

## THE STUDY OF LIVING CONTROL SYSTEMS

This book is a guide to doing a new kind of psychological research that focuses on the purposes rather than the causes of behavior. The research methods described here are based on a theory of behavior called Perceptual Control Theory (PCT) that views organisms as purposeful rather than mechanistic systems. According to PCT, purposeful behavior involves acting to control perceptual input variables. Thus, understanding the purposeful behavior of living organisms is a matter of determining the perceptual variables they are controlling when they are carrying out various behaviors. This book outlines research methods that determine what perceptual variables an organism is controlling, how it controls those variables, and why. It also describes methods for studying how an organism develops the ability to control different perceptions and how consciousness might be involved in this process.

RICHARD S. MARKEN is a leading authority on the Perceptual Control Theory (PCT) model of behavior. Now retired from a career as a psychology professor, human factors engineer, and health policy researcher, he still actively consults and carries out a program of research testing PCT.

## Endorsements for Living Control Systems

The history of science is marked by revolutions that are advanced by novel methods of observation and experiment. Richard Marken provides a comprehensive and indispensable research guide to a scientific revolution still in the making: understanding the purposeful nature of the behavior of living organisms as they act as living control systems.

Gary Cziko, Professor Emeritus of Educational Psychology,  
University of Illinois at Urbana-Champaign, USA

This book provides, with practical examples, some much-needed insight into how to study what living things do from beyond a stimulus–response perspective. This understanding has wide-ranging consequences for the study of behavior.

Heather Broccard-Bell, Adjunct Assistant Professor in  
Psychological Sciences, University of San Diego, USA

This is a beautifully crafted book that provides a refreshingly different perspective on research. Each chapter is like opening a door into a whole new way of thinking about what we already thought we knew. This book is a must for both novice and experienced researchers.

Sara Tai, Senior Lecturer in Clinical Psychology,  
University of Manchester, UK

Behavior serves a purpose, instead of being a reaction to a stimulus. What does this imply for a new science of psychology? What kind of theorizing, modeling, experimentation is adequate? Seriously occupied with these questions, I read this book. I was blown away by the creative, often surprising, insights and advice.

Franz Mechsner, Associate Professor, Northumbria University, UK

Richard Marken, one of the finest experimental psychologists of our time, has written a concise and readable introduction to Perceptual Control Theory. It will be a valuable resource to all students studying behavior.

Henry Yin, Professor of Psychology and Neuroscience,  
Duke University, USA

This book successfully turns the spotlight on experimental methodology for testing living control systems. Richard Marken describes methods based on Perceptual Control Theory (PCT) that can be used to study learning, social, cognitive, and psychotherapeutic constructs. Both novice and expert researchers should read this survey of PCT research.

Grace B. Dyrud, Emeritus Professor of Psychology,  
Augsburg University, USA

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Richard Marken leads the academic world in the study of living control systems. The research he describes takes forward pioneering methodologies. Full of diverse examples and illustrative diagrams, this book now makes these transformative methods practical for researchers, practitioners, and students across the life and social sciences.

Warren Mansell, Reader in Clinical Psychology,  
University of Manchester, UK, and Editor of *The Interdisciplinary Handbook of  
Perceptual Control Theory: Living Control Systems IV*

In this book, Richard Marken provides researchers with the information necessary to design and re-examine research in the field of psychology. It is a must-read for anyone who wants to do quality research in the fields of cognition, experimental psychology, consciousness, and behavior.

Shelley A. W. Roy, Senior Faculty Member for the  
International Association of Applied Control Theory

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*A Guide to Doing Research on Purpose*

RICHARD S. MARKEN  
*University of California—Los Angeles*



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## *Preface*

This book is a guide to doing a new kind of psychological research that is aimed at understanding the purposes rather than the causes of behavior. If you have already taken a course on research methods in psychology you will see that the methods described here differ considerably from the ones described in those courses. Indeed, the difference is apparently so great that, to date, these methods have lingered somewhat outside the mainstream of psychological research. But I believe the reason for this has more to do with pragmatism than novelty. Mainstream researchers don't ignore new methodologies simply because they are different. If they did then a journal such as *Psychological Methods*, which introduces new methodologies in every issue, would have a much lower impact factor than it has. Rather, researchers ignore new methods that seem unnecessary; that can't help them achieve their goals. Since the goal of most psychological research is to understand the causes of behavior, it is not surprising that researchers would see methods aimed at understanding the purposes of behavior as being unnecessary. So my aim in this book is not only to describe a new approach to doing psychological research but also to explain why this new approach is absolutely necessary.

