Developing Sport Expertise

Researchers and Coaches Put Theory into Practice

Third Edition

Edited by Damian Farrow, Joseph Baker and Clare MacMahon

ROUTLEDGE

Developing Sport Expertise

The athlete development process spans from initial sport engagement to elite-level performance to effective career transition out of sport. This is a long and complicated process. Identifying and nurturing talent, fine-tuning sport skills, and maintaining high levels of performance over the course of a career requires many thousands of hours of training and, increasingly, the input and support of expert coaches and sport scientists.

In this fully revised and updated new edition of the leading student and researcher overview of the development of sport expertise, a team of world-class sport scientists and professional coaches examine the fundamental science of skill acquisition and explore the methods by which science can be applied in the real-world context of sport performance.

This book surveys the very latest research in skill acquisition, provides a comprehensive and accessible review of core theory and key concepts, and includes an innovative "Coach's Corner" feature in each chapter, in which leading coaches offer insights from elite sport and critique contemporary practice in sport skill development. The third edition of *Developing Sport Expertise* will be invaluable reading for all researchers and students in the areas of expertise in sport, skill acquisition, motor control and development, sport psychology, or coaching theory and practice.

Damian Farrow is the Umpiring Coaching & Innovation Manager for the Australian Football League. He is also Professor of Skill Acquisition at the Institute of Health and Sport, Victoria University, Australia. His current roles are typical of Damian's career, being situated both in the high-performance sports industry and academia. His research and practical interests centre on the development of sport expertise with a particular focus on practice methodology and decision-making skills. Damian is the author/editor of seven books and over 150 peer-reviewed articles and book chapters.

Joseph Baker is Professor and Tanenbaum Chair in Sport Science, Data Modelling and Sport Analytics in the Faculty of Kinesiology and Physical Education at the University of Toronto, Canada. He has also held visiting researcher/professor positions at the Carnegie Research Institute at Leeds Metropolitan University in the United Kingdom, Victoria University and the Australian Institute of Sport in Australia, and the Institute of Sport Science at Westflische Wilhelms-Universit Münster in Germany. His research considers the varying influences on optimal human development, ranging from issues affecting athlete development and skill acquisition to barriers and facilitators of successful aging. Joe is Past President of the Canadian Society for Psychomotor Learning and Sport Psychology and the author/editor of 12 books and over 200 peer-reviewed articles and book chapters.

Clare MacMahon is an Associate Professor at La Trobe University in Melbourne, Australia. With a particular focus on talent development in sport and expertise in sports officiating, Clare's research brings together cognitive psychology and human movement. Clare is active in skill acquisition in Australia and internationally, having co-established the Australasian Skill Acquisition Network, which brings together researchers and practitioners, and as the Oceania representative for Sport Psychology to the International Association of Applied Psychology.

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com

Developing Sport Expertise

Researchers and Coaches Put Theory into Practice

Third Edition

Edited by
Damian Farrow, Joseph Baker
and Clare MacMahon

Routledge
Taylor & Francis Group
NEW YORK AND LONDON

Designed cover image: sturti / Getty Images

Third edition published 2024
by Routledge
605 Third Avenue, New York, NY 10158

and by Routledge
4 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2024 selection and editorial matter, Damian Farrow, Joseph Baker, and Clare MacMahon; individual chapters, the contributors

The right of Damian Farrow, Joseph Baker, and Clare MacMahon to be identified as the authors of the editorial material, and of the authors for their individual chapters, has been asserted in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice: Product or corporate names may be trademarks or registered trademarks and are used only for identification and explanation without intent to infringe.

First edition published by Routledge 2007

Second edition published by Routledge 2013

ISBN: 978-1-032-25818-8 (hbk)
ISBN: 978-1-032-25815-7 (pbk)
ISBN: 978-1-003-28516-8 (ebk)

DOI: 10.4324/9781003285168

Typeset in Garamond
by Taylor & Francis Books

Contents

List of illustrations vii
List of contributors x
Preface xvii

1 A very brief introduction to Applied Sport Expertise 1
DAMIAN FARROW, JOE BAKER AND CLARE MACMAHON

2 Sowing the seeds of success: Specialization, diversification, and early athlete training 6
JOE BAKER, GILLIAN RAMSAY AND ALEXANDRA MOSHER

3 The Athletic Skills Model as a foundation for the development of expertise: Creating challenging environments 15
GEERT J. P. SAVELSBERGH AND RENE WORMHOUDT

4 Coaching for creativity 27
VERONIQUE RICHARD AND DARREN HOLDER

5 Predicting athletes' futures: A necessity with little scientific basis 39
TILL KOOPMANN, KATHRYN JOHNSTON, ALEX ROBERTS AND JÖRG SCHORER

6 The expert sports official in research and practice 47
CLARE MACMAHON, TAMMIE VAN BIEMEN, HENNING PLESSNER AND ALEXANDRA PIZZERA

