# Ecological Psychology in Context

*James Gibson, Roger Barker, and the Legacy of William James's Radical Empiricism*

Harry Heft

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*Robert E. Shaw, William M. Mace, and Michael T. Turvey*

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**Heft** • *Ecological Psychology in Context: James Gibson, Roger Barker, and the Legacy of William James's Radical Empiricism*

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*Denison University*

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For Cindi and Peter, and for my parents

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*"One should not try to dilute the meaning of relation: relation is reciprocity .... In the beginning is the relation."*
*—Martin Buber (1970)*

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# Foreword
## Resources for Ecological Psychology

*Robert E. Shaw, William M. Mace, and Michael T. Turvey, Series Editors*

This series of volumes is dedicated to furthering the development of psychology as a branch of ecological science. In its broadest sense, ecology is a multidisciplinary approach to the study of living systems, their environments, and the reciprocity that has evolved between the two. Traditionally, ecological science emphasizes the study of the biological bases of *energy* transactions between animals and their physical environments across cellular, organismic, and population scales. Ecological psychology complements this traditional focus by emphasizing the study of *information* transactions between living systems and their environments, especially as they pertain to perceiving situations of significance to planning and execution of purposes activated in an environment.

The late James J. Gibson used the term *ecological psychology* to emphasize this animal-environment mutuality for the study of problems of perception. He believed that analyzing the environment to be perceived was just as much a part of the psychologist's task as analyzing animals themselves, and hence that the "physical" concepts applied to the environment and the "biological" and "psychological" concepts applied to organisms would have to be tailored to one another in a larger system of mutual constraint. His early interest in the applied problems of landing airplanes and driving automobiles led him to pioneer the study of the perceptual guidance of action.

The work of Nicholai Bernstein in biomechanics and physiology presents a complementary approach to problems of the coordination and

control of movement. His work suggests that action, too, cannot be studied without reference to the environment, and that physical and biological concepts must be developed together. The coupling of Gibson's ideas with those of Bernstein forms a natural basis for looking at the traditional psychological topics of perceiving, acting, and knowing as activities of ecosystems rather than isolated animals.

The purpose of this series is to form a useful collection, a resource, for people who wish to learn about ecological psychology and for those who wish to contribute to its development. The series will include original research, collected papers, reports of conferences and symposia, theoretical monographs, technical handbooks, and works from the many disciplines relevant to ecological psychology.

## Series Dedication

To James J. Gibson, whose pioneering work in ecological psychology has opened new vistas in psychology and related sciences, we respectfully dedicate this series.

# Preface

This book is intended as a contribution to the growing body of theoretical, empirical, and historical work in *ecological psychology*. Locating the present work in the domain of ecological psychology only serves to identify its focus up to a point, however. The term *ecological psychology* has been adopted by a number of experimental psychologists who, although sharing a broad viewpoint, otherwise hold somewhat different perspectives. As a result, for some readers the term 'ecological psychology' will call to mind the work of James Gibson, whereas for others it will suggest the work of Egon Brunswik, Roger Barker, or Urie Bronfenbrenner. Each of these psychologists at some time employed ecological psychology, or some variation of it, to refer exclusively to their specific framework. Likewise, the second generation of psychologists working from the standpoint of each of these frameworks often has taken ecological psychology to be synonymous solely with their particular point of view. For this reason, the obligatory thing to do when adopting ecological psychology as shorthand for a specific perspective is to be clear from the outset how the phrase is being employed.

So within the domain of ecological psychology, what are the theoretical commitments of this book? The ecological psychology at the core of this project is that developed by James J. Gibson, although its focus is not confined solely to that approach. Work has been underway for several decades now to extend Gibson's ideas by explicating some of its central concepts. This book participates in that effort in at least three ways.

First, the central theoretical and philosophical commitments of Gibson's perspective are articulated through an analysis of its immediate historical roots, and in doing so, the *metatheoretical foundations* of Gibson's ecological psychology are revealed. Primarily, this discussion

entails an analysis of the neglected work of James Gibson's mentor, Edwin B. Holt, and more fundamentally, the later philosophy and psychology of William James who was Holt's esteemed teacher. William James has long been a very familiar figure in psychology, but his later position, *radical empiricism*, which he viewed as the culmination of his life's work, has been neglected in the discipline. This volume shows that radical empiricism stands at the heart of Gibson's ecological program, and it can usefully be employed as the conceptual centerpiece for ecological psychology more broadly considered.

Second, this book expands the scope of Gibson's framework by examining relations between it and Roger Barker's ecobehavioral approach. Barker's program is distinctive in psychology because of its recognition of ecological phenomena operating across collectivities of individuals. With his discovery of *behavior settings* in the 1960s, Barker laid bare the critical role played by extra-individual ecological phenomena in everyday life. A partial synthesis between Gibson's and Barker's frameworks is possible because of shared historical commonalities that are rooted primarily in Gestalt psychology, and because of the common metatheoretical assumptions that join them in adopting an ecological perspective.

Third, the capacity of Gibson's program to encompass sociocultural phenomena is examined. Gibson long objected to the distinction between a natural domain and a sociocultural domain. His attitude in this regard is compatible with recent reevaluations in psychology and anthropology of the relation between human development and sociocultural processes, both from an evolutionary and an ontogenetic perspective. After exploring some of this latter work, which is coming to be called *cultural psychology* in many quarters, connections between it and Gibson's ecological perspective are examined. In particular, this discussion focuses on ways in which some of the knowledge sustained and elaborated through sociocultural processes are embodied ecologically in artifacts, tools, and representations, as well as how cognitive functions can be socially distributed. In such public forms, these embodiments of knowing can be aptly referred to as "ecological knowledge"; and viewed as such, they fit well with Gibson's vision of the environment as being rich in meaning from a psychological standpoint.

And what about the other ecological psychologies that will be familiar to some readers? Some features of Egon Brunswik's approach are explored, but primarily to draw a contrast between his and Gibson's views. In contrast, Bronfenbrenner's influential ecological program is examined only briefly. The exclusion of Bronfenbrenner's work stems from some theoretical incompatibilities between his and Gibson's perspective. Although aspects of Gibson's framework were indeed influenced by the

same set of ideas central to Bronfenbrenner's—namely, the work of Kurt Lewin—ultimately, Gibson parted theoretical company with Lewin, and by extension with programs rooted in his perspective. At the same time, whether Bronfenbrenner's concepts of "exosystems and macrosystems," which arguably depart from Lewin's phenomenological perspective, can be brought into alignment with the Gibson–Barker synthesis explored here is a possibility left unaddressed.

In short, the proposed synthesis of Gibson's and Barker's programs is motivated by the goal of seeking an ecological psychology that is broad in scope and, importantly, *theoretically coherent*. Rather than pursue an eclectic approach to theory, the position maintained here is that psychology will be best served by advancing theoretically coherent positions that can be submitted to logical scrutiny and empirical test. Admittedly, the framework proposed requires that adherents of Barker's perspective adjust a few features of their metatheoretical commitments; but these adjustments, in my view, serve Barker's goals quite well. Otherwise, this book attempts to remain true to both Gibson's and Barker's intentions, as I understand them.

Having indicated the book's focus, let me situate this project within a broader set of underlying concerns. Looking back over the previous century of psychology, it appears that we have made advances in the scientific study of some aspects of the human condition, while neglecting others. Specifically, although gains have been made in shedding light on those attributes we share with other animals, in the process much that is essentially human has been too often set aside. As a result, matters that should be at least the partial responsibility of psychology, such as meaning, values, and aesthetics, have too often been abandoned on the doorstep of the humanities. Experimental psychology is sorely in need of a framework that at once satisfies the theoretical rigor and empirical standards of natural science, while at the same time provides grounds congenial for inclusion of those qualities that seem to be distinctively human.

