

ADVISORY EDITORIAL BOARD

G. EKMAN*, STOCKHOLM	I. KOHLER, INNSBRUCK
C. W. ERIKSEN, URBANA	D. B. LINDSLEY, LOS ANGELES
W. K. ESTES, NEW YORK	R. D. LUCE, IRVINE
P. FRAISSE, PARIS	M. TREISMAN, OXFORD
W. R. GARNER, NEW HAVEN	W. R. ROSENBLITH, CAMBRIDGE (U.S.)
D. M. GREEN, CAMBRIDGE (U.S.)	H. A. SIMON, PITTSBURGH
R. L. GREGORY, BRISTOL	P. SUPPES, STANFORD
T. INDOW, TOKYO	N. S. SUTHERLAND, SUSSEX
	M. TODA, SAPPORO

*Until his death.

This is Volume I of

HANDBOOK OF PERCEPTION

EDITORS: *Edward C. Carterette and Morton P. Friedman*

A complete list of the books in this series appears at the end of this volume.

HANDBOOK OF PERCEPTION

VOLUME I

HISTORICAL AND PHILOSOPHICAL ROOTS
OF PERCEPTION

EDITED BY

Edward C. Carterette and Morton P. Friedman

Department of Psychology
University of California
Los Angeles, California



ACADEMIC PRESS New York and London 1974
A Subsidiary of Harcourt Brace Jovanovich, Publishers

COPYRIGHT © 1974, BY ACADEMIC PRESS, INC.

ALL RIGHTS RESERVED.

NO PART OF THIS PUBLICATION MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPY, RECORDING, OR ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE PUBLISHER.

ACADEMIC PRESS, INC.

111 Fifth Avenue, New York, New York 10003

United Kingdom Edition published by
ACADEMIC PRESS, INC. (LONDON) LTD.
24/28 Oval Road, London NW1

Library of Congress Cataloging in Publication Data

Carterette, Edward C

Historical & philosophical roots of perception.

(His Handbook of perception, 1)

Includes bibliographies.

I. Perception. I. Friedman, Morton P., joint author. II. Title.

BF311.C29 153.7 73-21837

ISBN 0-12-161901-X

PRINTED IN THE UNITED STATES OF AMERICA

LIST OF CONTRIBUTORS

Numbers in parentheses indicate the pages on which the authors' contributions begin.

- D. E. BERLYNE (123), Department of Psychology, University of Toronto, Toronto, Ontario, Canada
- R. M. BOYNTON* (285), University of Rochester, Rochester, New York
- KENT DALLET (387), Department of Psychology, University of California, Los Angeles, California
- MAX DEUTSCHER (57), Department of Philosophy, Macquarie University, North Ryde, New South Wales, Australia
- W. J. DOWLING (243), Department of Psychology, University of California, Los Angeles, California
- BRUCE EARHARD (93), Department of Psychology, Dalhousie University, Halifax, Nova Scotia, Canada
- RODERICK FIRTH (3), Department of Philosophy, Harvard University, Cambridge, Massachusetts
- DAGFINN FØLLESDAL (377), Department of Philosophy, University of Oslo, Oslo, Norway, *and* Department of Philosophy, Stanford University, Stanford, California
- JAMES J. GIBSON (309), Department of Psychology, Cornell University, Ithaca, New York
- RICHARD L. GREGORY (255), Brain and Perception Laboratory, Department of Anatomy, The Medical School, University of Bristol, Bristol, England
- RALPH NORMAN HABER (313), Department of Psychology, University of Rochester, Rochester, New York
- GILBERT HARMAN (41), Department of Philosophy, Princeton University, Princeton, New Jersey

* Present address: Department of Psychology, University of California, San Diego, California.