7 Developing the expert performance coach 58
MARK W. BRUNER, COLIN MCLAREN, RACHEL VAN WOEZIK AND JEAN CÔTÉ

8 Evaluating coaching expertise 70
CHRIS CUSHION

9 Technology supported coaching 80
DAMIAN FARROW, PETER LE NOURY AND OLIVIA CANT

10 Self-regulated learning in sport practice: Agency, assessment, and actioning 90
BRADLEY W. YOUNG, LISA BAIN AND JOSEPH BAKER

11 Data informed practice 100
TIM BUSZARD AND SAM ROBERTSON

12 Perception and pressure: Research and implications 110
MARK R. WILSON, SAMUEL J. VINE, TOM ARTHUR AND DAVID J. HARRIS

13 Play with and against!: Insights for the development of decision-making in team sports 122
PEDRO PASSOS

14 Developing technical skill expertise 133
GEORGIA GIBLIN, DAVID WHITESIDE AND MACHAR REID

15 Female sport expertise through a skill acquisition lens: A key future direction 143
CLARE MACMAHON, ANTHEA CLARKE, ALANA LEABEATER AND ALEX ROBERTS

Index 154

Illustrations

Figures

2.1	A simple schematic of early engagement patterns in youth sport.	11
3.1	The Fundamental 10	18
3.2	The ASM Movement Continuum is used to analyse one sport in relation to 10 basic movement skills. The circles, Specific, Adaptive, and Donor involve specific basic movement skills, the multi-circle involves non-specific basic movement skills, which are not in your main sport, game, or task.	19
3.3a and b	The Athletic Skills Track at Football Club Ajax Amsterdam, designed by Athletic Skills Model and built in 2012.	22
3.4	The Skill Garden.	23
3.5	Environment at Academy of Physical Education Amsterdam.	24
4.1	The creative potential system.	31
4.2	Coaching for creativity: A summary of what, why and how.	32
6.1	Classification system for sports officials.	48
6.2	Decision flow model of game managers for errors. Results of evaluation process can be either correct or result in an error which requires compensation.	49
6.3	The position of the assistant referee ahead of the offside line results in a perceptual error. The offender is perceived ahead of the second-last defender and thus offside, but actually is in line with the defender and thus onside. The perceptual error could result in a flag error.	50
6.4	Different communicative management styles for refereeing with examples from association football.	53
7.1	Stages of high-performance coach development.	67
9.1	The kinematic capture of a tennis player performing a forehand groundstroke.	81
9.2	A virtual opponent performing a serving action that produces a real-world ball trajectory which can be used inside an animated VR tennis environment.	81
10.1	The Self-Regulated Sport Practice Cycle of metacognitive processes and motivational processes.	91

10.2 Distributions of perceived self-organized time from 0 to 100% of all the activities that athletes engage in to prepare for their sport, for individual sport athletes (at left) and team sport (right) athletes. Note. Each bar represents a bin of 5 percentage points in width. Dotted lines indicate the mean percentage of perceived self-organized time by sport type. 94
10.3 The Co-regulatory Coaching Interface Model. 97
11.1 Overview of key decisions in practice design. 101
11.2 Example of how analytics can improve the measurement of representative learning design. The rule frequency shows how often the athlete experiences the conditions in practice or competition, which can be considered alongside how likely they are to produce a given response (i.e., an effective pass). 103
12.1 Schematic representation of the bi-directional pressure-performance relationship. 111
12.2 Modern pentathletes performed laser pistol shots before and after running (low/high fatigue) and during training and selection camps (low/high pressure). The quiet eye duration (a measure of focus on the target) of the athlete in the left panel was disrupted by pressure and not by fatigue, whereas the one on the right was more affected by fatigue than pressure. 113
12.3 The probability that an error occurred on an offensive play (fumble, incomplete pass, sack, interception) as a function of pressure score (higher = more pressure) and the outcome of the previous play. It is evident that errors were more likely after a preceding error and as pressure increased. The interaction effect showed that the effect of a preceding error on performance was more apparent under high-pressure plays (late in the game, in the red zone, when scores are close, on 4th down etc.). 115
12.4 The probability that an unforced error occurred on a point was higher as pressure increased (Panel A) and as a function of whether an unforced error had been committed on the preceding point (Panel B). There was no effect of pressure or preceding shot outcome on the probability of a winner (an unreturnable shot) (Panel C). 115
12.5 The present is where the power is. The past cannot be changed and the future cannot be determined. We have discussed how past errors (related to perceptions of the probability of failure) and thinking about the importance of future consequences (related to perceptions of cost of failure) can impair performance. The key is to pull focus back to the "now". 118
13.1 The inverted-U hypothesis for the synergies–performance relation. The best performance is achieved on the mid-level of synergies "stiffness". 124

