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What Causes Human Behavior— Stars, Selves, or Contingencies?

by Stephen F. Ledoux

Stephen Ledoux's book, What Causes Human Behavior—Stars, Selves, or Contingencies? is a strong, non-compromising, theoretical and philosophical argument that the answers come from behaviorology, the natural science of behavior, that the answers do not come from astrology, theology, etc., or from psychology, the mentalistic unnatural science of the mind. And he supports his argument with examples of effective, science-based applications of applied behaviorology (applied behavior analysis) and with analyses of human behavior in everyday life, going from simple behaviors, to complex verbal behavior, with suggestions that behaviorology is crucial to the solutions of the world problems of overpopulation, sustainability, and global warming. But also, he's not afraid to make these complex topics more readable by using an occasional contraction, an informal expression, and even a little humor, i.e. he's way cool.

✂Richard Malott, Ph.D. (Professor, Western Michigan University)

Professor Ledoux has written a primer on a newly emerging discipline: behaviorology. It is the natural science of environment-behavior relations and an intellectually challenging subject, one that variously intersects with astrology, psychology, philosophy, education, and physiology plus other biological and behavioral sciences. Ledoux's discussion of explanatory fictions and a variety of other explanatory fallacies alone, however, is worth the price of admission. And there is so much more!

✂John Stone, Ph.D. (Professor, East Tennessee State University, Johnson City, and President, Education Consumers Foundation at www.education-consumers.org)

Dr. Ledoux has written a book that is accessible to all readers willing to take the time to peruse its pages. He clearly explains the principles of behavior in this informative primer, with the last chapter, in particular, tied to applying them to saving humankind from disasters resulting from human behavior or the lack thereof.

✂Michael Shuler (Engineer, Peru, IN, retired)

In the prevailing academic order of 21st-century society, the complex subject of the behavior of organisms, particularly regarding the causes and effects of human behavior, is controlled by the explanatory myths that are inherent to psychology. This book presents a threat to that prevailing academic order. So every person prepared to actually discover why people do what they do must read it.

✂Michael Rauseo, Psy.D. (Faculty, Los Angeles Unified School District)

This book concisely covers a vast amount of ground in its mere 400 pages, preparing readers well for further, and more in-depth, examination of the discipline. Although the book is primarily written to elucidate human behavior, the laws and principles of behavior are used not only by behaviorologists but also by animal behavior technologists who study the behavior of non-humans. Dr. Ledoux has presented a complex discipline in an accessible format that is reinforcing to read and introduces a natural-science alternative to the various mystical and pseudoscience disciplines so prominent in society today. A natural-science approach brings with it highly effective and efficient engineering strategies and tactics, which are just what our world needs. This timely book deserves a Nobel Prize in my opinion!

✂James O’Heare, DLBC (Companion Animal Sciences Institute, Ottawa, Ontario, Canada)

As this book shows, we, and the next and younger cohorts of behaviorologists, must continue to make abundantly clear, to our fellow natural scientists as well as to the general public, the philosophically incommensurable differences between what B. F. Skinner called... “radical behaviorism,” and the traditional position with its stars, selves, minds, souls, and psychés.

✂Werner Matthijs, M.A. (Team Coördinator van de Toegepaste Gedragsologie, Universitair Psychiatrisch Centrum Sint Kamillus, Bierbeek, Belgium, retired)

Many of the principles of behavior, and their cultural implications, threaten received conceptions of behavior, including dearly-held pre-scientific assumptions about the nature and causes of our “selves.” This book gently walks readers through these principles and implications, allowing readers to overcome any attendant threats and to appreciate fully the subject matter at hand. In this primer Ledoux renders it all accessible, inviting, and eminently relevant.

✂Bruce Hamm, M.A., BCBA (Director, Blackbird Academy of Childhood Education, Vancouver, British Columbia, Canada)

Currently, students reaching the end of their formal educations suffer a terrible gap in coping skills, never having had an opportunity to study behavior in the formal mode of an uncompromised natural science. This easy-to-read primer presents some elementary behaviorological principles and examines important implications of bringing, and failing to bring, behavioral phenomena under the scrutiny of a pure natural science.