Perhaps the selective development of a problem domain is the inevitable result of adopting an analytical stance. As we focus on a particular feature in our field of experience, other features become relegated to the background—and, in some cases, even slip out of focus. But surely, a scientific psychology must be both scientific and psychological. We must make good on both counts. For reasons to be explored, I believe that ecological psychology provides some of the necessary groundwork for a psychology that is both scientifically rigorous and adequate to its subject matter.

## ACKNOWLEDGMENTS

I am deeply indebted to many teachers, colleagues, and friends who have helped me to steer a course among a number of broad and sometimes seemingly conflicting concerns. I am very grateful to Joachim Wohlwill, my mentor in the interdisciplinary program in environment–behavior studies at Pennsylvania State University, who offered me critical and supportive guidance throughout my graduate studies and who continued to foster my development for many years afterward. Jack Wohlwill, who was Brunswik's last student, was a model of dedicated scholarship and synthetic thinking for all who knew him.

Walter Weimer, of the Department of Psychology at Penn State, provided a stimulating and often provocative counterpoint to work in my home department, and in so doing enormously broadened my horizons about the nature of scientific inquiry. Now, over two decades later, I continue to feel the impact of Walt's intellectual provocations.

Following graduate school I had the extraordinary good fortune to spend a year at Cornell University studying with James Gibson. He graciously allowed me to shadow him and tolerated my naïve and half-formulated questions during what was, for me, a remarkable postdoctoral year. As becomes evident in the following chapters, my contact with James and Eleanor Gibson, initially through their writings and later in conversation, transformed my thinking.

Over the ensuing decades, ongoing exchanges with many others have directly shaped my views. Among those colleagues and friends who were most influential early in my academic career were Bob Daubert, Philip Glotzbach, and Anthony Lisska. Over the past two decades, my thinking has been influenced through interactions with many generous colleagues, especially Ed Reed, Herb Pick, Alan Costall, Kent Maynard, Steve Vogel, Rita Snyder, Mark Moller, and Bahram Tavakolian.

A number of years ago, I was struck by the aptness of a book dedication to "my teacher, under whom I have never studied" (R. I. Watson, 1978). This dedication conveys a sentiment that most academics feel: namely, a profound intellectual indebtedness to the community of scholars, past and present, from whose writings we have learned so much. My teachers from these ranks, most of whom I have never met, are far too numerous to list here, but their contributions to my thinking are apparent in the following pages.

The present work has benefitted immeasurably by the critical and supportive comments of many individuals. I am most grateful to Alan Costall, Jack Sanders, and Bill Mace, who read an earlier version of this book in its entirety. Their generosity in taking on this considerable task is greatly appreciated. Also, I am indebted to Phil Schoggen for his detailed

critique of an earlier draft of chapters 7 and 8. His penetrating assessment greatly improved my examination of Barker's program. In addition, I would like to thank the following individuals who graciously offered very helpful comments on one or more chapters of the book: Kerry Marsh, Paul Gump, Julie Mulroy, Anne Pick, Kent Maynard, Bahram Tavakolian, Rita Snyder, Tim Ingold, Mary Clark, Pat Zukow-Goldring, Steve Vogel, Mark Moller, Dikkie Schoggen, Jonathan Barker, Herb Pick, Endre Kadar, Dankert Vedeler, Ed Reed, Eleanor Gibson, Jon Krosnick, Tony Lisska, Bill Nichols, Philip Glotzbach, William Epstein, and Sharon Hutchins. Needless to say, the faults that remain in the book do so in spite of the best efforts of these generous colleagues. I would also like to express my gratitude to Marianna Vertullo of LEA for her expert editorial contributions and cheerful support during the final phases of this project. Finally, I thank Louise Barker for sharing with me the splendid photographs of her husband, Roger Barker.

Work on this project, and indeed on most of my scholarly endeavors over the past 24 years, has been supported by my home institution, Denison University. My semester's leave of absence from teaching responsibilities at the beginning of this project (spring 1995), and again near its end (fall 1999), both times supported by Robert C. Good Faculty Fellowships, made this project possible. Professional development support over several summers from Denison is also gratefully acknowledged. Liberal arts colleges, like Denison, with a primary commitment to undergraduate education, and that also support faculty research and scholarship, are truly treasures in the academic community.

I am also very grateful for the support and friendship of my colleagues in the Department of Psychology and across campus over the years.

Finally, there is no doubt that the long period of time during which this book has been in preparation must have seemed especially protracted to my family. I am inexpressibly grateful for their love, forebearance, support, and sacrifices. I thank Cynthia Kreger for her boundless encouragement, patience, and good cheer, and Peter Heft for tolerating my periods of solitude and preoccupation. His anticipated arrival during the project's early stages helped to inspire the endeavor, and my joy in his presence kept me energized throughout its preparation.

I consider myself remarkably fortunate for all of these experiences and for the support of so many. I look back with wonder at the role chance events and chance encounters seemed to have played in my development, and with awe and humility at the many kindnesses extended to me.

Columbus, Ohio
August 2000

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# Introduction

Has there been a moment since its formal founding in the late 19th century when experimental psychology was not in a state of theoretical conflict? Select any historical point during its first 120 years, and you will find psychologists embroiled in some theoretical squabble. It is true that psychology is by no means alone among the sciences in having ongoing theoretical tensions. And yet there is an important difference here. In most other sciences, especially those that share psychology's roots in natural science, these disagreements typically occur around the edges of a core set of shared theoretical presuppositions. But, in psychology, it is these very *core presuppositions* that are often being contested. Since its inception the discipline has been rife with claims from various quarters that particular theoretical approaches and conceptual tools, levels of analysis, and methods are canonical, with other contenders for that status lacking legitimacy. Psychologists continue to struggle among themselves concerning the best way to think about the subject matter of psychology, and to some extent even about identifying the proper subject matter of psychology.

What is the reason for this ongoing conflict and instability? In the aftermath of Kuhnian analyses of science, in which work in mature sciences is portrayed as being structured by an underlying common paradigm, the view of some psychologists seems to be that this turmoil reflects the ongoing preparadigmatic state that befits any immature science such as psychology. This explanation, however, lets psychologists too easily off the hook, and in so doing, covers up the source of the problem. One underlying purpose of this book is to offer a different explanation. Much of this theoretical instability can be explained by the fact that our systematic attempts to understand ourselves have been typically built on a conceptual foundation ill suited for this task. If

examined closely, it becomes evident that it is a foundation made up to a significant degree of long-standing concepts from the sciences of nonliving things, that is, the sciences of the inanimate.

With a few notable exceptions, the field of psychology has been an attempt to develop a science of animate beings on the back of concepts borrowed from traditional approaches to the study of the inanimate. This juxtaposition of the animate and the inanimate at the heart of psychologists' thinking has engendered irresolvable conceptual conflicts. Moreover, after stepping back and viewing it from a distance, the picture of psychological functioning that emerges from this science sometimes seems to bear little relation to our everyday experience—and worse, it sometimes seems to violate our notion of who we are.