The book starts by explaining that the research approach described here is necessary because it is the only way to find out how the behavior of a living control system actually works. A living control system is a system that controls in the sense that it acts to keep aspects of its own experience – its perceptions – in preselected states, protected from the effects of disturbances that would move them from these states. That is, the behavior of a living control system can be described as the *control of perception* (Powers, 1973b). This is purposeful behavior – the purpose being to keep perceptions in preselected states. In order to understand such behavior one has to know what perceptions the system is controlling. The research methods described here are aimed at doing just that: determining

the perceptual variables that a living control system is controlling when it is seen carrying out various behaviors.

If organisms are living control systems – and there is considerable evidence that they are – then the methods described in this book are the only ones that are appropriate to the study of their behavior. This is because they are the only methods that can reveal the perceptual variables around which their behavior is organized – what are called *controlled variables*. The conventional methods of psychological research completely ignore the existence of controlled variables. Instead, their aim is to find evidence of causal relationships between independent (environmental) variables and dependent (behavioral) variables. But there is reason to believe that these relationships tell us little about the nature of the organisms under study. Perceptual Control Theory (PCT) – a theory that explains how living control systems work – shows us that, if organisms are living control systems, then the independent–dependent variable relationships that are found in conventional psychological research are actually side effects of the disturbance-resisting nature of these systems and, therefore, tell us more about the nature of the environment in which these systems do their behaving than about the systems themselves (Powers, 1978).

Thus, the pragmatic reason for doing psychological research using the methods described here is provided by PCT. The reason is that these are the only methods that provide a correct picture of the nature of the organisms under study – if those organisms are living control systems. The reasons for thinking that organisms are, indeed, living control systems are presented in Chapter 1, where we see that the purposeful behavior of organisms is equivalent to the controlling done by nonliving control systems, such as a thermostat. PCT is, therefore, an explanation of how both nonliving and living control systems work.

The research methods described in the remainder of the book show how to test different predictions of the PCT model of behavior. These different predictions are derived from the complete version of PCT, which views organisms as a hierarchy of control systems, where systems at each level of the hierarchy are controlling different types of perceptual variables; higher level systems control more complex perceptions than lower level ones. This aspect of PCT is meant to account for the fact that organisms carry out purposes of different levels of complexity; carrying out the purpose of pointing a finger, for example, involves control of a less complex perception, the perception of the position of the finger, than carrying out the purpose of making a point in a political debate, which involves control of a far more

complex perception – the perception of one’s position on a political issue. This hierarchical model leads to predictions about the types of perceptual variables that organisms control and how they control them – predictions that can only be tested using the methods described in the book.

In order to test any of the predictions of PCT, the researcher must be able to determine what variable or variables the organism is controlling when it is carrying out various behaviors. This is done using the test for the controlled variable or TCV. The TCV is both the centerpiece and the most misunderstood aspect of the approach to research described here. It is the centerpiece of this approach because it is aimed at determining the variables around which behavior is organized; and when you know what these variables are, you know nearly everything you need to know about why the organism does what it does. But the TCV is also the most misunderstood aspect of this approach to research because it is often taken to be a test to determine the *control* variable, a variable that controls the behavior of the organism, rather than the *controlled* variable – a variable that the organism controls. This misunderstanding seems to come from a desire to see the TCV as being compatible with the conventional approach to psychological research where the goal is to find the variables that control behavior. By simply dropping the “ed” the controlled variable becomes an independent variable – a variable that is presumed to control (meaning to cause) behavior – and the TCV can be seen as a version of the conventional approach to doing psychological research, which it definitely is not.

One of my main reasons for writing this book is to put the “ed” back into the “controlled variable.” Controlled variables are discussed throughout this book; control variables don’t show up at all. By putting “ed” back where it belongs I hope to keep the reader aware of the fact that the study of living control systems is aimed at determining the variables that are *controlled by* – not the variables *that control* – these systems.

This book is based on the work of the late William T. Powers, who developed the PCT model of purposeful behavior and described the methods to test it that are described herein. I wish I had been able to write this book while Bill was still with us; besides being a brilliant scientist he was a skillful teacher and patient critic. But as it is, I managed to get useful advice during the writing of this book from a number of very capable colleagues and friends including, in alphabetical order, Professor Heather Bell, Professor Tim Carey, Professor Grace Dyrud, Professor Warren Mansell, Mr. Jeff Rothenberg, and Ms. Rikki Westerschulte. I would like

to express particular gratitude to Dr. Ryan Hughes for help with the section on neurophysiological evidence for levels of control and to Professor Henry Yin for encouraging me to write this book in the first place. I hope that the result justifies Henry's confidence in me.