✂Lawrence Fraley, Ed.D. (Professor, West Virginia University, Morgantown, retired)

If all children, youths, and adults, knew why they and all those around them behave as they do, the history of our cultures could have been much more positive. Taking a wonderful leap in the right direction, this book helps all readers to acquire such pivotal understanding as well as practical tools for changing our ways toward a better world.

✂Comunidad Los Horcones, Mexico

Stephen Ledoux’s book is an accessible and thorough primer to a modern science of behavior. It is very difficult to find both the breadth of topics and in-depth detail that Ledoux offers in this very readable and important contribution to the field.

✂Michael Clayton, Ph.D. (Professor, Missouri State University, Springfield)

This book talks about the journey into a science of behavior and why there is still so much resistance to it. The author explains why pre-scientific mystical, agential explanations are so slow to be replaced by natural-science explanations. Our daily language is filled with vestiges of this pre-scientific world including, as the author points

out, terms like “mind,” “self,” and even the pronouns we use. The author includes our misguided tendency to use descriptions as explanations. Anticipation of future events, and other “fictional accounts,” result in cessation of searching for real causes.

✦Norman Peterson, Ph.D. (author, and former professor, Western Michigan University, Kalamazoo)

Occasional blank pages provide space for:

Reader's Notes



Overt and Covert Behaviors and Contingencies

What Causes Human Behavior— Stars, Selves, or Contingencies?

Stephen F. Ledoux

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What Causes Human Behavior— Stars, Selves, or Contingencies?

Stephen F. Ledoux, Ph.D.

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Dedication

To all my students, past and passed:

Your efforts, questions, and reactions became part of the contingencies that shaped my repertoire and thus this book.☺☺

Other Books by Stephen F. Ledoux

Study Questions for Paul De Kruif's Microbe Hunters (1972)

Grandpa Fred's Baby Tender, or Why and How We Built Our Aircrabs
with Carl Cheney (1987)

The Panda and Monkey King Christmas—A Family's Year in China
with first author Nelly Case (1997)

Eight other books of *Study Questions* for various texts, one with other
authors (1999–2015; see BOOKS at www.behaviorology.org)

Behaviorology Majors Make a Difference
with 11 student authors (2013; a reassembly of a 1977 book)

*Running Out of Time—Introducing Behaviorology to Help Solve
Global Problems* (2014)

An Introduction to Verbal Behavior—Second Edition
with first author Norman Peterson (2014)

Origins and Components of Behaviorology—Third Edition (2015)

*Beautiful Sights and Sensations—Small Collections of Native American and
Other Arts* (2016)📖

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
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Many people deserve thanks and praise for catching various “typos” and other errors that crept into my massaging of a wide range of related materials into the manuscript that became an earlier book and then this book. While any residual problems are of course my own, I want to express my deepest appreciation to a subset of all those deserving folks. These friends and colleagues went above and beyond the usual levels of reviewer assistance. They provided extensive, careful, detailed and exacting suggestions and commentary. Their efforts particularly improved the clarity, readability, and topical coverage of the larger book from which this book directly derived. That larger book was my 2014 book, *Running Out of Time—Introducing Behaviorology to Help Solve Global Problems*. In alphabetical order (and from the USA unless otherwise specified) these people are John Ferreira, Lawrence Fraley, Bruce Hamm (from Canada), Philip Johnson, Werner Matthijs (from Belgium), James O’Heare (from Canada), Jón Sigurjónsson (from Iceland), and William Trumble. For similar assistance directly with the current book, in addition to all those who provided supportive comments (e.g., see the back cover) the people who deserve thanks and praise include Traci Cihon and her graduate students (at the University of North Texas), Nelly Case, Chris Cryer, Jaymes Farrell, Miles Ledoux, Doug Ploehn, Mike Shuler, and Susannah Sudborough. They each and all have my sincerest appreciation (and I hope we are still friends).