By sciences of the inanimate, I am referring of course, to the physical sciences–the oldest and most advanced of the modern sciences–and to particular physical science approaches at that. The collective progress made toward developing ever-sophisticated and predictive explanations of the character of the physical world is without a doubt among the most impressive intellectual achievements of the last millennium. From the analysis of matter at atomic and subatomic levels to the composition of the universe at a cosmological scale, the record of the physical sciences is imposing and admirable. It is not surprising then that in attempting to establish the groundwork for a scientific psychology, the first generations of experimental psychologists tried to emulate these endeavors by drawing on the conceptualizations of nature and the scientific methods that have proven so successful in the physical sciences.

Surely, modeling psychology after these highly advanced sciences is all to the good. Or is it? A premise of this book is that uncritical utilization of concepts and methods from the physical sciences has impeded progress in psychology precisely because some of these borrowed concepts fail to capture those qualities most characteristic of animate things. The position being advocated here instead is that psychology stands the best chance of progressing as a discipline when more than lip service is given to the fact that, first and foremost, psychology is the study of animate phenomena. Psychology needs to be built on a conceptual foundation compatible with the life sciences, and especially with the study of animals as organized, dynamic, adaptive beings, rather than on the mechanistic foundations of physical science.

This sweeping indictment needs to be qualified, however, in two respects. First, when I speak here of the physical sciences, I am referring to what is commonly called the Newtonian framework of physics and, more generally, the Cartesian metaphysics on which it is based (to be described later). Although this framework forms but a piece of contemporary theory in physics, it is the perspective that has had the

greatest impact on psychology. Consequently, reference here to the influences of physics and physical concepts is not intended to describe physics as contemporary physicists view it. Rather, it refers to physics as it has historically shaped psychological thinking; that is, physics as psychologists typically view it. Alternatives to the Newtonian approach in physics, such as field theory and more recently, the analysis of dynamic complex systems, will figure positively in later discussions in this book.

Second, the varieties of theories in psychology cannot be painted with a single brushstroke. Whereas some theoretical approaches are deeply influenced by the conceptual tools of the physical sciences, others, such as organismic approaches, have explicitly sought to break from that perspective. In the case of the latter, however, there is often an uncritical assimilation of some physicalistic concepts that prevents the goals of these theories to be fully realized. This shortcoming is most evident when it comes to how the environment is handled and how the relation between the person and the environment is conceptualized—but more on these matters later.

Consider some ways in which a science of the animate differs from a science of the inanimate. At the level of human experience, animate beings, unlike inanimate things, are (a) ceaselessly *active* and b) continually in the process of engaging their surroundings in a *selective* manner. Environmental conditions are in flux, and animate beings monitor these ongoing conditions, make functional adjustments with respect to them, and engage environmental features in relation to their own goals and interests. For these reasons, (c) animate beings exist *in relation* to a flow of events, and their functioning is best understood as that of dynamic, organismic processes *in context*. Animate beings selectively engage environmental features and selectively enter places in order to benefit from the functional opportunities things and places offer. And more than this, (d) animate beings participate in the *modification* of many of these very features and places. In these respects, (e) animate beings are *adaptive agents*.

Inanimate things, as described with traditional physical science concepts, lack these dynamic, selective, relational, and constructive qualities. Inanimate things are just that, inanimate; they are inert. They are passive recipients of what environmental conditions have to offer rather than being purposive agents in the environment.[1] As such, they are not sentient. Because the properties of inanimate things are not functional properties, an appreciation of context is not necessary for the analysis of

[1]Categorical boundaries are rarely sharp. Where do plants fit into this conceptual division? Admittedly, they do not fit neatly into either category, but because they lack agency, for the purposes of an ecological psychology they fit into the inanimate category (J. J. Gibson, 1979). Not all animals have agency, however, as in the case of sessile animals such as sponges, so strictly speaking animate is not completely synonymous with animal.

most inanimate things. It is with respect to these attributes that the sciences of the inanimate and the animate are most fundamentally at odds. And it is our inattention to these differences, resulting in employing standard concepts from the physical sciences where functional concepts are required, which begins to erode the possibility of developing a psychology fully adequate to living things.

Recognition of the distinctive qualities of animate beings requires an essential conceptual step; and this step more fully distinguishes the approach explored in the following pages from other broadly similar ones. At the conceptual core of a science of the animate is an *ecological perspective*. Such a perspective takes as its central tenet, as its sine qua non, the *dynamic interrelation* between a living thing and its environment, with the environment considered in its full complexity, including at multiple levels of organization.

## RETRIEVING ECOLOGICAL PSYCHOLOGY FROM THE MARGINS

Making a commitment to a psychology built on an ecological perspective unfortunately creates at least as many difficulties as it resolves. This is the case in large measure because some of our most basic patterns of thought, both in science and in daily living, grow out of conceptions rooted in Newtonian physics and Cartesian metaphysics. Standard physical science notions permeate our language and certainly our schooling, making particular ways of thinking familiar to the point of no longer being noticeable to us as but one way of thinking. And this is the case as much for the academic as it is for the layperson.

Consider three brief examples of this influence, each of which is discussed in more detail in the following chapters. First, our automatic and exclusive identification of the term *cause* with mechanistic antecedent-consequent relations illustrates one way that thinking from the perspective of Newtonian physics and Cartesian metaphysics has become part of the fabric of everyday discourse. With this formulation, when considering the cause of an occurrence, the tendency is to look for precipitating, antecedent events. This, however, may be too limited a view of causality when attempting to address animate phenomena.

A second example of this effect is the seemingly commonsense distinction between matter and mind, which grows in part out of attempts to describe aspects of perceptual experience in classical, physical terms.[2]

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[2]By physical I mean employing the concepts of the physical sciences, particularly as they are used to describe the environment and environment–organism relations. I distinguish *physicalistic* and *materialistic*, the latter referring to assumptions about the "stuff" of which all things in the natural world are made (Turvey, 1992). Opposing the use of standard physicalist concepts for psychology does not entail opposing materialism. As a science, psychology must be materialistic.

Armed with this distinction between matter and mind, psychologists tend to reject one side of this distinction, traditionally the mind, or if not, then to treat mind with circumspection—in either case, to the detriment of constructing an adequate psychology. Certainly, part of the problem here is how mind has been traditionally conceptualized, and in the following, we will take a non-conventional approach to this issue.

Third, but related to the preceding example, is the apparent dichotomy between the organism and its environment. From a psychological perspective, frequently reference is made to a domain "in" the organism as against a domain "outside" the organism, as if there is a clear and obvious boundary between the two. But, the question of where to locate this boundary is not clear-cut and, as a consequence, it is far more interesting than it appears at first glance.

When venturing into the territory of ecological thinking as it applies to psychological phenomena, it is necessary to jettison such ways of thinking in order to proceed in a coherent manner adequate to the subject matter. In the absence of familiar conceptual guideposts, finding our way is fraught with uncertainty. Ecological thinking requires a shift in point of view. For this reason, it can initially feel unfamiliar and confusing, which leads to the primary purpose of this book.

