

# Progress in Motor Control

VOLUME ONE

---

## Bernstein's Traditions in Movement Studies

**Mark L. Latash, PhD**  
Pennsylvania State University

Editor



**Human Kinetics**

# Contents

Preface .....	v
Credits .....	vii
<b>Chapter 1</b> The Scientific Legacy of Nikolai Bernstein .....	1
<i>Victor S. Gurfinkel and Paul J. Cordo</i>	
<b>Chapter 2</b> Reflections on a Bernsteinian Approach to Systems Neuroscience: The Controlled Locomotion of High-Decerebrate Cats .....	21
<i>Douglas G. Stuart and Jennifer C. McDonagh</i>	
<b>Chapter 3</b> Automation of Movements: Challenges to the Notions of the Orienting Reaction and Memory .....	51
<i>Lev P. Latash</i>	
<b>Chapter 4</b> The Model of the Future in Motor Control .....	89
<i>Josef M. Feigenberg</i>	
<b>Chapter 5</b> Bernstein's Principle of Equal Simplicity and Related Concepts .....	105
<i>Mario Wiesendanger</i>	
<b>Chapter 6</b> Coordinated Control of Posture and Movement: Respective Role of Motor Memory and External Constraints .....	127
<i>Jean Massion, Alexey Alexandrov, and Sylvie Vernazza</i>	
<b>Chapter 7</b> Mechanical, Neural, and Perceptual Effects of Tendon Vibration .....	151
<i>Paul J. Cordo, David Burke, Simon C. Gandevia, and John-Paul Hales</i>	
<b>Chapter 8</b> On the Number of Degrees of Freedom in Biological Limbs .....	173
<i>Stan Gielen, Bauke van Bolhuis, and Erik Vrijenhoek</i>	

<b>Chapter 9</b>	Abnormal Muscle Synergies in Hemiparetic Stroke: Origins and Implications for Movement Control . . .	191
	<i>W. Zev Rymer, Jules Dewald, P.T. Joseph Given, and Randall Beer</i>	
<b>Chapter 10</b>	From Bernstein's Physiology of Activity to Coordination Dynamics . . . . .	203
	<i>J.A. Scott Kelso</i>	
<b>Chapter 11</b>	Optical Flow Fields and Bernstein's "Modeling of the Future" . . . . .	221
	<i>Nam-Gyoon Kim and M.T. Turvey</i>	
<b>Chapter 12</b>	Bernstein's Legacy for Motor Development: How Infants Learn to Reach . . . . .	267
	<i>Esther Thelen</i>	
<b>Chapter 13</b>	Spatial Frames of Reference for Motor Control . . . .	289
	<i>Anatol G. Feldman</i>	
<b>Chapter 14</b>	Control of Multijoint Reaching Movement: The Elastic Membrane Metaphor . . . . .	315
	<i>Mark L. Latash</i>	
<b>Chapter 15</b>	Generalized Motor Programs and Units of Action in Bimanual Coordination . . . . .	329
	<i>Richard A. Schmidt, Herbert Heuer, Dina Ghodsian, and Douglas E. Young</i>	
<b>Chapter 16</b>	How Are Explosive Movements Controlled? . . . . .	361
	<i>A.J. "Knoek" van Soest and Gerrit Jan van Ingen Schenau</i>	
Index . . . . .		389
Contributors . . . . .		396
About the Editor . . . . .		398