

THIRD PRINTING

# THE BIOLOGICAL BASIS OF PERSONALITY

H. J. EYSENCK, Ph.D., D.Sc.

Professor of Psychology  
University of London

Director, Psychological Laboratories  
Institute of Psychiatry

Psychologist  
Maudsley and Bethlem Royal Hospitals  
London, England

A descriptive and causal model of human personality consonant with current concepts of experimental psychology, and the physiological and neurological mechanisms that unravel the biological basis of behavior patterns. The laws of behavior as they are affected by individual differences are reduced to the interplay of two dimensions, one of which embodies emotionality, neuroticism, or instability and the other introversion-extroversion, the modern equivalent to Galen's medieval doctrine of the four temperaments.

*American Lecture Series®*



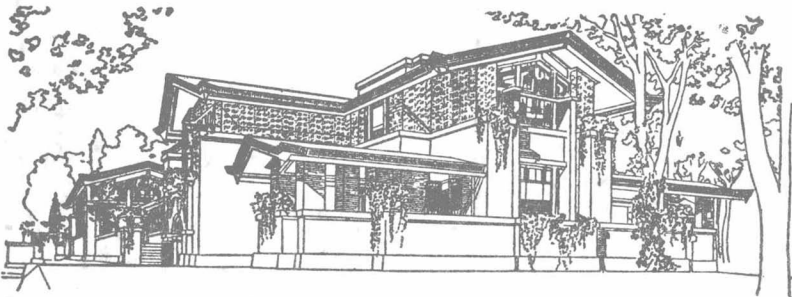
*Third Printing*

# THE BIOLOGICAL BASIS OF PERSONALITY

*By*

**H. J. EYSENCK, Ph.D., D.Sc.**

*Professor of Psychology, University of London  
Director, Psychological Laboratories, Institute of Psychiatry  
Psychologist, Maudsley and Bethlem Royal Hospitals  
London, England*



**CHARLES C THOMAS • PUBLISHER**  
*Springfield • Illinois • U.S.A.*

*Published and Distributed Throughout the World by*  
CHARLES C THOMAS • PUBLISHER  
BANNERSTONE HOUSE  
301-327 East Lawrence Avenue, Springfield, Illinois, U.S.A.

This book is protected by copyright. No  
part of it may be reproduced in any manner  
without written permission from the publisher.

© 1967, by CHARLES C THOMAS • PUBLISHER  
ISBN 0-398-00538-9  
Library of Congress Catalog Card Number: 67-18338

First Printing, 1967  
Second Printing, 1970  
Third Printing, 1977

*With THOMAS BOOKS careful attention is given to all details of  
manufacturing and design. It is the Publisher's desire to present  
books that are satisfactory as to their physical qualities and artistic  
possibilities and appropriate for their particular use. THOMAS  
BOOKS will be true to those laws of quality that assure a good name  
and good will.*

*Printed in the United States of America*  
N-1

## FOREWORD

OUR LIVING CHEMISTRY SERIES was conceived by Editor and Publisher to advance the newer knowledge of chemical medicine in the cause of clinical practice. The interdependence of chemistry and medicine is so great that physicians are turning to chemistry, and chemists to medicine, in order to understand the underlying basis of life processes in health and disease. Once chemical truths, proofs, and convictions become sound foundations for clinical phenomena, key hybrid investigators clarify the bewildering panorama of biochemical progress for application in everyday practice, stimulation of experimental research, and extension of postgraduate instruction. Each of our monographs thus unravels the chemical mechanisms and clinical management of many diseases that have remained relatively static in the minds of medical men for three thousand years. Our new Series is charged with the *nisus élan* of chemical wisdom, supreme in choice of international authors, optimal in standards of chemical scholarship, provocative in imagination for experimental research, comprehensive in discussions of scientific medicine, and authoritative in chemical perspective of human disorders.