*The overall aim of this book is to articulate an emerging conceptual foundation for an ecological approach in psychology.* Having announced such a grandiose intention, it is necessary to qualify what I am doing in this book. Fortunately, this project does not need to be cut from whole cloth—I am not so presumptuous as to attempt such a daunting task. The groundwork for an ecological psychology already exists among diverse sources in the psychological literature. To date, however, some of these ecologically-related writings have been marginalized in experimental psychology, remaining outside of the mainstream of disciplinary thought. My intention is to retrieve some of these initiatives, and by synthesizing them, give these individual efforts added strength and persuasiveness through their mutual relations. This synthesis is based partially on identifying shared *historical roots*, and partially on elucidating *theoretical complementarities*. Rather than proposing a novel perspective, the goal here is to examine in considerable detail a few existing bodies of work, which when joined together provide the needed conceptual foundation for an ecological psychology. Primarily, the focus is on the ecological psychology of James J. Gibson[3] and the eco-behavioral science of Roger

[3] In truth, it is inaccurate to attribute sole authorship of this ecological approach to James Gibson. As he stated repeatedly, his equal partner in this endeavor was Eleanor J. Gibson, whose efforts were and continue to be directed primarily at developmental issues from an ecological perspective. The focus here on James Gibson's work, and its historical origins, is in no way intended to diminish the contributions of Eleanor Gibson, *continued on next page*

G. Barker.[4] And of these two positions, Gibson's constitutes the core of the ecological framework advanced herein.

## THREE GOALS OF THE PROJECT

With these broad intentions in mind, let me indicate three more specific goals of this book. First of all, Gibson's approach is currently the most well known of the ecological psychologies in the field of experimental psychology. At the same time, it appears to be an approach that is not easily grasped in its entirety. It has been frequently misunderstood by its critics, and even underappreciated by more sympathetic readers. *One of the goals of this book is to cultivate a deeper appreciation for Gibson's approach by articulating its theoretical commitments, in part through philosophical and historical analysis.*

The primary focus of this analysis is the later philosophy of William James and the psychological and philosophical contributions of E. B. Holt, two of Gibson's intellectual antecedents. This historical and philosophical ground has received only brief consideration in other scholarly studies of Gibson's work (Lombardo, 1985; Reed, 1988). Gibson's program is quite different from familiar formulations of psychological processes, and by extension, from the historical origins on which these mainstream ideas rest. It is partially for this reason that his ecological approach has been marginalized in the discipline. In the absence of a fuller exposition of its roots, Gibson's ecological program will continue to be vulnerable to dismissal as a maverick, quirky point of view. This book shows that, to the contrary, this approach has deep connections to critical developments in early 20th-century American philosophy and psychology, which themselves have a time-honored pedigree.

A second reason why ecological psychology can be easily pushed to the margins of the field is because, in fact, it is not one program but many different ones bearing uncertain connections. Gibson's is but one ecological psychology among several others; and the appellation "ecological psychology" points to several different, loosely joined positions rather than

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[3]*continued from previous page* who by any measure is surely among the outstanding experimental psychologists and scientists of the 20th century. At the same time, in spite of their commonalities, the Gibsons were not of one mind, and there have been fine differences between the way they each approach certain issues. Consequently, it is not possible to talk about "the Gibsons' view" without occasional qualification. For this reason, although most of what follows is consistent with Eleanor Gibson's ideas, it is important to stress that it is the work of James Gibson that is traced in this book.

[4] I would be remiss if I did not mention the substantive contributions of Barker's close colleagues to this endeavor, especially Louise Barker, Herbert Wright, Paul Gump, and Phil Schoggen. Reference to "Barker's program" in the following pages acknowledges his clear leadership of this group, but it is also intended at times as a shorthand for the efforts of his research team.

any shared perspective. There is considerable justification for questioning the possibility of a coherent ecological psychology among them. What, if anything, proposals for an ecological psychology share, besides a general call for sensitivity to environmental conditions variously defined, is far from clear. Consequently, *a second goal of this book is to explicate a set of foundational ideas that can serve to draw together two of the major ecological programs in psychology, James Gibson's and Roger Barker's.* This synthesis is especially worthwhile because it enables the expansion of the scope of ecological psychology in theoretically coherent ways.

Now is a propitious time for such an undertaking. The past decade has seen an increasing number of psychologists embrace several ideas that are fundamental to an ecological approach. There has been a growing recognition of the critical role contextual factors play in psychological phenomena; and reciprocally, there has been increasing skepticism about the meaningfulness of analyses that wrest phenomena from their accompanying contexts. Further, the notion of multiple and reciprocal causation has firmly taken hold in psychology, replacing single cause, unidirectional explanations of events. These two ideas— recognition of the significance of context and a sensitivity to multiple and reciprocal causes—are, in fact, facets of the dynamic, organic perspective that is the hallmark of the life sciences.[5]

For these reasons and others that could be mentioned, experimental psychology as a discipline may be moving ineluctably toward a conceptual and a methodological stance that will transform it into an ecological psychology. As becomes evident, a significant consequence of this transformation is recognition of the central role that sociocultural processes must play in an account of psychology.

Finally, a third goal of this project is *to consider the place of ecological psychology in the discipline of psychology more generally.* Because of its metatheoretical commitments, ecological psychology is well suited to take some preliminary steps to address what is certainly one of experimental psychology's most glaring deficiencies. To state the problem briefly here, the account of psychological processes offered up by the discipline often seems to have only a minor bearing on individuals'

[5]Such qualities also characterize some approaches in physics that have been proposed in this century as alternatives to the Newtonian framework. Indeed, Hermann (1998) convincingly argued that concepts from analyses of biological systems in recent decades are of greater value in understanding inanimate systems than is the reverse. He wrote:

> In the past, discussions of the relevance of science for the interpretation of reality, including human existence, were based on the simplification of physics. However, the close relationship of alternative interpretations of living matter ... suggests that the understanding of living, rather than inanimate systems, would be of greater use in reconciling the simplifying and complex qualities of reality. (p. 7)

everyday lives. Our present understanding of the human condition is surely more limited than any psychologist would like.

Some critics, such as Koch (1964, 1999), have attributed this circumstance in part to an impoverished conceptual language that arises from unwarranted strictures on what can be properly admitted into the discipline. A historical analysis suggests that this tendency can be traced back several centuries to the early development of the natural science attitude itself (Toulmin, 1990). A number of less than desirable consequences follow from this state of affairs. Only two are named here. First, there is the ever-widening gulf between the content of psychology and other domains of inquiry concerned with the human condition, namely, the humanities and the arts. Arguably, the problem Koch so vigorously criticized has lessened somewhat in recent years. But, it is sad to say that a great deal of psychology still falls short when it comes to offering an account of the human condition that psychologists and nonpsychologists alike recognize as adequate to their own everyday experience.

This point leads to a second consequence of an inadequate conceptual language. Because of the authoritative status of the sciences in Western culture, the "image of human nature" that psychology offers up has the power to transform how we think about ourselves. For this reason, an impoverished or an inaccurate account of human experience can reflexively and gradually become accurate or self-fulfilling in time through the imprimatur of science, even if this is an unintended outcome. For this reason, the work of psychologists, both in a research context and in the classroom, carries with it a greater measure of moral responsibility than is often recognized.

One essential quality of human experience that has received scant attention in experimental psychology is its *meaningfulness*. Unlike the world described by the physical sciences, the world-as-lived is meaningful; and clearly, much of human action is characterized by "efforts toward meaning." Individuals strive to make sense, in both mundane and elevated ways, of the constant and changing character of their lives. That continuing efforts of this nature are basic to human beings can be evidenced on those rare occasions when we experience disorientation and distress in situations lacking in meaning for us. These efforts are more commonly evidenced by the extensive and elaborate individual and sociocultural actions plainly visible around us that function to maintain meaningful structures in our lives. The discipline is in need of systematic and rigorous ways to address this central dimension of human experience. At its most basic level, meaning is a relational or contextual property of human experience, and ecological

psychology can play a central role in articulating this dimension of immediate experience.[6]

In short, what is being offered here is a study of ecological psychology in context in several different, although interrelated, respects: in historical context; in relation to the other sciences, and the life sciences in particular; as a concern for phenomena occurring at multiple levels of organization; in the context of the role of sociocultural processes in psychological phenomena; and in recognition that meaning, which arises out of contextual considerations, is an inescapable quality of human experience.