The current book not only developed from, but also serves as a primer for, my earlier, more comprehensive and technical book, *Running Out of Time...* From these books I hope all humanity derives benefits. *SFL* 

Foreword

*M*y work includes serving as the faculty advisor for the Teaching Science Lab (TSL) in the Department of Behavior Analysis at the University of North Texas (UNT). The TSL is responsible for the design and implementation of six sections of a two-course Introduction to Behavior Principles sequence for undergraduate students. The TSL is also a teaching and research lab in which graduate and undergraduate students in Behavior Analysis and related disciplines learn about Behavioral Systems Analysis, Instructional Design, Precision Teaching, the Constructional Approach, and behavior analytic applications to education through their work in the TSL.

Each semester somewhere between 100 and 200 undergraduate students enroll in the Introduction to Behavior Principles classes at UNT. Many of these students have never heard of Behavior Analysis let alone Behaviorology. Most of the students enroll in the course because it is a core course in the Social/Behavioral Sciences. Others take the course because they know someone who is affected by an Autism Spectrum Disorder (ASD) or because they are encouraged by faculty in other discipline areas such as Psychology, Education, or Speech Language Pathology to learn about Applied Behavior Analysis (ABA). Many others think they are going to learn how to do criminal profiling. Perhaps the most challenging part of our job as course instructors is that the majority of the students who enroll in our courses have a long history of looking anywhere except the environment for the causes of behavior.

The students who enroll in these courses have the misfortune of being part of a generation that is tasked with the job of contributing solutions to some of the world's most challenging problems. However, these students are also some of the most fortunate undergraduate students because they are enrolled at a university that has a Department of Behavior Analysis that is separate from the Departments of Psychology and Education. They can choose to major or minor in Behavior Analysis, a choice many undergraduate students at universities all over the world do not get to make, because there are not many undergraduate programs in Behavior Analysis/Behaviorology. But how does one encourage them to make that choice? How do you encourage a student who has never contacted behavioral science, or the philosophy of behaviorism, to see that taking a natural-science approach to understanding behavior may be the best option they have for contributing to solving some of the most pressing problems facing humanity? How do you tell them that very few behavior analysts are gainfully employed working in areas other than autism intervention but that there is much we can contribute? I do not have the answers to these questions but I do have the opportunity to find out.

In the fall of 2014, the members of the TSL and I became disenchanted with our current instructional design and student learning outcomes. We decided

to take on a massive course redesign effort; we wanted a course in which the undergraduate students could learn about Behavior Analysis by experiencing Behavior Analysis as applied to their educational experience. We wanted our students to be able to shift in and out of a behavior analytic world view, to be able to make an informed choice to declare a major or minor in Behavior Analysis, and for those who did not choose to major or minor in Behavior Analysis, to know under what conditions they should call a Behavior Analyst/Behaviorologist to their interdisciplinary and multidisciplinary teams. We also wanted to help our students to acquire the repertoires that would help them to contribute to more effective strategies to address societal issues.

So we started to look for a new book for the course. We considered Skinner's 1953 book, *Science and Human Behavior*, and reviewed nearly every popular introduction to behavior analysis text available. After settling on one and beginning to construct our course materials, I happened upon a book Dr. Ledoux had recently published: *Running Out of Time—Introducing Behaviorology to Help Solve Global Problems*. I ordered a copy and brought it to the TSL. I knew after a cursory review that this was the textbook I wanted to adopt for the class but the members of the TSL were already six months into preparing course materials based on the text we had previously selected. I passed the book around to the TSL members and within a couple of weeks everyone was on board. We scrapped everything we had done and started again. We had found a text that introduced behavior analysis/behaviorology as a natural science, a text that spelled out how behavior analysis/behaviorology was different from other disciplines, a text that introduced basic principles and techniques of behavior analysis/behaviorology and did it in the context of why behavior analysis/behaviorology was important to contributing more effective solutions to global issues. It was different from other textbooks. It included chapters on the history of behavior analysis/behaviorology. It immediately tied basic principle into applications that are less commonly explored by behavior analysts. But it was written for an audience of more traditional natural scientists (e.g., biologists, physiologists) and natural science practitioners (e.g., engineers). We knew it would be a difficult text for our undergraduate students but we bravely adopted it and we rolled out our first redesigned courses in the fall of 2015.

