



a Pelican Original

# The Psychology of Learning

Robert Borger and A. E. M. Seaborne

## **Pelican Books**

### **The Psychology of Learning**

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## Editorial Foreword

To place this book in its historical setting we need only to recall the three main phases through which psychology has passed in the course of the last hundred years. Until the mid nineteenth century psychology was a branch of philosophy. After Darwin and throughout the last half of the century it became increasingly influenced by biological concepts and preoccupied with laboratory methods. Early in the present century it had established its position as a natural science without philosophical commitments. In its new-found independence psychology then split into a variety of 'schools' – Behaviourism, Psycho-analysis, Gestalt Psychology and others. By the next mid century, however, sectarianism in psychology was on the wane. When Roger Russell succeeded Sir Cyril Burt to the chair of psychology at University College London he made a significant remark, 'To-day it is not so much a matter of schools of psychology in general: it is rather that there are schools of thought in special fields, e.g. Learning Theory.' So it was, and so it has remained. 'Learning Theory' was an apt example to choose. This has been a major preoccupation of experimental psychologists for at least the last thirty years. There are several important schools of thought concerning the basic principles of learning and each school has a formidable body of experimental evidence in support of its theory. The theories and the experiments adduced in support are not in principle difficult to understand, but out of concern for precision these schools have developed also a rather formidable technical terminology. Hence the need for restating the facts and the theories in language understandable by students of psychology, by teachers, and by 'ordinary' readers. To provide such a restatement is what the authors of this book have set out to do. And this is what they have, in fact, done.

C. A. Mace





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We are grateful to Professor James Olds of the University of Michigan who kindly allowed us to reproduce plate 2 and to the National Aeronautics and Space Administration who supplied plate 9. Plate 1 is reproduced by permission of *Life Magazine* © 1965 *Time Inc.* and plate 4 by permission of William Vandivert. Plates 3 and 5 were photographed in the laboratory of the M.R.C. Unit for the Experimental Investigation of Behaviour at University College, London, and are reproduced by courtesy of Mr G. A. Tolliver.



# 1. Introduction

People are continually engaged in some learning activity or other – learning to ride a bicycle or speak a foreign language, to dance, swim, cook or play the latest card game, to handle a pneumatic drill, manage a shop or administer a Government department. For each person, a selection of such experiences, and especially the universal one of school, goes to make up his idea of what learning is about and what sort of questions need to be answered. They help to produce some more or less clear expectation of what this book will be about. We might as well ask at the very beginning: what is the relationship between the reader's questions about learning and those that psychologists try to answer? When psychologists talk about learning, do they mean the same thing as the reader?

The examples of learning that have been quoted cover a wide range of human activity. How does one deal with such a varied and complex field? Is it all just one topic to be dealt with under a single title?

Many people who have written about human learning have done so as a result of long experience in teaching children. They have grappled with the task of producing learning in others, have reviewed and reconsidered both what they were doing and what they were trying to do, and have arrived at insights and theories about the learning process as they saw it. Ideas developed in this way can be valuable and are certainly often influential. Suppose, however, that we want something more systematic, an experimental investigation of learning that not only produces conclusions, but can present the evidence and the reasoning on which they are based. Where should one begin?

Two broad approaches are possible. We can, on the one hand, concentrate directly on 'real' situations – people learning mathematics or languages or particular skills – and gradually build

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up a sort of mosaic made up of knowledge about individual cases. Here we are asking not so much, 'what happens when people learn', but rather, 'in what circumstances and by what methods do people best learn mathematics or French or typing?' This approach has been characteristic of much educational research. We can, on the other hand, set out to look for principles that apply to learning in general. After all, we talk about 'learning' in every instance that has been mentioned. Could this be significant? Why do we label all these situations in the same way? We may be tempted to suppose that they have something in common, that there is something similar in what happens to the learner. If so, if we can clarify what it is and distil from our everyday language some sort of working definition, we might then be able to set up comparatively simple and controlled situations to demonstrate some basic rules of learning. On the whole, this has been the approach of experimental psychology, and it has led to an interest in many problems that may seem a long way removed from the classroom, the training school or the library.

What is it about learning history or algebra, about learning to operate a lathe or to play chess, to recognize a faulty paint-finish or a case of Parkinson's disease, that makes us use the same word 'learning' in every case? What is the common feature? Certainly the procedures and situations are very different, as are the actual achievements involved. The only similarity lies in that in each case the learner *changes* according to criteria specific to the situation – the history student can talk about the factors leading up to the outbreak of World War I, whereas this was previously impossible, the budding chess player finds that he is beating his father with increasing frequency. These are the sorts of observation which we would in fact use in deciding if learning was taking place. We would point to such changes if challenged to explain what we meant by saying that this or that individual had learnt something.