JULIAN HOCHBERG (179), Department of Psychology, Columbia University, New York, New York

WOLFGANG METZGER (109), Psychologisches Institut, University of Münster, Münster, West Germany

KELYN ROBERTS (243), Department of Psychology, University of California, Los Angeles, California

WILLIAM ROTTMAYER (335), Department of Philosophy, Eastern Washington State College, Cheney, Washington

JOSEPH R. ROYCE (149), Center for Advanced Study in Theoretical Psychology, University of Alberta, Edmonton, Alberta, Canada

WM. W. ROZEBOOM (211), Center for Advanced Study in Theoretical Psychology, University of Alberta, Edmonton, Alberta, Canada

PATRICK SUPPES, (335), Institute for Mathematical Studies in the Social Sciences, Stanford University, Stanford, California

ELIANE VURPILLOT* (363), Laboratoire de Psychologie Experimentale et Comparée, Université René Descartes, Paris, France

MICHAEL WERTHEIMER (75), Department of Psychology, University of Colorado, Boulder, Colorado

R. M. YOST (19), Department of Philosophy, University of California, Los Angeles, California

* Present address: 28 rue Serpente, Paris 6e, France.

FOREWORD

The problem of perception is one of understanding the way in which the organism transforms, organizes, and structures information arising from the world in sense data or memory. With this definition of perception in mind, the aims of this treatise are to bring together essential aspects of the very large, diverse, and widely scattered literature on human perception and to give a précis of the state of knowledge in every area of perception. It is aimed at the psychologist in particular and at the natural scientist in general. A given topic is covered in a comprehensive survey in which fundamental facts and concepts are presented and important leads to journals and monographs of the specialized literature are provided. Perception is considered in its broadest sense. Therefore, the work will treat a wide range of experimental and theoretical work.

The first part of the treatise deals with the fundamentals of perceptual systems. It is comprised of six volumes covering (1) historical and philosophical roots of perception, (2) psychophysical judgment and measurement, (3) the biology of perceptual systems, (4) hearing, (5) seeing, and (6) feeling, tasting, smelling, and hurting.

Another six volumes will cover the perceiving organism, which takes up the wider view and generally ignores specialty boundaries. The major areas will include speech and language, perception of space and objects, perception of form and pattern, cognitive performance, information processing, perceptual memory, perceptual aspects of thinking and problem solving, esthetics, and the ecology of the perceiver. Coverage will be given to theoretical issues and models of perceptual processes and also to central topics in perceptual judgment and decision.

The "Handbook of Perception" should serve as a basic source and reference work for all in the arts or sciences, indeed for all who are interested in human perception.

EDWARD C. CARTERETTE
MORTON P. FRIEDMAN

PREFACE

. . . Any quality of a thing which affects our sense-organs does also more than that: it arouses processes in the hemispheres which are due to the organization of that organ by past experiences, and the result of which in consciousness are commonly described as ideas which the sensation suggests. The first of these ideas is that of the *thing* to which the sensible quality belongs. *The consciousness of particular material things present to sense* is nowadays called *perception*.

WILLIAM JAMES
(in *The Principles of Psychology*,
Volume 2, 1890)

Perception is a rich, diverse, and difficult field. The concerns of perception range from problems of knowing on through sensory processes to the perception of events in time and space.

In this volume we consider some of the main persisting conceptual issues. We begin with some philosophical problems of perception, of sense experience, of epistemology, and include some questions on the philosophy of mind. From a definitely psychological point of view we consider some origins of contemporary work in perception, in particular of perceptual structure, association, attention, cognition and knowledge, consciousness and action. We conclude with a series of chapters emphasizing several contemporary views of perception.