13.2 A behavioural methodological proposal. Levels of representativeness: (1) soft interaction, no interaction, or passive interaction among opponents: (2) medium interaction, minor contact is allowed and the possibility of recovering ball possession is open; (3) full interaction, all the possibilities of action are open (similar to a competitive match situation). The numbers 1, 2, and 3 identify the three levels of the methodological proposal: 1. Improve the perception and action attunement; 2. Increase the speed of decision-making; 3. Increase decision-making accuracy. 127
14.1 An example of some of the key attributes of a tennis racquet that a tennis player can now customize to their performance needs with an individualized fitting service. 137

Tables

1.1 Key issues coaches and scientists identify in collaborations: Improving coach and scientist interactions. 2
7.1 Comparing Rankings of Actual Versus Preferred Sources of Coaching Knowledge. 65
8.1 Framework of Factors to Evaluate Expertise. 76
8.2 Eisenhower's decision-making matrix. 78
9.1 Examples of the different sensor options and measures available. 84

Contributors

Tom Arthur, PhD
Public Health and Sports Sciences
Faculty of Health and Life Sciences
University of Exeter,
Exeter, UK

Lisa Bain
School of Human Kinetics
University of Ottawa
Ottawa, Canada

Joe Baker, PhD
School of Kinesiology and Health Science
York University
Toronto, Canada

Mark Bruner, PhD
School of Physical and Health Education
Nipissing University
North Bay, Canada

Tim Buszard, PhD
Institute for Health and Sport
Victoria University
Victoria, Australia

Olivia Cant, PhD
Institute for Health and Sport
Victoria University
Victoria, Australia

Anthea Clarke, PhD
Sport and Exercise Science
School of Allied Health, Human Services and Sport
La Trobe University
Victoria, Australia

Jean Côté, PhD
School of Kinesiology and Health Studies
Queen's University
Kingston, Canada

Neil Craig
Coaching Consultant
Victoria, Australia

Chris Cushion, PhD
School of Sport Exercise and Health Sciences,
Loughborough University,
Loughborough, UK

Damian Farrow, PhD
Australian Football League
& Institute for Health and Sport
Victoria University
Victoria, Australia

Rory Fitzpatrick
Irish Sailing
Dublin, Ireland

Mike Frogley
Summer Paralympic Performance
Advisor
Own the Podium, Canada

Georgia Giblin, PhD
Detroit Tigers
Detroit, USA

David J. Harris, PhD
Public Health and Sports Sciences
Faculty of Health and Life Sciences
University of Exeter
Exeter, UK

Darren Holder
Coaching Better
Queensland, Australia

Kathryn Johnston, PhD
Faculty of Kinesiology and Physical
Education
University of Toronto
Toronto, Canada

Eddie Jones
Rugby Australia
Sydney, Australia

Till Koopmann, PhD
Institute of Sport Science
Carl von Ossietzky University of Oldenburg
Oldenburg, Germany

Dillon Lawson
New York Yankees
New York, USA

Alana Leabeater
Sport and Exercise Science
School of Allied Health, Human Services and Sport
La Trobe University
Victoria, Australia

Peter Le Noury, PhD
School of Exercise and Nutrition Sciences
Queensland University of Technology
Queensland, Australia

Clare MacMahon, PhD
Sport and Exercise Science
School of Allied Health, Human Services and Sport
La Trobe University
Victoria, Australia

Colin McLaren, PhD
Department of Experiential Studies in Community and Sport
Cape Breton University
Sydney, Canada

Stuart Morgan
Swiss Golf
Lausanne, Switzerland

Alexandra Mosher, PhD
School of Kinesiology and Health Science
York University
Toronto, Canada

Pedros Passos, PhD
Faculty of Human Kinetics
University of Lisbon
Lisbon, Portugal

Amy Perrett
Rugby Australia
Sydney
New South Wales, Australia

Alexandra Pizzera, PhD
Institute of Psychology
German Sport University
Cologne, Germany

Henning Plessner, PhD
Institute of Sports and Sports Sciences
Heidelberg University
Heidelberg, Germany

Nicole Pratt
Tennis Australia
Victoria, Australia

Gillian Ramsay, MSc
Faculty of Kinesiology and Physical Education
University of Toronto
Toronto, Canada

Simon Rea
Tennis Australia
Victoria, Australia

Machar Reid, PhD
Tennis Australia
Victoria, Australia

Veronique Richard
School of Human Movement and
Nutrition Sciences
The University of Queensland
Queensland, Australia

Alex Roberts, PhD
Sport and Exercise Science
School of Allied Health, Human Services and Sport
La Trobe University
Victoria, Australia
&
Talent and Coaching
Queensland Academy of Sport
Australia

Sam Robertson, PhD
Institute for Health and Sport
Victoria University
Victoria, Australia