These examples of learning are of a special kind. Usually they involve the explicit recognition by the learner of some objective he wishes to attain, and often specially created cir-

cumstances – such as schools or industrial training schemes – are available to help him do it. We spend quite a considerable part of our lives in this sort of deliberate and self-conscious learning situation, and it provides the most obvious examples; but it is a feature that is not essential. Children, for example, learn a great many things even though they may have no particular intention of doing so. Nor need there be intention on anyone else's part – no stage-managing is necessary for the proverbial child to find out about fires and learn to avoid them. The essential features of this situation are an interaction between learner and environment, and a subsequent change in the pattern of his behaviour. Of course, if the circumstances have been deliberately engineered to bring about such a change, we are more likely to notice it and label it as a learning situation. But had they been like that 'by accident', or arranged for some quite different purpose, their impact on the 'learner' would have been the same – though we must obviously recognize the intention of the learner as a factor in the situation. If we are concerned with learning as a *process*, we must include this case with the rest. And we must not leave out those cases where the change that takes place is not a particular *achievement*, not something that we should normally comment on, or even recognize as a behavioural entity. Such a conception of learning will include, say, developing the habit of taking a particular route to work, of wearing certain clothes, of smoking, speaking with a certain accent, refusing certain foods, being friendly to certain people. All these represent changes of behaviour brought about in some way by the interaction of the environment with the individual. We might not ordinarily think of the development of food preferences as a learning phenomenon. Yet having once started to group together, under the heading of 'learning', the process of becoming a doctor and that of gaining proficiency on a bicycle, it may become appropriate to include all conceivable aspects of behaviour, important or trivial, simple or complex, deliberately contrived or brought about 'by accident'. To consider learning is to consider how the interaction between an individual and his environment

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brings about changes in the way in which he tends to behave.

We can go further. So far we have considered human beings – but changes in the pattern of behaviour under the influence of the environment obviously take place in animals other than man. Indeed, the capacity to change in response to properties of the 'external world' seems to be, in various degrees, a basic characteristic of all living organisms.

Compared to man, earthworms are, of course, rather limited in what they can achieve. But if we consider, as a provisional definition of an instance of learning, *any more or less permanent change of behaviour which is the result of experience*, we find that we must regard even these primitive animals as capable of some learning. This opens up the investigation of learning processes in dogs, cats, octopus, chimpanzees and a host of others – including, of course, the ubiquitous white rat.

It may seem that our attempt to turn the idea of learning into a working concept has had the effect of greatly complicating the issue. Certainly it looks as though we shall have to deal with a much wider range of situations than we started out with. But it has also had certain advantages. It is becoming clearer what are the defining features of the phenomenon we are trying to come to grips with. This means, particularly once we have brought animals into the picture, that we can construct comparatively simple experiments to serve as possible models for a whole range of more complex learning situations. We can introduce an animal into an environment whose properties we can specify and control. We can observe the ways in which its behaviour changes, and attempt to discover any systematic relationships between what happened in the animal's environment and what happened to its behaviour. The use of animals makes possible types of experimental set-up, degrees of control and kinds of measurement that ethical and legal considerations, as well as sheer inconvenience, would rule out in the case of human beings. It has the added advantage that it decreases the similarity between the investigator and his subject – a situation peculiar to psychology – and thus helps the attainment of the sort of objective attitude that is usually regarded as being essen-

tial in scientific work. All this, and the fact that many people either just like working with or are specifically interested in animals, accounts for the large volume of animal research done by learning psychologists.

Needless to say, there is also a great deal of work done on learning in human beings. While some experimental procedures are ruled out, many others are only possible with people – all those involving verbal material, for example. A great deal of human learning is, or appears to be, vastly more complex than anything to be found among animals, and this raises serious problems for experimental method. Some psychologists try to meet this challenge directly, while others may take the view that they should start by attacking those parts of their subject matter that are relatively simple. In either case, they are usually concerned with trying to make a contribution towards some comprehensive account of the learning process.

For the moment, let us recapitulate. We started off with a look at what learning might mean to most people who are not in fact professionally concerned with it. We indicated that within psychology the term learning was not used in quite the same way, and we tried to arrive at a more technical working definition of the area to be investigated: more or less permanent changes of behaviour that are the result of experience. This view of learning includes a wide range of situations that might not ordinarily be thought of under that heading – in particular it extends the topic quite explicitly to both human and animal behaviour, without making any sharp distinctions. We suggested that while inevitably methods and materials differ according to the type of learning situation being investigated, psychologists are essentially concerned with a search for rules and principles of wide application. It is important to appreciate this general aim in order to understand the choice of some of the particular problems being studied.

How far have we really moved from our starting point – how adequate is the definition and the type of inquiry that has been outlined in dealing with a normal everyday conception of learning? Consider a number of possible objections.



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To begin with one might feel some misgivings about the emphasis that has been placed, in everything that has been said so far, on behaviour. This may be all right for animals, or when dealing with the learning of manual skills. But if someone is learning history, say, surely he is gaining knowledge and understanding, not acquiring some new way of behaving.

Just what sort of distinction is this? To find out what progress is being made in learning to operate a lathe we must look at some aspect of performance, at something that the learner *does*. And when he is learning history? Unless he does *something*, in writing, or speaking, or by giving some other sort of sign, we shall be unable to study how he is getting on. Indeed our judgement of whether any learning has taken place at all must ultimately rest on making some sort of observations. If pressed to explain what we mean by saying that someone *understands* a certain mathematical theorem, we must do it in terms of an account of various things he can *do* – reproduce it, explain it, apply it in different situations.

There are two differences between this case and the one involving some routine manual task. One is the difference in *type* of behaviour – speaking or writing words or symbols as compared to making comparatively straightforward movements. The other is a difference of complexity. We can contrast understanding with rote learning both in mathematics and in lathe operation. Judged from the point of view of *criteria* this amounts to contrasting a wide and flexible range of behaviour with a more limited one.

These are important differences and any comprehensive account of learning will have to deal with them – but, as far as the basic *data* of any investigation are concerned, they are differences in behaviour. Perhaps now that it has been said, it may seem an obvious point, but it needs to be made. We cannot study even the most profound knowledge except by making observations on the behaviour that it produces. In fact we should put it the other way round. It is because we observe particular sorts of behaviour that we start talking about knowledge in the first place.