## OVERVIEW AND PLAN OF THE BOOK

With those introductory remarks, let us turn to an overview of the argument, along with a description of the structure of the presentation.

Part I begins with a brief discussion of psychology's perennial theoretical dilemma. From the outset, experimental psychology has been caught between, on the one hand, following successful paths established in the physical sciences and, on the other, recognizing the necessity of grounding its concepts in evolutionary theory. A dilemma arises from psychology's being thusly positioned because of some conceptual differences between the Newtonian worldview that underlies classical physical science approaches and the functional perspective of an evolutionary account of living processes. Newtonian physics is an attempt to describe a timeless world that is already in place. An evolutionary approach assumes a dynamic world continually coming into existence in often unforeseeable ways. The standard metatheoretical foundation of much 20th-century psychology, based as it is on a Newtonian–Cartesian philosophical heritage, leaves the discipline awash in tensions arising from these radically different stances. As a result, critical tensions lurk at the heart of the discipline.

An alternative metatheoretical approach more suitable for an ecological psychology had been developed and was available early in this century, although—then as now—it has attracted little attention in most psychological circles. This alternative, discussed in detail in chapter 1, is William James's philosophy of radical empiricism. It is highly ironic that in spite of James's eminence among psychologists, his philosophy of radical empiricism—which in many ways was the culmination of his life's

[6] Ecological psychology is not alone in identifying meaning as a central and yet neglected issue in the discipline. A major effort has been underway for a decade or more in the psychology of language to give meaning or semantics the attention it has long been overdue (e.g., Lakoff, 1986).

work—is relatively unknown to psychologists.[7] This paradoxical situation needs to be examined. James formulated radical empiricism as a means of circumventing the insurmountable problems presented to psychologies built on the Cartesian tradition. Unlike these latter positions on which evolutionary considerations can only be awkwardly imposed post hoc and that retain the exclusive mechanistic focus of Newtonian science, radical empiricism grows directly out of a functionalist, evolutionary account of psychological processes and fully embraces the reciprocity between animal and environment that such a view entails. This book shows how the perspective of radical empiricism, which fits compatibly with evolutionary theory, leads to a psychology that more fully captures the nature of human experience than does its rivals.

Radical empiricism may be relatively unknown to contemporary psychologists, but the most significant psychological product of this philosophical system has become quite visible in recent decades: I refer here to James J. Gibson's ecological psychology. Although growing in influence recently, Gibson's theory remains on the periphery of psychology for several reasons, foremost of which is its conspicuous departure from standard formulations of psychological processes. Psychologists initially confronting Gibson's ecological approach, and even those having some familiarity with it, typically have difficulty anchoring it to any existing intellectual traditions. It seems highly idiosyncratic, appearing virtually "out

[7] In the weeks preceding the completion of this book, I came across two very recent and problematic uses of the term *radical empiricism*, one somewhat misleading and the other inaccurate. As to the former, in an extended and detailed call for interactionism in analyses of developmental processes, Elman et al., (1999) used the term to refer to an extreme environmentalist position. Although that may be a literal rendering of the phrase, it is not at all what James's had in mind when he employed radical empiricism to refer to his philosophical position. Used in this way, radical empiricism becomes closely aligned with radical behaviorism. If radical empiricism takes on this connotation in the coming years, it would be regrettable, because in the process a distinctive viewpoint that James and others sought to develop would be lost.

More problematic is the use of the term by Capaldi and Proctor (1999), who accurately connected the term to James's philosophy, but who are quite wrong in describing James as a relativist who foreshadowed the epistemological relativism seen in much post-modernist philosophy. Only a cursory reading of James's position could lead to such a conclusion. I am sympathetic with many of the concerns that motivate Capaldi and Proctor's discussion, but I worry that their misreading of James could foreshadow a similar misreading of the present work.

As I will show, there has been a long-standing tendency to employ certain dichotomies in analyses of psychology that are rather dubious, one of which is objective/subjective vis-à-vis knowledge claims. James's radical empiricism is a rejection of this dichotomy. Therefore, while James finds the notion of "objective" knowledge (in the sense of knowledge that corresponds with external reality) problematic, that does not mean he considered knowledge to be something that minds impose on the world. To draw that conclusion is to remain within the objective/subjective dichotomy. This claim is not only inaccurate with reference to James, but also with reference to some (but not all) versions of pragmatism generated by his or John Dewey's writings.

of the blue." This circumstance has impeded ready comprehension of its essential claims, which in turn has adversely affected its wider acceptance. Reading Gibson's work does little to remedy this situation. Although he clearly indicated which theoretical traditions he distanced himself from, it is far from obvious how to ground his ecological theory in a positive manner. The presentation of radical empiricism here partially fills in this gap.

But James's radical empiricism alone does not lay the foundation for Gibson's ecological program. Although this ecological approach is an off-spring of James's philosophy of radical empiricism, Gibson's exposure to radical empiricism was apparently indirect, through his primary graduate school mentor, Edwin B. Holt, a student of James, who devoted most of his intellectual life to working out some psychological implications of James's radical empiricism. Holt's position has sometimes been called *philosophical behaviorism*. A largely forgotten figure today, Holt was very prominent in both psychological and philosophical circles during the first three decades of the 20th century. His work provides the linkage between James's radical empiricism and Gibson's ecological psychology, and it is the focus of chapter 2.

Holt's writings receive the extensive treatment that they do here precisely because his work has been forgotten by contemporary psychologists. But it is deserving of far more attention than it has received in recent decades. Not only does it provide an important extension of radical empiricism into psychological theory, and in so doing connect Gibson's ecological approach to Jamesian psychology and philosophy, but it is insightful and notable in its own right in spite of some limitations from a contemporary vantage point. By presenting as detailed examination of Holt's work as I do, I run the risk of detracting from the main purpose of developing a broad-based account of an ecological perspective. If other sources existed that reviewed Holt's ideas and demonstrated their contribution to Gibson's thought, far less space would be devoted here to this body of work. Unfortunately, this is not the case. Hopefully, my examination of Holt's contributions will help to rehabilitate the work of this important 20th-century thinker. Some of the reasons for his fall from prominence in psychology reflect the prevailing social climate in academia for much of this century and are themselves instructive to consider, if only briefly.

Having examined in detail some of the writings of James and Holt, Part II turns to Gibson's ecological theory, specifically to articulate the interconnections among the three. Although Gibson's ideas are presented here at a level accessible for the newcomer to this work, because my primary goal is to demonstrate the linkages between Gibson, James, and Holt, Gibson's ideas are not systematically reviewed. Some overviews for various audiences have been offered elsewhere (Heft, 1981, 1988b, 1997);

moreover, numerous, detailed expositions of his ideas are readily available (e.g., Michaels & Carrello, 1981; Reed, 1988), not to mention Gibson's own highly accessible books and papers. Prior general familiarity with Gibson's work is not necessary for reading these chapters in Part II; the chapters can stand on their own. But they are not intended as a substitute for a full exposition of Gibson's ecological framework.