Dr. Eysenck of London creates a descriptive model of human personality consonant with current concepts of experimental psychology, on the one hand, and physiological and neurological mechanisms, on the other, to unravel the biological basis of behavior patterns. The laws of behavior that yield to the energy of the individual are reduced to the interplay of two dimensions, one of which embodies emotionality, neuroticism, or instability and the other introversion-extroversion, the modern discovery equivalent to Galen's medieval doctrine of the four temperaments. "What is man that thou art mindful of him?" The logical answer is vested in these psychological principles that, like the Nile, begin in minuteness and end in magnificence, as we are led up the high hill by gentle

slopes while the master discusses the structure of personality from formative process to integrated product and formulates causal psychological theories on the main dimensions of personality to beguile the way. From the Maudsley work on identical and fraternal twins, reared together and separately, we see that the building blocks of personality structure determined by heredity reveal biological causations of indelible individual differences in form but not in function or in behavior. The biological basis of personality in both structure and dynamics is gleaned further from the detailed investigation of the reticular formation and the visceral brain while the author shows the relevance of the concepts of "arousal" and "activation" to the personality dimensions of introversion and emotionality. The "arousal" concept has been overloaded by incorporating in it two quite distinct notions which are now divided into two interrelated systems. The resulting theory of personality, supported by physiological studies and Teplov's Pavlovian observations with visual enfolding, enables the prediction of broad dimensions of personality of fairly specific physiological attributes. Introverts manifest a relatively strong excitatory central nervous system and weak inhibitory tendencies while extraverts reverse this pattern. Human beings thus differ with respect to the speed and strength with which reactive inhibition is produced and the rate with which the inhibition is dissipated, based on differences in neural structures.

Man is a biosocial being with heredity and environment inseparably entwined in their influence on his behavior; yet recent psychological research has failed to take into account the biological factors responsible for individual differences, which are integrated herein with the more widely recognized environmental determinants. The pendulum has swung too far in the direction of overemphasizing purely social and environmental forces, but the true human status is revealed to redress the balance. As the theory progresses, our minds are made to move in complicated patterns attaining pinnacles achieved by the imagination in its most daring reconnoiters in order to interpret accurately the biological phenomena inherent in personality structure with relative ease. It is not a painless procedure because the logical text smoothes away most of the difficulties en route, developing perception in human behavior, interpreting intent with common sense rounded out and minutely articulated in

psychological terms. Personality remains the center of reference which makes human behavior intelligible, the organ of self-direction and self-actualization that confers unity on human experience. It is no collection of sensations, motives, and memories but a powerful inward force. It is no mere outward structure but an inward grace that propels man into the future. Man is always what he is yet to be, projecting his life into the future while psychology keeps tracing it into the past, for only in the process of becoming does the form of life complete itself and the *eidos* of the person become realized. Modern genetics reveals personality not as an organic compound of individual parts but as a creative synthesis of the components into a new being different from and transcending all. The whole is not dominated by the parts as mechanistic psychology maintains, but is self-determined; for personality is the most complete embodiment of the wholeness which is imminent in both nature and man.

The term personality is derived from the Latin *persona*, meaning mask, the outward indication of a person's characteristics, or from the Latin *per se una*, meaning self-containing. It is that innate force which integrates the person's behavior, adjusts him to his environment, or activates his feedback response to the reactions of individuals. Man is a machine by birth but a self by experience, dependent upon the nature and movement of associated life. Personality thus embodies the qualities or characteristics of a person which determine how he reacts and is reacted to by other people. Some maintain that personality involves an essential uniqueness of individuals as a whole and can be studied only in their social setting, while others consider wholeness an esoteric characteristic and study personality by delineating relevant parts rather than the wholes. The measurement of personality involves quantitating certain forms of behavior which allow us to infer the characteristic personality. The tenuous nature of most postulated dimensions underlying the surface traits of personality is thrown out of focus by the swamping effect of overriding method variance specifically linked to the particular techniques involved in assessment. The author is a formidable opponent of projective methods of personality study but a rigorous exponent of the scientific study of personality. Thus, by psychometric studies of individual differences and by factor analysis, he



evolves basic dimensions of personality, rational methods of measurement, and the relationship between these dimensions and susceptibility to conditioning, to disease patterns, and response to drugs. The study of personality has thus been undertaken to type individuals with the highest standards of scientific rigor of mathematical analysis to find new answers to old questions by hypothetico-deductive methods.

