems. If littering is properly construed as a member of the general class of pollution behaviors, other forms or members of that class can be studied in a similar manner. For example, consider the act of discharging industrial waste into a neighboring river. This form of pollution is also diagrammed in Table 1–1. The alternative to water pollution presented in the table is identical to that in our nonlittering example, and the implications for intervention are the same; that is, ways will be needed to overcome the negative short-term consequences of the alternative. In the case of antilittering, praise was used. For water pollution one suggestion has been that the federal government offer tax incentives to companies that engage in nonpolluting alternatives. This solution is diagrammed in the last row in Table 1–1. If we compare the last row with the immediately preceding one for pollution, it is clear that the effectiveness of the solution hinges in part on the relative magnitude of the short-term consequences; that is, if the tax incentive is to be effective, it must be greater than the increased cost of burying the waste (S^{R-} short).

There are other behavioral principles that may aid us in the development of solutions to environmental problems (see Chapter 3). The point we have been making is that environmental problems take on an entirely different cast when viewed from a psychological perspective. But psychologists are not the only professionals taking this perspective; many other types of behavioral scientists

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have contributed to the development of environmentally relevant psychology. The nature of that endeavor will be discussed in the next chapter.

SUMMARY

A psychological approach to environmental problems is one that examines the behavioral contribution to these problems. The goal of this approach is the development of a behavioral technology for controlling environmentally protective and destructive behavior. In this book we will approach behavior from the perspective that although it is greatly influenced by its environment it also exerts a reciprocal influence on the environment. Such a perspective leads to the delineation of several aspects of environmental problems as critical—for example, the congruence of short-term and long-term consequences. Behavioral scientists of all varieties can contribute to the generation of solutions to environmental problems within the framework of an environmentally relevant psychology, as later chapters will show.

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