I cannot remember how or when in this process I came to meet Dr. Ledoux—maybe it was the ABAI conference in the spring of 2015—but I do remember that he was eager to visit UNT and to see our redesigned courses. Dr. Ledoux came to UNT in the fall of 2015. He visited all six sections of our Introduction to Behavior Principles courses, our TSL meetings, signed books for our students, and spent several hours talking to our students and TSL members about the science of behavior (something he now does at least once each year). Dr. Ledoux and I also started an ongoing dialogue. We would talk about the history of our discipline, about the future of our discipline, about how much more we needed to do, and about how to best reach the next

generations of behaviorologists. These discussions and our first semesters of outcome data sparked a discussion about the possibility of a new book, one that better suited the aforementioned audience characteristics of our student population. Dr. Ledoux readily agreed to take on this challenge and has worked diligently to produce this book, *What Causes Human Behavior—Stars, Selves, or Contingencies?*

In *What Causes Human Behavior—Stars, Selves, or Contingencies?* Dr. Ledoux brings the natural science of behavior to a broader audience, which is ideal for an undergraduate-level Introduction to Behavior Analysis course. Beginning with why a natural science of behavior is not only important but also necessary for our survival, and ending with a plea for behaviorological solutions that decrease the overconsumption of the limited resources available in our global community, Dr. Ledoux has written a primer to *Running Out of Time...*, preparing his readers for further study, reflection, and application of the natural science of behavior.

At times, readers may become frustrated with the subject matter of this book; it is more science than they may have ever thought was involved with behavior. They may resist the challenges Dr. Ledoux poses to his readers as they are pressured to question their beliefs about why behavior occurs. Others will marvel about why they have not been introduced to behaviorology before coming into contact with this book. Perhaps most importantly, the readers of this book will be an integral part of the next generation of society who will decide what role, and how much of a role, the natural science of behavior will have in contributing to solutions to the world's most pressing social issues.♣

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Associate Professor
Department of Behavior Analysis
University of North Texas
May 2017 ♡

On Typography & Related Resources

This book is set in the Adobe Garamond, Adobe Garamond Expert, and Tekton collections of typefaces. In addition, a valuable basis for the typographic standards of this work deserves acknowledgment. As much as possible, this book follows the practices described in two highly recommended volumes by Ms. Robin Williams (both of which Peachpit Press, in Berkeley, CA, USA, publishes). One is the 1990 edition of *The Mac is Not a Typewriter*. The other is the 1996 edition of *Beyond the Mac is Not a Typewriter*. For example, on page 16 of the 1990 book, Williams specifies practices regarding the placement of punctuation used with quotation marks, an area in which some ambiguity has existed with respect to what is “proper.” In addition the present book follows the advice in these books about avoiding “widows” (which is the name for leaving less than two words on the last line of a paragraph) and “orphans” (which is the name either for leaving the first line of a paragraph alone at the bottom of a page, or for leaving the last line of a paragraph alone at the top of the next page). Also, since some confusing alternatives remain regarding the use of hyphens and dashes, this book would simply limit hyphens to separating the parts of words that break at a line end, although this book never breaks words at line ends. Then, “en dashes” most commonly separate the whole words of compound adjectives, and “em dashes” set off multiple-word—a compound adjective with an en dash—phrases or clauses. (Note that ebook formatting typically destroys most of these easy-reading characteristics that developed across humanity’s centuries of successful printing-press experience.)