*Beyond the bright searchlights of science,  
Out of sight of the windows of sense,  
Old riddles still bid us defiance,  
Old questions of Why and of Whence.*  
*W. C. Dampier-Whetham*

I. NEWTON KUGELMASS, M.D., Ph.D., Sc.D., *Editor*

## PREFACE

“MY NEXT TRICK is impossible!” says the circus acrobat, but the audience knows that he is going to perform it triumphantly nevertheless. Writing a book such as this is an impossible task, and I can only hope that no one will imagine that I am unaware of this fact, or that I am under any illusion that the feat has been performed triumphantly. To straddle the fields of personality research and experimental psychology is in itself quite a demanding task; add to that an attempt to cover also research in psychiatry, genetics, neurology, pharmacology, electrophysiology and several related disciplines, and it will be clear that anyone claiming expertise in all these fields would be either a genius or a charlatan. Nevertheless, evidence had been accumulating in recent years to indicate that personality has a strong biological basis, and the effort had to be made to cover sufficient of the relevant literature to see whether some sort of unified picture would in fact appear. It is my impression that such a picture is indeed beginning to emerge, and that however misconceived some of its proportions and aspects may turn out to be, nevertheless it may serve to direct research into more useful channels, and to pull together existing knowledge from many different sources. Even a bad map is probably better than no map at all, and this book was written in order to provide such a map—as good as I could make it, but of course still very far indeed from anything approaching perfection.

Maps or models of personality exist in rich profusion, and it may be asked why another one should be required. My answer is simply that the field of personality is not an isolated island, lying far from other more civilised countries and continents; personality interacts constantly and inevitably with experimental psychology, pharmacology, neurology, and the various other sciences mentioned earlier.



Personality theorists can only benefit from discovering what light these other sciences may have to shed on their problems, and conversely scientists in these other fields may benefit from knowing something about the ways in which their disciplines interact with personality. Divisions between academic subjects tend to be of administrative convenience, but they may easily obscure the real and much more important links which exist between them and which may provide some of the most exciting fields for fruitful research. I cannot pretend to have uncovered all the suggestive and fruitful relations existing between personality study and surrounding fields, nor can I pretend to have made no errors in dealing with disciplines in which I have not myself had an opportunity of working; in extenuation I can only join Dr. Johnson in pleading "ignorance, sheer ignorance!" This is a pioneering effort, and as such is subject to more possibilities of downright error than most books.

The model of personality which emerges is in fact the third I have tried to construct. My first was presented some twenty years ago; it was a purely descriptive model bringing together psychological experiments, psychiatric assessments, and psychometric methods of analysis, notably factor analysis. The resulting books (*Dimensions of Personality*; *The Experimental Study of Personality*; and a historical account entitled *The Structure of Human Personality*) contained some adumbrations of notions developed later on, but did not essentially go beyond description. The second model took shape ten years ago and tried to supply some form of causal analysis by reference to concepts current in experimental psychology; *Dynamics of Anxiety and Hysteria*, *Experiments in Personality*, and *Experiments with Drugs* embodied much of the experimental and theoretical work done during this period. In this book I have tried to go deeper still and find biological causes underlying the psychological concepts of emotion, excitation, and inhibition which formed the building stones of my earlier efforts. To me, it seems that the causal links postulated between personality variables on the one hand, and neurological and physiological discoveries on the other, make the whole model more realistic and take it out of the field of solipsistic speculation in which the school of the "empty organism" thrives. Such an estimate depends, of course, on the success of the undertaking; if the suggested links should not in fact prove to

give rise to verifiable deductions, then nothing would have been gained. However, I believe that even the small amount of evidence already available makes such an outcome unlikely; however wrong the details may be, the main suggestions made are unlikely to be entirely upset by future research—or so I like to think. The reader must of course be the ultimate judge of this.

