

# PSYCHOLOGY

A Factual Textbook

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## PREFACE

Experimental psychology has reached the stage of maturity. There is a vast amount of well-substantiated fact which forms the foundation of the science, and we have felt that these facts should be presented to the young student of psychology in terms free from the bias of metaphysical presuppositions or of psychological systems. In short, our aim has been to present such a factual text as one should expect from a science. Accordingly, theoretical discussions have been to a great extent omitted and controversial points avoided. Our purpose has been to achieve, not a handbook encumbered with a mass of detailed information, dates, the names of investigators and the titles of monographs, but a generalized statement of fundamental facts in so far as generalization is possible at this time.

Even a cursory examination of the book will reveal an uneven balance among the various chapters. This fault, if it is a fault, is that of psychology and not of the authors. Psychological knowledge is much more extended and precise in some fields than in others. We believe that it is better to present the facts as they exist rather than to distort the picture, by suppression in some chapters and overemphasis in others, in order to achieve proper proportion.

Research has been intense and extensive in psychology during the last few decades, and it was evident to us that it is no longer possible for one man correctly to evaluate and critically to select the results of experimentation over more than a limited range. We have therefore asked experimentalists to prepare chapters in the fields in which they are specialists. Much of the material is printed substantially as it was submitted by these collaborators. We have for the most part merely suggested revision by the authors, or have cut, or have rephrased in order to avoid overlapping and to obtain, so far as possible,



a unity of style and a balanced form. In all cases, however, we must assume final responsibility.

We take this opportunity to express our deep appreciation of the hearty and enthusiastic cooperation of the collaborators who have at all times in the preparation of this book generously acceded to our plans and wishes.

E. G. B.

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## CHAPTER I

### THE NATURE OF PSYCHOLOGY

A person is a living organism acting in relation to its environment. This environment is the world at large, and it is always changing. Some of these changes affect the organism, and often, when the organism is affected, we find that its behavior is altered. Such a change in behavior may in turn produce change in the environment. So the process keeps up, constituting what is commonly called 'life.'

**The organism in its environment.** Let us examine such a living person from a scientific point of view. Then we find that we have to do with an extremely complex physical system: an organism and its immediate environment. Events within this system have a definite causal order, thus: a stimulus affects a sense organ, something happens in the nervous system and the organism does something. It is in the understanding of this system that psychology is primarily interested.

1. A *stimulus* is such a change of energy in the environment as affects a sense organ. Light becomes a stimulus when it enters the eye and falls upon a sensitive retina. Sound becomes a stimulus when it gets through to the inner ear where the auditory nerve endings lie. A weight upon the skin, a cough-drop in the mouth, a perfume in the nostrils—these are stimuli provided they actually do stimulate. They are not stimuli if the sense organ is in any way prevented from functioning. A distant object may be called a stimulus if it gives rise to light or sound or any other form of energy that presently stimulates the organism. Most often, when we speak of a stimulus, we are thinking of some object that is under control in an experiment. Thus a tuning-fork is a stimulus to tone because by it we can control the sound that reaches the ear.



Sometimes it is preferable to call this external cause of action a *situation*. A situation is thought of as more complex than a stimulus and also as depending for its effect upon the particular past experience of the person. Red light falling upon the retina is a stimulus, but a traffic officer blowing his whistle and holding up his hand is a situation. The distinction is one of convenience and is not sharp.

2. A stimulus or situation affects an organism through its sense organs. The sense organs respond in their own peculiar ways to the energies that stimulate them. Specific nerve impulses result, and they pass with many modifications into the spinal cord and the brain. There the incoming impulses determine outgoing impulses that arouse muscular movement or the secretion of glands. This second large phase of the total system which we are considering is *neural*.

The outgoing impulses are determined only in part by the impulses that the stimulus or situation has aroused. Action depends more upon the constitution of the nervous system than upon the stimulus. A whistle produces this or that reaction of the organism, according to its meaning, that is to say, according as the nervous system because of past learning directs the effect of the whistle into one channel of action or another.

Not all stimulation of the sense organs gives rise to action. Many incoming impulses seem to get lost. However, we can never know very much about such impulses, because it is only those nervous events that lead to action that we can study easily. When a man is said to *see* that a card is red, we mean, usually, that he *says* that the card looks red to him, or else that he *makes a signal* to show that the card is red. He must *do* something about the stimulus if we are ever to find out that the stimulus was effective, and it is for this reason that we are not far wrong in saying that psychology studies only those nervous events which lead, or can lead, to action.

3. The last phase of the total system is *response* or *behavior*. We use the term *response* when the result is simple and scientifically definite, like the movement of a finger in response