You can address correspondence regarding this book to the author (at ledoux@canton.edu). For more information, visit www.behaviorology.org where you can find all the back issues of the journal of TIBI (The International Behaviorology Institute). Previously named *Behaviorology Today* (ISSN 1536-6669), TIBI renamed it *Journal of Behaviorology* (ISSN 2331-0774) in 2013.

Some related books may also interest the reader. One is my 2014 text, *Running Out of Time—Introducing Behaviorology to Help Solve Global Problems*. Another, first published in 1997, is a 2015 book of my thematically related readings, *Origins and Components of Behaviorology—Third Edition*, which also contains contributions by other TIBI founders, including Glenn Latham and Lawrence Fraley. Also, consider Fraley’s 2012 *Dignified Dying—A Behaviorological Thanatology* and his 2013 *Behaviorological Rehabilitation and the Criminal Justice System*. To order the books by Fraley, write the publisher, ABCs, at ledoux@canton.edu. Order *Running Out of Time...* or *Origins and Components...* directly from the distributor, **Direct Book Service, Inc.**, at 800-776-2665. They will likely answer the phone with “Dogwise,” because one of their long standing and most popular specialties involves books about our canine friends; several of these books already specifically apply the laws of behavior that *Running Out of Time...* systematically introduces in detail.☺

“Introduction” **(Traditionally, the Preface)**

Starting in the last decades of the twentieth century, traditional natural scientists (e.g., physicists, chemists, and biologists) and engineers turned their attention to solving new, major (and minor) problems around the globe. They quickly discovered that both the problems and the solutions involve human behavior and changes in human behavior. Yet most of them were generally unaware that a 100-year-old natural science of behavior, now called behaviorology, was available to address its part in the solutions through its engineering counterpart, “Applied Behavior Analysis” (ABA). The 100th year of behaviorism—its centenary year in 2012—provided an occasion to review this discipline for them, if ever so briefly, in the form of an abridged article. Entitled “Behaviorism at 100,” the article appeared in the first issue (January 2012) of the centenary volume of the journal *American Scientist* (available at www.americanscientist.org). The unabridged, peer-reviewed version appeared in volume 15, number 1, of the journal *Behaviorology Today* two months later (available at www.behaviorology.org). To support the teamwork of all the natural sciences in solving local and global problems, this book provides some elaboration of the basic science content of the unabridged article, using more examples and less technical terminology.

The focus of this book, however, resides elsewhere rather than solely in the value of behaviorology for helping solve global problems. This is not because such a focus lacks merit, but because another book already supports that focus. My 2014 textbook, *Running Out of time—Introducing Behaviorology to Help Solve Global Problems* (often simply called the *ROOT* book or, for the cover color, “The Green Book”) makes such connections throughout its pages.

The present book also connects with “help humanity save itself and the planet.” However, for most readers, this book likely represents their first behavior-related *scientific* book. So it limits this connection mostly to a later chapter. Instead this book focuses simply on enabling some basic understanding of many fascinating points about human behavior in ways that not only interest people but also help them provide answers for their questions about the topic.

In the process of fulfilling that focus, this book must also address the many traditional, and pre-scientific, views about behavior that have proven so misleading for people, such as many views in astrology and psychology. To neither of these does the label, “natural science,” apply. Using pre-scientific phrasing, they ask the traditional question of “Why do people do what they do?” And the answers that these disciplines provide for this question have proven inadequate. If we rephrase the question scientifically, then we can ask it of behaviorology: “Why does human behavior happen?” Basic answers to either form of the question, from these three unequal disciplines, could be paraphrased

this way: Human behavior occurs, “because of our stars (astrology)” or “because of our selves (psychology)” or “because of our contingencies (behaviorology).”

Behaviorology answers with the term, “contingencies,” because this term refers to the “if–then” relations between behavior and its causes. That is, *contingencies* encompass, in general, all the dependencies, all the interrelationships, between behavior, as an effect, and all of its various and interacting natural–science causes. These include “nature” and “nurture” (i.e., genes and physiology and environment) as we shall later explore.