Theories of personality may have practical applications, and I have tried in various books to suggest such applications to criminology, for instance, or the treatment of neurosis (*Crime and Personality*; *Experiments in Behaviour Therapy*; *The Causes and Cures of Neurosis*<sup>1</sup>). But however enticing such applications may be, they depend for their value on the truth and accuracy of the theory or model from which they are derived. In this book I am not at all concerned with application, but merely with the facts as they appear at the time of writing. It is for this reason that readers may find the ratio of references to text rather large; where so many different specialties are involved it seemed particularly desirable to stick closely to the experimental facts, and to document every statement. This does not make for elegant writing, but it may be more useful for working scientists.

An exception to this rule (if only a limited one) has been made in Chapters II and III. In these I partly recapitulate the major features of models 1 and 2, and it seemed inappropriate to go into details which had already been published *in extenso*. In relation to the descriptive model, in particular, it seemed unnecessary to do so, as a companion volume to the present one, entitled *Description and Measurement of Personality*,<sup>2</sup> has summarized all the evidence, as well as reporting a large amount of new material. In consequence only a very condensed account of this model is here given, and to many readers this will undoubtedly seem dogmatic in the extreme. For further information, discussion of unsolved issues, and qualifications of too explicit statements, these readers must be referred to the above mentioned volume (exact references to this and the other books mentioned will be found in the bibliography).

In Chapter III I have dealt in a similar manner with my second model, but here it was necessary to go into some greater detail as

<sup>1</sup>With Dr. S. Rachman.

<sup>2</sup>With Dr. S. B. G. Eysenck.

the last summary of experimental work had appeared in 1957 (*Dynamics of Anxiety and Hysteria*). I compromised by dealing mainly with material published since then, except when one or other of the older studies was too important to omit. Altogether, here as elsewhere, I attempted to concentrate on essentials and let the less important, more controversial issues go by default; they are interesting and important, but to deal with them in sufficient detail would have meant doubling the length of the book.

Inevitably, in going from one model to the next, hypotheses and theories had to be modified or even jettisoned. It did not seem advisable to burden the book with an elaborate account of the development of the theories that survived, or a necrology of those that died. In a few cases it seemed interesting and important to refer briefly to historical positions now given up or greatly altered; reminiscence in pursuit rotor learning and figural aftereffects are two obvious examples. But on the whole there is sufficient similarity between earlier and later positions to mediate similar predictions, and where that appeared to be true I did not try to trace developments and connections. The theories presented must stand or fall by their ability to give rise to successful predictions; their historical development is irrelevant in this connection. In the same way, criticisms of earlier versions and experiments apparently disproving positions not now maintained have not been dealt with at length; while important to the development of the theories in question, they are no longer relevant.

Some parts of the book first saw the light of day as lectures given to special audiences. Chapter I in part retains the form of the Charles Myers Lecture, given to the British Psychological Society in 1965, and is reprinted with their permission. Chapter IV derives from the Herbert Spencer Lecture given at Oxford in 1964, and Chapter VI from the Thomas Young Lecture given at St. George's Hospital in 1963. To the audiences at these and other lectures, who by their questions and comments indicated where my account was too unclear to be followed easily, I am grateful; and equally I owe much to my colleagues and students with whom I have discussed in detail many of the ideas contained in this book, and who have contributed importantly to the experimental work discussed. It is not too much to say that without their wholehearted cooperation this book would

have remained an empty shell of ideas without experimental justification or support.

H. J. EYSENCK  
*Institute of Psychiatry*  
*University of London*

# CONTENTS

	<i>Page</i>
<i>Foreword</i> . . . . .	vii
<i>Preface</i> . . . . .	xi
 <i>Chapter</i>	
I. THE TWO FACES OF PSYCHOLOGY . . . . .	3
II. THE STRUCTURE OF PERSONALITY . . . . .	34
III. THE EXPERIMENTAL ANALYSIS OF PERSONALITY . . . . .	75
Involuntary Rest Pauses (IRP) and Blocking . . . . .	83
Sensory Thresholds . . . . .	99
Formation of Conditioned Responses . . . . .	117
Learning . . . . .	126
Perceptual Phenomena . . . . .	135
Motor Movements . . . . .	153
Achievement and Aspiration . . . . .	163
Autonomic Reactions . . . . .	167
IV. HEREDITY AND PERSONALITY . . . . .	187
V. ACTIVATION, AROUSAL, AND EMOTION . . . . .	226
VI. PERSONALITY AND DRUGS . . . . .	263
VII. PERSONALITY AND BRAIN DAMAGE—C. B. Blakemore . . . . .	319
 <i>Epilogue</i> . . . . .	 340
<i>References</i> . . . . .	347
<i>Subject Index</i> . . . . .	391