Chapters 3, 4, and 5 that comprise Part II, examine the interconnections among the works of these individuals—and I stress their *inter*connections—because not only do major features of Gibson's ecological theory reflect the influences of James and Holt, with many of Gibson's proposals growing out of themes central to radical empiricist philosophy and philosophical behaviorism, but also aspects of Gibson's theory can reflexively address several critical and unresolved problems that arose for James in the formulation of radical empiricism. This discussion contributes to the ongoing philosophical examination of James's later work, which is experiencing somewhat of a renaissance in recent decades (e.g., Lamberth, 1999; Myers, 1986; H. Putnam, 1990, 1995; R. Putnam, 1997; Reed, 1997; Seigfried, 1978, 1990; Simon, 1998; Suckiel, 1982; Taylor & Wozniak, 1996). Hopefully, interweaving central features of Gibson's, James's, and Holt's ideas in these chapters will help the relative newcomer to Gibson's work gain a firm foothold; will give those readers with a background in this perspective new and deeper insight; and will enrich the philosophical development of radical empiricism and its allied program, pragmatism.

These chapters that comprise Parts I and II of this volume have as their collective intention to explicate and thereby *deepen* the theoretical base of an ecological psychology. This deeper conceptual base, however, remains somewhat narrow, focusing as it does primarily on matters concerning the psychology of perception and cognition. *Broadening* the conceptual base of ecological psychology is the overall intent of Part III.

The first three chapters in Part III attempt to merge Gibson's ecological psychology with the somewhat lesser known eco-behavioral program of Roger Barker. Through painstaking observational research, Barker and his colleagues made important discoveries about the structure and dynamics of the social settings within which individuals conduct their daily lives. They found that higher order ecological structures emerge from the dynamic interrelations established among individuals and environmental features, and in turn these extra-individual structures are the basis for some of the order seen at the level of individual action. I show that Gibson's and Barker's programs are complementary, with each working at different levels of ecopsychological analysis.

To date, these two ecological programs have been dealt with quite separately in the literature, but they are historically and metatheoretically

compatible. Both approaches have been deeply influenced by the field-theoretic Gestalt tradition. Further, and most significantly, the theoretical linchpin between Gibson's and Barker's systems is the seminal work of Fritz Heider during the first half of the 20th century. Chapter 6 examines these Gestalt influences, as well as the related and very important perceptual work of Heider. Although Heider is well known for his contributions to social psychology (e.g., attribution theory, one of the more influential theories of the 1980s, is traceable to him), his earlier perceptual writings are less well known to psychologists.

Chapter 7 focuses specifically on Barker's ecological psychology, including a critical examination of a recent attempt to expand this program. In place of the latter, an alternative proposal is offered that draws on writings concerning dynamic complex systems. Chapter 8 considers the interrelationships between Gibson's and Barker's programs. Overall, by juxtaposing Barker's framework with that of Gibson's, it becomes possible to elucidate a theoretically coherent ecological theory of psychology that operates at multiple levels of analysis.

Ecological psychology's conceptual base is expanded further in chapter 9 where *sociocultural* processes become the focus. The framework of ecological psychology is seen as being compatible with the viewpoint in contemporary cultural anthropology that culture provides a necessary background for understanding developing psychological processes, both from a phylogenetic and an ontogenetic perspective. The quality of psychological experience that becomes most central from such a viewpoint is *meaning*, which is the very quality that is most problematic for a psychology built on the standard physicalistic concepts. The entities of physical science—or rather, natural entities considered at the level of analysis of physical science—are without meaning and value-free. It is primarily for this reason that a psychology with its roots in the physical sciences, as is the case with most contemporary experimental psychology, has precious little to say about meaning. This lacuna in contemporary experimental psychology is glaring considering that meaning and value are ubiquitous, inescapable, and arguably the quintessential features of human experience. In an ecological-functional account, where psychological processes are viewed as part of a sociocultural network of mutually supporting, adaptive relations, and where the individual as a participant in culture is recognized as sustaining, and indeed creating, cultural structures through everyday actions, meaning takes center stage—as well it must if psychology is to have much to say about the human condition. Significantly, ecological psychology suggests an approach to meaning from a third-person perspective, thereby offering a way of making this issue amenable to experimental study.

These considerations add further weight to the fundamental Jamesian insight that psychology must adopt a relational focus. Knowing will be seen as being best understood as a functional relation between the knower and the known. Rather than viewing knowing as an intra-individual process, as something primarily occurring "in" the private theaters of individuals' consciousness, it will be seen, most basically, as action-in-context. By adopting this perspective, psychological processes cannot be justifiably seen as events occurring within the boundaries of the body in any simple sense. Instead, the realm of the psychological encompasses the environment (defined relationally) to include, among other things, tools, artifacts, and representations.[8] Opportunistic discovery of tools and the intentional design of artifacts and representations demonstrate that knowing can extend into the environment itself, encompassing both the individual and the environment considered jointly. What this discussion highlights, in particular, is the *public nature of knowing*, which is embodied not only in social action but also in artifacts and other human constructions. The public availability of knowledge is seen as fundamental to sociocultural processes, and in turn, is essential for understanding many of the advanced forms of knowing that distinguish humans from other animals.

As an extension of this claim, chapter 9 proposes that knowing can be distributed among groups of individuals. It is quite commonplace that each of us participates in collective activities that no one of us could accomplish alone. This phenomenon is more than a mere division of labor where members of a group divide up a set of tasks that any one of them could, in principle, carry out. In many cases, an individual only knows one part of the collective activity. Thus, what is commonly found in the everyday world, once we begin to look for it, are instances of knowing that exist only in a distributed form across a group of individuals and across the tools, artifacts, and representations they employ. In such cases, the needed knowledge for carrying out many activities resides with no one person, but only exists en masse.

This discussion of extended and distributed cognition, compatible with the relational foundations laid by James, Holt, and Gibson (not to mention Dewey and Heidegger), helps to liberate psychology from its traditional "derma-bounded" focus—a focus that locates psychological phenomena solely within the boundaries of skin. In turn, this discussion leads to the recognition of the important place that work such as Barker's on extra-

[8]As should be apparent from the context, and as becomes very clear in the following chapters, the term *representation* is not used in the standard way to refer to something existing in an individual's head, in the sense of a "mental representation." Following Gibson, I am using representation to refer to environmental features such as drawings, photographs, and writing.

individual phenomena has in psychology. Knowing, or mind, if you will, extends into the functional and symbolic possibilities of an individual's sociocultural world. Recognizing this is truly an important step toward a more fully realized ecological psychology.

Finally, chapter 10 returns the discussion to its point of origin. The radical empiricist roots of ecological psychology are reexamined in light of the overall presentation. An ecological psychology built on radical empiricist assumptions, and integrated with recent ideas in anthropology, the study of technology and tools, the analysis of situated and socially distributed cognition, and dynamic complex systems will enable psychology to break free from those physical science conceptions that have constrained its growth to date. With this ecological framework at its core, the prospects for a scientific psychology that highlights rather than obscures unique qualities of the human condition become more imaginable.