Some comment on the astrology and psychology alternatives is pertinent first. Historically astrology basically claimed that star or planet positions cause our behavior. And currently psychology claims that non–physical agents inside us, such as selves, cause our behavior. Spontaneously, the selves supposedly tell the body what to do. This repeats in secular (i.e., non–religious) terms a long–standing claim of theology (i.e., the study of religion) that souls cause our behavior by telling the body what to do. Today, astrology maintains a certain entertainment value (e.g., daily newspaper horoscopes). Psychology, however, is taken much more seriously (as is theology). For that reason, this book includes comparisons and contrasts particularly between behaviorology and psychology.

Alluding to historical points that we cover in early chapters, both the first 100 years of the natural science of behavior, and its more recent (in 1987) complete separation and independence from psychology, *as behaviorology*, are now behind us. Thus we must clarify that this natural science of behavior, behaviorology, is neither a part of, nor any kind of, psychology, which means that this book is *not* a book in psychology or for it. The term, behaviorology, names the basic natural science behind a range of applications, including Applied Behavior Analysis, which is so vital in the treatment of autism.

With that kind of background, several options competed for the title of this book. Some possibilities still pushed the “help solve global problems” focus, like “*So Many People, So Little Time*,” or “*Behaviorology—Advancing Sustainability*.” Other nice titles, like “*Saving the Planet Through Cultural Shift*,” pushed a bigger scope than the book covers. This book, however, mainly provides a primer for behaviorology and its scientific answers for the “why behavior happens” questions. So, in the context of dealing with traditional, taken–for–granted, pre–scientific and contradictory answers for these questions, the title “*What Causes Human Behavior—Stars, Selves, or Contingencies?*” works well.

This book can, however, provide a couple of curious challenges for some people. For one, reading it begins the process of countering the current effects of the previous 50,000 years or more of pre–scientific cultural conditioning about human nature and human behavior, something that we all grow up experiencing. This includes all the myths and legends and explanations, from multiple cultures, that may still hold life lessons but whose foundations can no longer bear close, especially scientific, scrutiny. Nevertheless, we all grow up surrounded and cultured—the usual term is *conditioned*—by these views about human nature and human behavior, which induces our taking them for

granted. Should something come along that calls them into question, the result can be intellectually and emotionally challenging. Happily, reasonable exposure to the realities of the natural science of behavior can meet such challenges.

A different kind of challenge concerns some gradual changes in the way we talk and write. This book implements talking and writing changes that help move us away from our reliance on sentence phrasings that inherently contradict our scientific knowledge about behavior. Instead we shift to phrase forms and word usages that typically get criticized as non-standard forms and usages. We then use them in ways that better support our scientific knowledge about behavior, thereby helping make them into standard forms and usages. For example occasionally we use nouns as adjectives, and we use adjectives as nouns for the subjects of sentences. This reduces the reliance on pronouns as subjects of sentences. The result may start out seeming awkward. But it moves us toward a more efficient grammar that better supports scientific realities. This shift in phrase forms and word usages contains fewer inherent implications of ghosts (i.e., mystical—as in untestable or unmeasurable—behavior-directing agents) residing inside bodies, a point that also receives more complete treatment in various chapters. I beg the reader's indulgence in support of these grammatical shifts. As readers will discover as we move through the chapters of the book, the benefits of these shifts gradually increase, and far outweigh the risks of maintaining traditional aspects of grammar that have been harming us for millennia by coincidentally supporting anti-science superstitions.

The chapters of the book divide into two parts. Part I pursues history, assumptions, concepts, principles, and practices. Part II pursues more complex developments, along with the beginnings of some natural-science answers to some of humanity's long-standing questions. You see these topics briefly described under the chapter entries in the Table of Contents.