**THE BIOLOGICAL BASIS  
OF PERSONALITY**





## CHAPTER I

### THE TWO FACES OF PSYCHOLOGY

IN THE WRITER'S OFFICE there hang two pictures—one of a Victorian aristocrat, the other of a Russian peasant. Sir Francis Galton symbolises more than anyone else the fundamental concern of psychology with individual differences, with genetic causes of personality development, and with the statistical investigation of systems of classification. Ivan Petrovich Pavlov symbolises more than anyone else the fundamental concern of psychology with general laws, with environmental modification of behaviour, and with the experimental study of functional relationships. It may seem obvious and indeed inevitable that psychology is equally concerned with both these approaches, but this view does not seem to be at all widely held. Experimental psychologists often seem quite unaware of the problems created by individual differences; personality theorists seem equally unconcerned with the lack of relationship between their concepts and those of the experimentalists.

Let us begin by considering the attitude of the experimentalist. He would claim that his method of procedure is modelled exactly on that of the physicist and that it fulfills in every way the requirements of scientific procedure. A functional relation is hypothesized between  $a$  and  $b$ , such that  $a = f(b)$ ; experiments are carried out to verify the hypothesis and to elucidate the precise nature of the function, preferably in mathematical terms. Such a programme looks inviting, and appears indeed to resemble the physicist's paradigm. But are things really that easy? Consider Köhler's hypothesis that the size of the Müller-Lyer illusion should decrease with massed practice, due to increased satiation inside the angles formed by the arrowheads (Köhler and Fishback, 1950). Opposed to this we have the hypothesis put forward by Eysenck and Slater (1958)

that inhibition of attention during massed practice would lead to an increase in the size of the illusion. During forty massed trials, fifty subjects showed an increase in size of illusion from 1.14 through 1.28 and 1.75 to 2.13, which would seem to be in line with the Eysenck and Slater prediction, but this change was found to be insignificant because of the tremendous size of the individual differences. Some subjects showed a strong increase in the size of the illusion, others showed an equally strong decrease, while yet others showed no change at all, or an up-and-down shift. Individual differences accounted for 99 per cent of all the variance observed; systematic "functional" differences only for 1 per cent! Thus adherence to the procedure of the experimentalist, who relegates individual differences to the error term of his analysis of variance, would leave him with only 1 per cent of all the causal factors to study—surely a somewhat excessive price to pay for apparent adherence to the physicist's paradigm!<sup>1</sup>

Another example may be taken from learning theory. Hovland (1939) investigated the differential effects of massed and spaced practice on paired-associate learning. He too found an insignificant main effect, primarily due to large individual differences; some 44 per cent of his subjects learned more rapidly under distributed practice, while some 38 per cent learned more rapidly under massed practice; the remainder showed no effect either way. Similar results were found in serial learning. Research since has paid no attention to this problem of individual differences, in spite of the fact that these differences swamp all other effects; we take leave to doubt whether physicists would throw overboard massive and repeated findings for the sake of some putative "pure" model of experimental procedure.

But in actual fact this alleged model exists only in the imagination; physicists do indeed make use of experimental studies of functional relations, but they carefully supplement these with what in biology we would call taxonomic studies. No physicist would dream of assessing the electric conductivity, or the magnetic properties, or the

<sup>1</sup>Parker and Newbigger (1965) have recently brought forward evidence to show that the decrease in magnitude of the illusion is a function of the psychophysical method employed; their data suggest that learning, rather than satiation or inhibition, is responsible for any decline observed.