THE PSYCHOLOGY
OF HUMAN MOVEMENT

Edited by
MARY M. SMYTH and ALAN M. WING
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Foreword

A few years ago a well-known investigator in the area of motor learning visited the University of Oregon, and in the course of his lecture he lamented on the decline of research in motor learning. After some thought, I decided that he was partly right but also partly wrong. The part about which he was wrong was more important. True, little current research concerned how to practice—for instance, whether spaced practice was better than massed practice, or whether knowledge of results affected learning speed. However, it was not true that less research was being conducted on motor control. What had happened was that over the years the focus of research had shifted from an emphasis on procedures of learning to one describing the processes that underlie motor control. This was all part of a larger revolution in psychology from a dominance of behaviorism to information processing. While behaviorism is concerned only with the end product, skilled behavior, information processing is concerned with describing the processes involved in achieving that skill.

While the well-known researcher was partly correct in that less research was being conducted on motor learning than in the past, he was largely wrong in that the new approach has great relevance for learning. The best way to promote improvement in motor performance is to understand in a fundamental way the underlying processes of motor skill. From such knowledge emerges ideas on how to improve performance. Such knowledge suggests not only improvements in training technique but also ways to change the task itself (which is a major aspect of the field of ergonomics) and better ways to select more appropriate people for some tasks. Thus, the information-processing approach to skill provided a unifying theme for the applied fields of learning, ergonomics, and personnel selection. The approach may ultimately yield other applications, as in the diagnosis and treatment of neurological disorders.

There are many textbooks on motor learning, but most of those fail to reflect satisfactorily this information-processing approach. Only a few textbooks accurately reflect a modern approach to understanding motor skill that puts primary emphasis on the processes of movement and action. Smyth and Wing's book is a welcome addition to the few suitable texts for instructing undergraduates or beginning graduate students in motor control, and it will be an excellent text for students of psychology and of physical education at both levels of training. The book does an admirable job in teaching not only basic concepts but also in giving a dynamic view of research in the motor area.

Another notable change in the motor area over the years concerns its
increasingly interdisciplinary character. A student who is seriously interested in motor control must learn much about the physiology of the motor system, neurological disorders of movement (e.g., those occurring with Parkinson's disease or cerebellar damage), and the course of motor control development from infancy to adulthood. Although we appreciate the need for an interdisciplinary approach, it is difficult for one person to be really proficient with such diverse areas. A strength of this book is that it draws on experts in each of the necessary sub-disciplines, and yet by use of the information-processing theme it keeps the chapters well integrated. The chapter authors are all expert in one area while familiar enough with others to provide effective integration. Kerry Greer writes on the physiology of motor control, and Laurette Hay on motor development. Alan Wing, whose specialty is the psychology of motor control, has also worked with neuropsychological patients and hence is an excellent person to write about neurological disorders. The other chapter authors—Smyth, Sheridan, van Galen, Heuer, and Johnson—are all specialists in the areas about which they write.

I have always felt that on the whole the best teachers are those who have a first-hand effort in the research enterprise. It is doubly useful when the research of such teachers is at the leading edge of the discipline. Such teachers are up to date and best express the enthusiasm for their field. The editors of this book, Mary Smyth and Alan Wing, are active researchers at the forefront of the field. Their work has been important for basic conceptions of motor control. The other chapter authors are also active researchers in their specialties. The result is a progressive text on movement, action and skill, a book modern in its concepts and incisive in its focus.

Steven W. Keele
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Preface

This book is an introduction to the study of human goal-directed movement. It provides a comprehensive survey of experimental work that crosses several disciplines, including psychology, kinesiology, physical education, and neurophysiology. In the main, the framework for the many and varied research findings covered in this book comes from psychology and brings to the fore the information processing that underlies purposive movement. The approach taken emphasises the higher-order, organizational processes that contribute to coordinated goal-directed movement. However, the need to take account of constraints on voluntary movement arising in the movement apparatus of muscles and joints is not forgotten.

The book is written for undergraduate students who may have little or no prior knowledge of studying movement and, therefore, care is devoted to the definition of specialised terms. In this respect, the provision of a glossary should also help the reader. Liberal use is made of figures, as a good pictorial representation of the subject matter can greatly help the student assimilate new material. Although primarily intended for undergraduate students, particularly those studying psychology and motor behaviour, some of the material included would provide a good starting point for more advanced, graduate seminars on human movement. To this end, there is a thorough bibliography.

The book may be viewed in two parts. The first part, comprising Chapters 2 to 7, develops major theoretical ideas within motor neurophysiology, voluntary control of simple aiming movements, memory for movement, perception and action, sequencing of movements, and the demands made by movement on information-processing resources. The subject matter has important interrelations with topics in areas such as psychology, neurophysiology, and kinesiology. Chapters 8, 9 and 10 in the second part treat changes that can occur in the organisation and execution of movement through training, in development, or as a result of damage to the central nervous system. This reflects our conviction that any approach to movement, action and skill should draw on a wide range of sources of data and not be confined to a narrow empirical base founded in studies of 'normal' adult subjects. While the student in psychology or kinesiology will appreciate this broadened perspective, it also makes this book very relevant to the needs of students in physical education and the therapy professions.

Due to the co-authored nature of this book, assistance and advice in its production has come from sources too numerous to list in full. We particularly appreciate the detailed comments received from Karl Newell...
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INTRODUCTION

People move. Indeed, all animals move, and it is movement that allows them to respond adaptively to the environment. We often ignore the basic movements that an animal or a person makes because we are interested in the effect that the movements have on the environment, particularly in relation to intentions that movements help fulfil. This means that we are often more concerned with the actions we perform than with the actual movements of which they are composed. It does not matter whether we use the right hand or the left hand to drink a glass of water when thirsty, and we could describe many different movements as “drinking a glass of water” because that description relates to the action being performed, not to the particular groups of muscles that are performing it. Nevertheless, if we want to understand people as effective operators on the world in which they live, then we have to consider not only the decision about the action that they have taken, but the way in which they implement such decisions and produce particular sets of movements.