This book describes many of the discoveries and applications of the first 100 years of behaviorological science, particularly regarding *why* human behavior occurs. The undercurrent throughout the book concerns the relevance of this natural science not only to helping build a sustainable society in a timely manner but also to addressing the wide range of personal, local and global issues confronting individuals and humanity. All these issues have definitive behavior components. So addressing these issues benefits from a comprehensive natural science of behavior. These issues range from how to train a pet to the problem of overpopulation, which is perhaps humanity's most fundamental practical problem. No book, including this one, solves such problems by itself. But the more humanity understands about the causes of behavior, which is the topic of this book, the more success each of us, and humanity in general, will have at solving such problems. We can even solve them in the timely manner that will prevent us from having to experience the worst effects of major problems like global warming.

Some folks feel that finding out “why people do what they do” (or, more scientifically, “why human behavior happens”) is so important and fascinating

that everything about the topic must *immediately* appear, now, in this chapter! While that cannot occur, their enthusiasm is praiseworthy. Meaningful coverage of a topic like human behavior takes time, and space, *and pages*. We need to address our topic not only fairly and reasonably but also in a manner that can leave readers able to provide appropriate answers to their own additional questions, including how to further apply this knowledge. Such topic coverage requires at least this whole book.

Along those lines, this book follows the common, natural–science educational pattern. This pattern consists of first briefly mentioning a topic, or series of topics, some of which might be related. Then, we revisit these topics, developing them in greater depth and with more details and examples. At the same time, we also continue to mention new, additional and possibly related topics, at least briefly. And these cycles repeat, chapter after chapter, with a bit of review but always with greater depth and more details and examples and interconnections. Thus, you may feel that our coverage of some principle or concept seems inadequate at some early point. Fear not. We will return to it, especially after covering newer related points that help us put things together. We have even already taken the first steps for some cycles by mentioning some topics in this introductory chapter. You will see the topics of these cycles return soon. Meanwhile, you may sometimes run across one or another non–technical word that seems new to you. Your English dictionary can then serve you well. On the other hand, you can find some technically defined behaviorological terms in the Glossary. Or, you may read the Glossary as a sort of sleep therapy.

Lastly, and by design, this book invokes a vast range of examples from ordinary, everyday, and mostly human behavior. As a result virtually every reader can surely find something to dislike in the book, something which actually only reflects the vast and wonderful natural complexity of life. While for most readers this book serves as a first book about behaviorology, some readers may find that it does not go far enough for them into the systematic substance and components of the behaviorology discipline. For example, this book says little about experimental methodology or other particularly complicated technical topics in the discipline, such as the topic of “equivalence relations” with its vast implication, including for regular public education. In such cases the easiest next step takes readers to my 2014 *ROOT* book, which does cover these areas. The ...*Related Resources* material, which appeared just before this chapter, contains additional, pertinent information about the 2014 book. Beyond that, a wide selection of books and articles, listed in the bibliography, can satisfy much remaining curiosity.

Addendum. Before closing this chapter, let’s *briefly* consider three advanced topics (or you can skip them). Touching on them helps demonstrate, by example, why this book leaves advanced topics for the next–level book.

The three topics involve a certain omission in this book, and two characteristics of this book. The omission concerns “pragmatism,” while one characteristic concerns the similarity between this book and its predecessor,

ROOT, and the other characteristic concerns the connection between the discipline of behaviorology and the discipline of physiology.

Let's begin with the similarity between books, because it stems from the historical events that produced this book. While my earlier *ROOT* textbook proved appropriate for advanced undergraduate majors and beyond, it seemed a bit too thorough or difficult for first-semester students still unsure of their major. So a professor who mostly had first-semester students in class asked me to downsize the *ROOT* book, and quickly (i.e., for the following fall semester, a time frame that precluded writing a completely new book). She also suggested using less technical terminology for this different, more general audience. The book you hold is the result. Of course, this led to many sets of pages containing much the same content between this book and the *ROOT* book, although in the *ROOT* book, topics receive more thorough coverage with more emphasis on technical details. As a result some worries might arise about so-called "self plagiarism." To me, however, this term is somewhat "self contradictory" in that it contradicts the main meaning of plagiarism (i.e., to steal and use *another's* ideas or writings as one's own). One cannot really "steal" one's own ideas or writings. So allow me to make two suggestions to anyone worried about the similarities between some parts of these two books. (a) Enjoy them and benefit from them, as these similarities are part of why these two books make a great reading sequence. More importantly (b) let's all worry instead, and work in a timely manner, on helping humanity save Planet Earth. At present this needs to become the highest priority, and our science has much to contribute.