EDWARD C. CARTERETTE
MORTON P. FRIEDMAN

CONTENTS OF OTHER VOLUMES

Volume II: Psychophysical Judgment and Measurement

I. Introduction and Overview

Introduction and Overview

E. C. Carterette and M. P. Friedman

History of Psychophysics and Judgment

F. N. Jones

II. Perceptual Choice and Judgment

Attention: The Processing of Multiple Sources of Information

W. R. Garner

Psychological Decision Mechanisms and Perception

E. Galanter

Memory Processes and Judgment

A. Sandusky

Contextual Effects: A Range-Frequency Analysis

A. Parducci

Personality and Social Effects in Judgment

H. S. Upshaw

III. Measurement Models and Applications

Stimulus and Response Measurement

E. W. Holman and A. A. J. Marley

Algebraic Models in Perception

N. H. Anderson

Detection, Discrimination, and Recognition

R. D. Luce and D. M. Green

IV. Scaling

Overview of Psychophysical Scaling Methods

F. N. Jones

Perceptual Magnitude and Its Measurement

S. S. Stevens

V. Multidimensional Models

Multidimensional Scaling Models for Measurement of Human Perception

J. D. Carroll and M. Wish

Methods for Scaling Individual Differences in Perception and Judgment

M. Wish and J. D. Carroll

Applications of Multidimensional Scaling in Perception

T. Indow

Author Index—Subject Index

Volume III: Biology of Perceptual Systems

Energy, Transducers, and Sensory Discrimination

T. D. M. Roberts

Neuronal Properties

Charles F. Stevens

Integration in Nervous Systems

G. Adrian Horridge

Primordial Sense Organs and the Evolution of Sensory Systems

Lawrence Kruger and Barry E. Stein

Behavioral Embryology

Colwyn B. Trevarthen

Ethology

Wolfgang M. Schleidt

Genetic Control

Karla Butler Thomas

Object Recognition

N. S. Sutherland

Chemoreception

Bernice M. Wenzel

Tasting and Smelling

Bernice M. Wenzel

Cutaneous Mechanoreceptors

Paul R. Burgess

Tactual Perception of Textures

*M. M. Taylor, S. J. Lederman,
and R. H. Gibson*

The Spatial Senses

I. P. Howard

Orientation and Motion in Space

I. P. Howard

Temperature Reception

Herbert Hensel

Vision

Israel Abramov and James Gordon

Seeing

Israel Abramov and James Gordon

Hearing: Central Neural Mechanisms

Bruce Masterton and Irving T. Diamond

Audition

Douglas B. Webster

Author Index—Subject Index

Chapter 1

SENSE EXPERIENCE

RODERICK FIRTH

I. The Epistemological Problem of Perception	4
II. Cartesianism and Its Critics	6
A. The Identification of Sense Experience	7
B. Inference from Sense Experience	13
C. Self-warrant and Conceptual Parasitism	15
References	18

A psychologist who picks up a contemporary book or article on the philosophy of perception is likely to be baffled by what he finds. Some of it may seem trivial. Why should philosophers wonder so subtly and at such length whether the statement “The mountain looks purple” has the same meaning as “The mountain has a purple look,” and whether either of these has the same meaning as “The mountain appears purple” or “The mountain seems purple”? Why should it matter so much whether “The mountain looks purple” is synonymous with “The mountain looks the way purple things look under normal conditions”? Even if these problems turn out to be puzzling and intriguing ones, why have philosophers chosen *them* to worry about? They seem quite remote from anything that a psychologist is likely to call “the problem of perception.” Are they, indeed, related in any important way to the problems that have dominated the philosophy of perception throughout the history of Western thought?

These are all fair questions and I should like to do what I can to answer them. In the pages at my disposal I cannot write a comprehensive essay entitled “The Concept of Sense Experience in Contemporary Philosophy.” If I had space for such an essay it would surely be criticized by other philosophers as narrow, provincial, and not sufficiently appreciative of the recent work of Professors X, Y, and Z. But it is possible, I believe, to make a few observations that will help, at the very least, to explain the motivation behind *some* of the recent developments in the philosophy of perception, in particular some of the recent work on the concept of sense experience.