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# I

# Ecological Theory and Philosophical Realism

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# Prologue: Intimations of an Ecological Psychology

> And just as an individual, to be free, must verbalize the past that has resulted in his present, so an entire science must remain in dialogue with its past and analyze its hidden biases and omissions if it is not to wither away into dried-up specialties and unfulfilling evasions. (Jaynes, 1973a, p. x)

The modern conception of psychology is rooted firmly in the Cartesian perspective. The expression "the Cartesian perspective" refers to the worldview accompanying the rise of the New Science, starting roughly in the early 17th century and represented in the work of such scientists as Galileo and Kepler. It received its clearest and most systematic articulation in the writings of Descartes, and later reached formal scientific expression in Newton's imposing cosmology and physics. Thus, the phrase "the Cartesian perspective" does not refer solely to the philosophical and scientific writings of Descartes. Instead, it is intended as a label for the convergence of thought among many empirically minded Renaissance and Enlightenment thinkers who self-consciously, through logical reasoning and mathematical analysis, sought to liberate individual inquiry from centuries of institutional constraints. Its goal was, and is, to articulate the abstract, universal principles on which the natural order rests (Berlin, 1980).[1]

The Cartesian approach as applied specifically to psychological concerns recognizes two distinct domains: the *environment* and the *person*. It offers up a picture of the world consisting of matter in motion and, in contrast, a separate dynamic realm of mental phenomena where such materialistic accounts do not apply. Although phenomena of psychological interest—such as perceptual experience, thoughts, and emotions—are to be located within this domain of the person, their causes are typically sought in the material domain. What this conceptualization requires, then,

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[1]With its emphasis on discovering decontextualized universals, the Cartesian perspective that came to be synonymous with the natural science approach differed from an alternative, but equally "progressive" approach to understanding represented by the humanists of the late 16th century (Toulmin, 1990).

is that psychological analyses come to grips with processes of both the person and the environment—and it is here where the going gets rough. For if occurrences in the environment follow physical laws that are best understood as mechanical events, and if phenomena of the mental realm follow dynamic, nonphysicalist principles, then psychological phenomena in this dualistic framework cannot be related in any straightforward way with conditions of the environment.

How then can events in the physical world and phenomena of the psychological domain be coordinated? How can lawful relations be identified between environmental conditions and persons? Because the features of the environment and the operations of the body are both describable in the common currency of physical properties and mechanical events—that is, because the mechanical operations of the physical body are co-extensive with the mechanics of the physical environment—the body can be viewed as functioning as an intermediary between the environment and the mental realm.

This dualistic Cartesian perspective, which requires the coordination of a physical mechanistic domain (environment and body) and a dynamic mental domain, is contemporary psychology's legacy from its intellectual past. In the wake of this history, psychological theories have either followed this formulation generally and uncritically, or have adopted analyses that in the manner of their rejection of dualism retain some of its most problematic features.

## CONCEPTUALIZING THE ENVIRONMENT AND THE PERSON

Let us look more systematically at the way the environment and the person are conceptualized in the Cartesian perspective. The picture of the environment offered by this perspective is that of a world of inert matter in mechanical interaction. Matter and the objects composed from it are located in a container of space, their location specifiable with reference to three Cartesian coordinates, and also along a dimension of abstract time (Burtt, 1954). The various properties of objects in the world are describable in forms of physical energy, and through these energies, object properties are conveyed to the knower: Visually perceivable properties of objects are conveyed by light energy giving rise to visual experience. Tangible properties, such as solidity and texture, and sounds emitted from inanimate and animate objects are conveyed via mechanical energy and realized psychologically as tactual and auditory experience, respectively. The chemical composition of environmental features is conveyed by chemical energy and realized as taste and smell. This kind of account of the *physical* properties of the material world forms the basis of most contemporary treatments of the environment in experimental psychology.

And how have processes of the person been conceptualized? Such conceptualizations have changed in scientific circles over the past several centuries from an unholy Cartesian dualistic alliance of mechanical bodily processes and those of an unextended soul, either in interaction or in a parallel relation, to a more exclusive concern with material processes of the body. Analyses of bodily processes have themselves progressed from accounts described in purely mechanical terms, modeled after inanimate phenomena [e.g., the hydraulics of a closed system of fluids (Descartes) or the vibrations of taut strings (Newton and Hartley)], to analyses using biochemical concepts more suited to the nature of organic processes.

Taking a long view, then, this developing understanding of environmental properties and of person processes has followed different trajectories. Whereas the conceptualization of person processes has radically changed over the past three to four centuries, the concepts that psychologists employ today to describe the environment are substantially the same as those that scientists used in the days of Galileo, Descartes, and especially Newton. Looking at these different trajectories, would advances in the biological sciences have enabled a more primitive understanding of living processes to catch up with a more sophisticated understanding of the environment? Or, alternatively, in some sense, has the conceptualization of the environment in psychology failed to keep pace with changing views of the living organism? Although at first glance the first of these interpretations may seem more accurate, in my estimation, it is our conceptualization of the environment from a psychological perspective that is lagging behind.

The Newtonian revolution in the physical sciences during the Enlightenment has a counterpart in the Darwinian revolution in the life sciences of the 19th century. Evolutionary theory has obvious and important implications for the way in which psychologists think about living things, and consequently, this framework has dramatically transformed the conceptualization of the organism. Perhaps less obviously, but equally important, are the implications of evolutionary theory for how psychologists think about the environment. However, now, almost 150 years since the publication of *The Origin of the Species*, the treatment of the environment in psychology, for the most part, remains unchanged since the Enlightenment and is still couched in the language of the physical sciences.

Here is the origin of many of the theoretical tensions in experimental psychology. Put perhaps much too simply, the reason is this: The implications of the Darwinian revolution in the life sciences have yet to catch on fully in contemporary psychology. While psychological analyses of organismic processes have been transformed by evolutionary thinking, psychological analyses of the environment relevant to organismic

functioning have not. In the absence of a conceptualization of the environment more in keeping with evolutionary thinking, the current analyses of psychological issues are infused with a mixture of concepts from the physical sciences and the biological sciences, not to mention verbal descriptions of first-person mental experience of psychological processes.[2]

Conceptual confusion results when psychological phenomena are described simultaneously in these various ways. And yet this is what is often done in contemporary psychology. Take the standard formulation of perception. It entails a physical description of environmental conditions and some combination of biological and experiential description applied to the individual, and oftentimes hypothetical intrapsychic processes are included as well. For example, the conventional textbook account of visual perception is a description of physical energies of light, which initiate biochemical processes in the retina and subsequent neural activity in the optic pathways and cortex, resulting in a mental representation of the environment with correlates in conscious experience.

But the conceptual frameworks provided by the physical sciences and the life sciences, as well as phenomenological analysis, are alternative descriptive systems, and each descriptive system may be more appropriately suited to one kind of phenomenon than another. What often seems to be absent in much of contemporary psychology is explicit recognition that many of its commonly used concepts stem from alternative explanatory systems. One way to conceptualize the differences between the concepts of these alternative explanatory systems is with reference to the notion of differing levels of organization.

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[2]This complaint that evolutionary theory has yet to have a full impact on psychology might strike some readers as wildly inaccurate for at least two reasons. First, the historical record plainly shows that some psychologists embraced Darwinian theory from the founding years of the discipline, even though for many of the first generation of psychologists, such functional concerns were of minor importance because they were inconsistent with the primary goals of the discipline (e.g., the description of the contents of consciousness and their relations). Let me reiterate, however, that my claim is that evolutionary theory has had minimal impact on how psychologists conceptualize the *environment*, and in turn how that conceptualization affects one's view of the organism. A second reason that this comment might seem inaccurate is because of the development in recent decades of so-called evolutionary psychology (e.g., Barkow, Cosmides, & Toobey, 1992.) The goals of that approach, to explain present-day psychological attributes in terms of their prior evolutionary value, differ greatly from the goals of ecological psychology. Ecological psychology is an analytical framework that seeks to reveal lawful, functional relations in the ongoing reciprocal interaction of the individual and the environment. In other words, each approach asks quite different questions. That being said, there remains several substantive differences between the concepts employed by evolutionary psychologists and ecological psychologists—most notably, the way culture is conceptualized, and in turn, the place of sociocultural processes in human development (see chap. 9).

