



Nikolai Aleksejevich Bernstein

Brilliant Russian Scientist-Innovator, Neurophysiologist

1896-1966

Although generally thought of as a physiologist, it is clear from the breadth and scope of his ideas that this narrow label has more to do with his educational background than his conceptualization. Within his work are hints of the biologist, the psychologist, the mathematician, and the philosopher. One thing is certain, however, Nikolai Bernstein was a pioneer of research into biology and neurophysiological motor control, and he had immense influence on what he called “the science of human movements.” In his introduction to the first English publication of the text “The Coordination and Regulation of Movements,” which was published in 1967 shortly after his death, Bernstein stressed, “his was the study of motor tasks – activities which feature not only motor performances, but also the setting and realization of behaviorally significant goals through planning and problem-solving.” As such, his work has been of great interest to Dr. Masgutova as it relates directly to her understanding of motor planning and motor performance within unconditioned motor systems and to her ability to identify concrete parameters for reflex pattern analysis.

Bernstein’s emphasis on motor tasks led him naturally to consider both the initiation of motor activity and its resulting sensory consequences. He proposed that human motion is controlled through adaptation of the constraints placed upon it, that any movement is composed of several smaller movements, and that any alteration of these smaller movements will affect the movement as a whole. This specific notion brought Dr. Masgutova to conduct similar level analyses on reflexes and their structural and dynamic components, which led to a greater understanding and development of reflex pattern parameters such as reflex circuit functioning, direction of motion in reflex reactions, and latency of response and intensity of response after stimulus.

In 1926, Bernstein studied the development of walking as humans matured and aged along with those who had brain damage. He was the first to use the term “biomechanics.” Bernstein also created a considerable body of work related to motor learning and models for stages of learning in which he highlighted not only intellectual and emotional development, but also movement development. Bernstein was one of the first members of the Academy of Medical Sciences of USSR. In 1948, he was awarded the Stalin Prize for science. As was the case with many Soviet era researchers, his ideas have only really been known to western scientists since about the 1960s, when his book “The Co-ordination and Regulation of Movements” was translated into English from Russian. Today his work is viewed as remarkably insightful and remains valid and respected.

Credits and Further Reading:

Bernstein, N., “The Techniques of the Study of Movements,” Published in the Textbook of the Physiology of Work, Moscow, 1934

Bernstein, N., “The Co-ordination and Regulation of Movements,” Oxford, New York: Pergamon Press, 1967

Bernstein, N., et al, Edited by H.T.A. Whiting, “Human Motor Actions: Bernstein Reassessed,” Elsevier Science Publishers B.V., 1984

Latash, M., Editor, “Progress in Motor Control: Bernstein’s Traditions in Movement Studies,” Mark Latash, 1998