I. THE EPISTEMOLOGICAL PROBLEM OF PERCEPTION

There is no traditional branch of philosophy broad enough to embrace every problem that might be called a "philosophical problem of perception." Philosophers in our Western tradition, however, have been interested in perception primarily because they have wanted to answer the question "What is knowledge?"—the central question of epistemology. This is an ancient philosophical question. Plato raises it explicitly in the *Theaetetus*, and then turns the dialogue immediately into a discussion of sensation and perception. The question "What is *empirical* knowledge?" which has dominated the history of modern philosophy, leads even more certainly to problems of perception. For if "empirical knowledge" means knowledge based on some form of observation, then all empirical knowledge of the "external world" is presumably based on perception. If psychologists will keep this in mind they will find it easier to understand the special point of view from which philosophers look at perception. From the point of view of an empirical science the problem of perception is, roughly speaking, a *causal* problem. The editors of this *Handbook* have defined it as "the problem of understanding the way in which the organism transforms, organizes, and structures information arising from the world in sense data or memory." But the philosophical question "What is knowledge?" calls for an examination of the *concept* of knowledge. Thus philosophers tend to be interested in causal questions about perception only to the extent that these seem to be relevant to conceptual questions.

We can be much more specific than this, however, about the interests of the philosopher. In order to answer the question "What is knowledge?" it is first necessary to answer the question "What makes a belief warranted (or justified)?" This is not because knowledge is constituted, as some philosophers have thought, only of true, warranted beliefs. There seem to be special circumstances in which someone can be said to know that so-and-so is the case even though he is not justified in believing that so-and-so is the case. But in normal circumstances the fact that a particular person *A* is not warranted in believing a particular proposition *p*, is a sufficient reason for concluding that *A* does not know *p*. I may believe right now, for example, that it is snowing in northern New Hampshire. I may believe this with deep conviction, and my belief may in fact be true. But if my belief is wishful thinking or a lucky guess, if it is not a warranted belief, then I do not *know* that it is snowing in northern New Hampshire. Thus the question "What is knowledge?" cannot be answered unless we first discover what makes a belief warranted. And if all empirical knowledge is somehow based on perception, it becomes a matter of special importance for epistemology to know what makes a *perceptual* belief (or judgment) warranted. It is fair

to say, I think, that this is what most philosophers have in mind when they speak of "the problem of perception." Most of them are not inclined to be skeptical. They have no serious doubt that the vast majority of our perceptual beliefs *are* warranted, and that these beliefs constitute an important part of our empirical knowledge. But the problem of perception is to explain, so to speak, how it is *possible* for them to be warranted. If they are warranted because there is evidence for them, just what can this evidence be? And by what valid principles of inference can this evidence confer warrant on perceptual beliefs?

It should be noted at this point that terms like "perceptual belief" and "perceptual judgment" are ambiguous. If I assert "I see a lighthouse" or "I hear a bell" it is natural to say that I am expressing a perceptual belief—a belief to the effect that I am perceiving something of such and such a kind. Such judgments might well be called "psychophysical perceptual judgments." They entail the existence of objects like lighthouses and bells that constitute part of the subject-matter of the physical sciences. They also entail the existence of perceptual experiences (seeing, hearing, etc.) that constitute part of the subject-matter of psychology. The term "perceptual judgment," however, has traditionally been applied to judgments of quite another kind—to judgments that can be expressed in "observation statements" such as "That is a lighthouse" or "This is a bell." Statements like these may identify and characterize the things that I perceive. Unlike "psychophysical perceptual judgments," however, they do not assert or entail that I perceive the things (e.g., the lighthouse and the bell) that are identified and characterized. Many philosophers seem to have thought that the epistemological problem of perception can be defined by reference to perceptual judgments in this traditional sense of the term. The problem of perception, as they have construed it, is to explain how such judgments acquire the high degree of warrant that they so often have. But there is, in fact, no way to identify a class of such judgments that is distinctively perceptual. The fact that they can be expressed in demonstrative statements of the form "This (or that) is a ———," is not sufficient. It is quite possible to point at an object that one cannot see at the moment (e.g., an object behind one's back) and assert with conviction "That is my favorite book." In such a case it would be more appropriate to say that the judgment is based on memory than perception (although perception may play some role). To meet this difficulty we might be tempted to add what looks like a minor qualification. The problem of perception, we might say, is to explain how such judgments acquire warrant when we actually perceive the things referred to by the words "this" and "that." But this qualification introduces a consideration that is epistemologically irrelevant. Even if the statement "That is a lighthouse" is warranted by perception, its warrant does not