Geert J.P. Savelsbergh, PhD
Amsterdam Institute for Sport Science
Department of Human Movement Sciences
Vrije University
Amsterdam, The Netherlands

Jörg Schorer, PhD
Institute of Sport Science
Carl von Ossietzky University of Oldenburg
Oldenburg, Germany

Rohan Taylor
Swimming Australia
Victoria, Australia

Tammie van Biemen
Faculty of Behavioural and Movement Sciences
Vrije Universiteit
Amsterdam, The Netherlands

Rachel Van Woezik, MSc Kin
Department of Athletics
Nipissing University
North Bay, Canada

Samuel J. Vine, PhD
Public Health and Sports Sciences
Faculty of Health and Life Sciences
University of Exeter
Exeter, UK

Julia Walsh, PhD
Australian Boomerangs
Victoria, Australia

Jack Walton
Loughborough, England

David Whiteside, PhD
New York Yankees
New York, USA

Mark Wilson, PhD
Public Health and Sports Sciences
Faculty of Health and Life Sciences
University of Exeter
Exeter, UK

Natalie Wood
Essendon Football Club
Victoria, Australia

Rene Wormhoudt
Royal Netherlands Football Association
Zeist, The Netherlands

Bradley W. Young, PhD
School of Human Kinetics
University of Ottawa
Ottawa, Canada

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com

Preface

The impetus for the first edition of this text came from an applied workshop convened by the three of us at the Australian Institute of Sport (AIS) in 2005. This meeting brought together coaches, athletes, researchers, and applied sports scientists to share information under the banner of Applied Sport Expertise and Learning. To this day it has been one of the most impactful two-day workshops each of us have ever attended. The unique circumstance where many of the world's foremost academic minds in Sport Expertise were able to attend the AIS and share ideas with elite Australian coaches from a wide variety of sports was unparalleled at that time. The researchers at this workshop were asked to consider the following questions when preparing their presentations:

1 What does your research tell us about the development of talented/elite athletes, coaches, and officials?
2 How can the information from your research be used to optimize training and performance?
3 Do your research findings have any application to talent identification programs?

It is now 16 years since the publication of the first edition of *Developing Sport Expertise: Researchers and Coaches Put Theory into Practice* in 2007 and a decade since the second edition. Not surprisingly there has been substantial progress made both theoretically and practically in regards to many of the domains examined in the text. Technology has continued to evolve such that testing, measurement, and training approaches not possible in 2007 and 2013 are now mainstream. Many countries continue to invest significantly in the development of their sporting talent in the search for more Olympic Gold, through talent identification and development systems. Similarly, professional sports have "discovered" Sport Expertise, and, pleasingly, there are now more roles in the underpinning fields of Skill Acquisition, Sport Psychology, and Talent Development than ever before as teams try to find a competitive edge. Public interest in expertise, and more specifically Sport Expertise, piqued around the time of the second edition of the text and that interest hasn't waned. There has been a regular procession of popular psychology books starting with Malcolm Gladwell's *Outliers* and Dan Coyle's *Talent Code* through to more recent publications such as *The Best* by Mark Williams and Tim Wigmore, and *The Tyranny of Talent* by Joe Baker (one of the editors of the book you're currently reading). If you are not reading about Sport Expertise, chances are you are listening to a podcast about it!

Given this context, the purpose of this edition has not altered substantially compared to previous editions. This third edition serves to fill a gap in the available literature

that presents accessible theory and practical recommendations from the experts producing the research and actually working in this exciting domain. In filling this gap, we have updated chapters from the first and second editions and added some new chapters. As a result, the current edition represents a summary of the issues in Applied Sport Expertise Research that have particular relevance at the present time.

As with previous editions, the third edition of this book is quite different from other texts on Sport Expertise. In the current text, the researchers have presented their work in a manner that is applicable and accessible not only to scientists, but also to administrators and sport managers, coaches, and athletes. Again, current top-level coaches have reviewed and commented on the researchers' findings (see the Coach's Corner segment of each chapter), and present real-world application of the concepts discussed. These coaches have been drawn from around the world and represent some of the finest experts working in professional sport, Olympic sport, and talent development today. They work with a variety of sports and athletes at developmental, sub-elite, and professional or Olympic levels.

Given the focus on marrying research and application, this book is designed for the progressive coach and/or athlete who is motivated to adjust their coaching or training programs so that they are making the most out of current research on optimal training and development. It examines sport skill on a macro level, understanding some of the pre-cursors underpinning the development of Sport Expertise, sport development systems, talent, and programming, as well as a micro level, addressing contemporary issues around coach development, the design of training, use of technology, and the development of all facets of expert sport performance.

We hope you enjoy the book. As always, it would not be possible without the efforts of the researchers and coaches whose high-quality work is captured in this text.

Damian Farrow, Joe Baker, and Clare MacMahon