In addition this new book (and even to some extent the *ROOT* book) is not really for those of us who are already familiar with the natural science of behavior, although the occasional review of the discipline does provide us with benefits. Instead this book is principally a primer for helping to bring our science to the attention of everyone else. Indeed, consider that *many* good books exist that *cover applications* of this science while just providing a *summary* of the science *to help cover the applications better* (e.g., in my opinion the best one is Whaley & Malott's 1971 book, *Elementary Principles of Behavior*). Since the appearance of Skinner's 1953 book, *Science and Human Behavior*, however, how many books cover this *science per se*, while just providing some applications *to help cover the science better*? This and the *ROOT* book try to follow the latter, using some applications *mainly to support the science coverage*. The *ROOT* book probably does this better, but the culture has inadequately prepared everyone for reading it, which is why that professor asked me to down-size it.

Next let's briefly consider this book's omission of pragmatism. As a typical definition, pragmatism refers to the value of a course of action residing in its measurable consequences. This book omits any detailed discussion, because the topic is more complicated than topics appropriate for a primer. Nevertheless, in the opinion of some disciplinary professionals, Skinner's pragmatism is his most important contribution to the science. For example Dr. Guy Bruce describes Skinner's pragmatism this way:

By pragmatism, I mean his preference for effective and efficient methods for discovering effective and efficient explanations of behavior change and procedures for changing behavior. By way of illustration, consider his pragmatic definition of respondent and operant behavior (as adaptive interactions between organism and environment), his interest in discovering orderly relationships between organism actions and environmental events, both of which are natural, not supernatural, events directly observable and measurable, specifically the type of environmental events [that scientists can study] allowing the discovery of useful explanations and procedures for changing behavior. Taking pragmatism as the starting point, we can see how all aspects of the science of behavior that Skinner created are consistent with that pragmatism, how we define behavior, how we measure it, within and across subject experimental manipulations, explanations, and procedures (personal communication).

Much merit resides in that view. Still, in my opinion, Skinner's analysis of verbal behavior likely represents his most important contribution. (Books mentioned in this "Introduction" chapter/Preface appear in the Bibliography.)

Finally, briefly consider this book's characteristic of including the overlapping interests of physiology and behaviorology. This inclusion causes reactions from "pause" to consternation among some of those who are already natural scientists of behavior. But such reactions seldom occur among traditional natural scientists (e.g., physicists, chemists, biologists) who see this inclusion as appropriately clarifying our intersection with the traditional natural sciences. It helps explain, for them, our natural-science status.

Without thoroughly including these connections in "first-contact" books like this one, people contacting our science for the first time have difficulty seeing that, and accepting our pointing out that, we are not part of psychology. All their conditioning has been to see psychology as *the* behavior discipline (beyond theology). But, as we later discuss in detail, psychology cannot maintain the natural functional history of events across multiple disciplinary levels, as expected and demanded by traditional natural sciences, because psychology breaks that history when it includes its spontaneously acting, mystically invented inner agents in the causal sequence. But our science does maintain the natural functional history of events across multiple disciplinary levels, rather than break it, because the natural variables that we address *are already parts of that history*.

For such reasons I include our discipline's connections with physiology in this book, not that our discipline cannot stand alone, because it can. But we need not, and cannot afford to, stand alone. All the natural sciences must stand together to solve the planet's problems in the required timely manner. Such is the direction that this book takes.✿

Stephen F. Ledoux **Los Alamos NM USA** **June 2017** ✿