



Dynamics of Skill Acquisition: A Constraints-Led Approach

By Keith Davids, Chris Button, Simon Bennett



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Dynamics of Skill Acquisition: A Constraints-Led Approach provides a comprehensive analysis of the evolution of the constraints-led perspective, a recognized theory in motor learning and control. It is the first text to outline the development of a conceptual model of coordination and control within a multidisciplinary framework, capturing the various interlocking scales of analysis (e.g., neural, behavioral, psychological) and the many subsystems (e.g., perceptual and movement) involved in producing behavior. A conceptual model of coordination and control is important not just for designing learning environments, but it is also important for ensuring that learners gain positive experiences when acquiring motor skills.

Dynamics of Skill Acquisition provides the foundational concepts, methodological tools, and language to design positive learning experiences that facilitate movement coordination and control across various dynamic environments that require a high degree of precision of movements, from playing golf to performing surgery. The text also incorporates several learning features to assist readers:

- Chapter outlines list major topics and subtopics.
- Self-test questions at the end of each chapter provide opportunities for class discussion, individual review and reflection, and talking points for independent studies.
- Spotlight on Research highlight boxes provide more detailed descriptions of important studies to help readers understand how interacting constraints shape movement behavior.
- Key Concept boxes in each chapter remind students of the chapters' important concepts.
- Realistic case studies in the final chapter help both students and practitioners visualize the constraints-led approach in practice. Each case study expands on the

topics addressed in part II and encourages both reflection and application of knowledge to provide a solution.

-Additional readings at the end of each chapter allow students, movement scientists, and practitioners to expand their learning.

-Glossary terms are boldfaced in text and defined in a glossary at the end of the book.

-Chapter summaries offer a compilation of important concepts.

Practitioners and students will appreciate the applied focus of *Dynamics of Skill Acquisition*, which outlines a model of human movement with specific constraints-led approach strategies that address skill acquisition across a variety of professions, including teaching, coaching, and rehabilitation. By learning both the theoretical origins and applications for implementing a constraints-led approach to movement skill acquisition, readers will gain insight into how the informed organization of learning and rehabilitation environments produces more effective and efficient use of practice and therapy time.

Dynamics of Skill Acquisition is divided into two parts. **Part I** provides an overview of the key theoretical contributions to the study of skill acquisition and introduces the constraints-led approach focusing on the implications of Newell's (1986) model as a template for understanding how motor skills are acquired.

Part II discusses the relationship between the theoretical concepts introduced in part I and the practical issues facing learners and movement practitioners. It provides readers with practical implications of the constraints-led approach and includes hypothetical case studies, which contain examples of the constraints-led model in action. In particular, the constraints-led approach shifts practitioners' perspectives on how to do the following:

-Deal with individual differences

-Organize practice to optimize learning

-Use verbal instructions and feedback

-Direct learners' attention during skill observation

With the increased interest in the role of constraints to shape motor learning, *Dynamics of Skill Acquisition* provides a timely analysis of the constraints-led approach, helping readers understand how coordination patterns are assembled, controlled, and acquired. No other book presents the theoretical roots and development to the constraints-led perspective and uses a blend of both dynamical systems and ecological approaches to skill acquisition to provide application strategies for all people with an interest in movement coordination and control.

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Keith Davids, PhD, is a professor of motor control and head of the School of Human Movement Studies at Queensland University of Technology in Brisbane, Australia. Over the past 25 years, Davids has focused his research and teaching in the area of motor learning and control. He has published five books and numerous book chapters and journal articles, and he has held teaching positions in Europe, New Zealand, and Australia.

He received his PhD in motor control in 1986 from Leeds University (UK) and has supervised the research of doctoral students from Australia, Germany, New Zealand, Portugal, Saudi Arabia, Singapore, and UK.

In his spare time Davids enjoys cooking, walking, and playing and coaching masters-level soccer in New Zealand and Australia. He and his wife, Anna, live in Queensland and have four children: Michael, Jacob, Charlie, and India.

Chris Button, PhD, is a senior lecturer and director of the Human Performance Centre, University of Otago, in Dunedin, New Zealand. He received his PhD in sport and exercise science in 2000 from Manchester Metropolitan University, UK. His doctoral research focused on coordination and interception skills applying ecological concepts to the study of interceptive actions.

Button is a biomechanist accredited by Sport and Exercise Science New Zealand. He is also a member of Royal Society of New Zealand. Button works with the coaches and athletes of the New Zealand Academy of Sport and provides sport science support to elite athletes and coaches in netball, football (soccer), swimming, and motor sports.

Button publishes his research in a variety of journals on sport science, psychology, and international movement science. He has received invitations to coordinate theoretical and practical seminars to the pre-Commonwealth Games Conference and the World Scientific Congresses of Science & Football/Golf.

Button lives with his wife, Angela, in Dunedin. He enjoys traveling, outdoor pursuits, and sports, especially football, skiing, and squash.

Simon Bennett, PhD, is a reader in behavioral neuroscience at the Research Institute for Sport and Exercise Sciences at Liverpool John Moores University (UK), where he researches and lectures on topics pertaining to visuomotor coordination and control.

Bennett received his PhD in 1996 from Manchester Metropolitan University (UK). Both his PhD research and postdoctoral work have focused on the control and acquisition of interceptive skills. Bennett has coauthored more than 60 papers published in sport science, sensorimotor neuroscience, and movement science journals; he has also coedited 3 books and several book chapters.

In his leisure time, Bennett enjoys spending time outdoors, cycling, skiing, and traveling. He lives in Alsager, Stoke-on-Trent, UK.

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