As is discussed later (chap. 8), natural phenomena can be viewed as being organized at different levels of organization, and particular conceptual resources are better suited for capturing the distinctive processes operating at one level of organization as opposed to another. For example, when a problem is identified at a biochemical level, such as how photochemicals in the retina are altered by light and then reconstituted, an analysis at the level of physical and biochemical processes is clearly most desirable. However, when psychological processes are the concern (e.g., perceiving the layout of environmental features), what is needed is an account of the functional relation between the properties of environment and an individual's actions.

A functional analysis centers on the individual's ongoing transactions with meaningful features of the environment. Accordingly, it involves a conceptualization of environmental conditions at a molar (rather than molecular) level of organization commensurate with an individual's molar, purposive actions (i.e., the self-directed actions of the whole organism). In other words, a functional analysis emphasizes the intentionality of individuals' actions, and concurrently adopts a molar analysis of the environment in relation to which these actions transpire. With this focus, psychologists are in a position to work within a framework where both facets of the environment–person relation are conceptually commensurate. And, maintaining commensurate analytical levels is crucial because in this way the ongoing, reciprocal interrelations between the environment and the person become conceivable in a coherent manner. At this level of analysis, individuals engage the environment in order to learn more about its properties and, in many instances, individually and collectively contribute to the environment's changing functional character. This kind of analytical stance, emphasizing the *reciprocity* of the environment and the person, is a central feature of an *ecological approach.*

Because it has these attributes, the ecological approach to be explored in subsequent chapters avoids many of the seemingly intractable problems and theoretical tensions associated with the standard Cartesian formulation, with its conjoining of physical variables, biological processes, and conscious experience. Perhaps more significantly, the ecological framework will create opportunities for breaking new conceptual ground in psychology.

Where does one begin to develop an ecological analysis of the environment and the individual? Many of the concepts needed for such a project, as well as the metatheoretical foundations required for its further development, have been available in the psychological literature for some time. The next section begins to draw some of these ideas together.

## COLLECTING THE THREADS OF ECOLOGICAL PSYCHOLOGY

Looking for the precise historical beginning of an idea is usually an empty exercise. Intellectual progress is a cumulative and collective enterprise among a community of inquirers extended over historical time and distributed across geographical places. At some point, however, anticipatory ripples from diverse sources converge into the beginnings of a ground swell, at which time a certain idea may come to be expressed explicitly for the first time. Accordingly, in this study of ecological psychology, no single event marks its initial development; but some significant historical threads that appeared earlier in this century can be picked up.

A good place to start is Heider's (1926/1959) classic essay "Thing and Medium," and Tolman and Brunswik's (1935/1966) joint paper "The Organism and the Causal Texture of the Environment." Both papers point to a problem that has been insufficiently addressed in psychology, a problem most explicitly formulated by Heider.

Generalizing from first-person experience, it would seem that all individuals perceive a world populated with innumerable objects and features (e.g., trees, houses, tools, other individuals etc.). And yet perception as it has typically been studied in psychology begins with a consideration of the impact of physical stimulation from the world on specialized sensory receptors of the body. If contact with the world consists of physical stimulation of these receptor interfaces located on the body, how is it that individuals experience a world of features "out there" that extends away from them and among which they negotiate? How is it possible to bridge the gap, conceptually speaking, between the perceiver and the environment?

In the case of vision, by beginning an analysis of perception with retinal stimulation, the next step is to discover how the character of the experienced world can be derived from these scintillations of receptor firings. However, a prior question has been overlooked: What is the relation between the environment and visual stimulation? Or, stated more generally, what is the relation between the structure of the environment and stimulation at receptor surfaces? This is the important question raised by Heider.

The only framework for the analysis of perception available to most psychologists is one that takes physical stimulation as the appropriate conceptualization of the "stimulus." Beginning with a conceptualization of the stimulus as physical stimulation at the receptor level creates enormous, and perhaps insurmountable, theoretical and philosophical problems for any account of perception because from the outset the structural properties of the environment are absent. With such a formulation, perception of environmental features becomes, if not magical, then pure guesswork.

Alternatives to this approach are lacking because, quite simply, the structure of the environment from a psychological perspective, as contrasted with a physical perspective, has rarely been considered. Heider (1930/1959) described the situation this way:

> Everybody will concede that the perceptual apparatus belongs to an organism which is adapted to the environment; nevertheless, in discussion of perception the structure of the environment is often completely neglected, and only the proximal stimuli (for instance, the wave length of the stimuli impinging on the organs) are taken account of. (p. 35)

Heider's essay and the Tolman and Brunswik paper offered different approaches to this problem. Heider considered how structure can be conveyed via a medium, such as the air, to a perceiver. Tolman and Brunswik (1935/1966) offered a broader analysis of what they called the environment's "causal texture," wherein the probabilistic dependencies existing among environmental events can be the basis for an organism developing expectations of environmental structure (see chap. 6).

At first glance, consideration of the problem of environmental structure may seem to be only a narrow concern for the analysis of perception. But there is hardly a topic in psychology for which considerations of the nature of the environment and an individual's relation to it do not play an essential role. As Tolman and Brunswik (1935/1966) pointed out:

> All the problems of psychology—not only those of visual perception and learning—but the more general problems of instinct, insight, learning, intelligence, motivation, personality, and emotion all center around this one general feature of the given organism's abilities and tendencies for adjusting to these *actual causal textures [of the environment]*. (p. 483, emphasis added)

If this claim is warranted, analysis of the structure of the environment would seem to be a task that is crucial for understanding all manner of psychological phenomena. For this reason, analysis of the structure of the environment is among the more central tasks for psychology as a whole.[3] Notably, it is also one of the most neglected tasks in the discipline.

"Ever since Darwin" (to borrow Stephen Jay Gould's phrase), adaptive functioning has been seen as the hallmark of any viable living organism, and this requires that animals have the means to detect environmental

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[3] More generally, there is a long tradition in philosophy, and by extension, psychology that considers perceptual experience as fundamental to all other forms of knowing. This viewpoint is explicit in phenomenological approaches, which adopt the perspective that "we *never* completely escape from the realm of perceptual reality, and even seemingly independent structures of categorical thought (of 'rationality') are ultimately founded in perception" (Edie, 1964, p. xvii).

conditions at some distance from them. And yet with few exceptions, psychologists have been employing theoretical approaches to perceiving that are tacitly, if not explicitly, structured by pre-Darwinian (i.e., by Cartesian thinking; see chap. 1). The necessary attempts to accommodate evolutionary considerations into psychological theory have typically involved little more than grafting some sort of functional analysis onto this pre-Darwinian perspective. Such a move results in attention being directed either to the peripheral sensitivities of animals and their associated proximal stimuli, or to intra-organismic processes, or to both. In all of these cases, the sole focus of the analysis is on processes of the organism. But as Heider (1926/1959) and Tolman and Brunswik (1935/1966) pointed out, such a restricted focus is incomplete. Because organisms function adaptively in an environment filled with meaningful features located at various distances from them, the earlier question remains unanswered: How can the gap be bridged between environmental conditions and psychological processes?

If the gap is conceptualized as one separating physical stimulation and psychological experience, then it is, in fact, unbridgeable. This is because to state the problem as one of discovering the relation between physical properties and psychological experience is to attempt to link conceptual resources operating at incommensurate levels of analysis. Is this then an irresolvable issue, or is there some alternative way of framing the problem? Clearly, a variant of the dualistic, Cartesian metaphysical framework will not do.

In his later writings, William James labored to formulate an alternative way of conceptualizing the relation between the environment and the person. The result was his philosophy of radical empiricism, and through this alternative, James did not so much bridge the gap as attempt to eliminate it entirely. Radical empiricism provides the philosophical and historical foundations for ecological psychology.

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