Arthur S. Iberall Distinguished Lecture

December 2, 2016 ⌘ University of Connecticut ⌘ 4:00 p.m.

A106, Bousfield Psychology Building

Physical Activity Theory from First Principles

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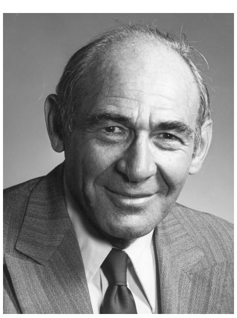
Abstract

Physical activity has been approached from many scientific perspectives in attempts to understand how individuals can live longer, healthier lives. Varied barriers to physical activity have been studied under assumptions regarding the portability of findings to increasingly complex situations (e.g., diverse environments, individuals nested in groups). Recognition of this biological complexity leads one to consider approaches in physics that address complex systems. Arthur Iberall's Homeokinetic Approach to Physical Biology appears ideally suited to developing fundamental and novel understanding in the emerging science of physical activity. Homeokinetics purposely seeks to understand macroscopic field behavior of any complex system, and the many "atomisms" that interact to cause changes in that field. This macroscopic field *is* the human-environment interaction and the atomisms are the behavioral modes that interact in complex ways to create the stability of the system. In reality, changing physical activity patterns remains one of the hardest things for a human to do, once a "stable regime" of daily activity has been established. Increasing physical activity, then, requires no less than changing the stability of a complex physical system through the injection of energy towards a new stable state.

Iberall's biospectographic methodologies and Gene Yates's approach to biological time will be explored, combined, and put to use in an attempt to understand physical activity from a truly physical perspective, charting the characteristic spectra necessary to understand this physical system through its behavioral cycles. Theoretical underpinnings from Homeokinetics, Kinesiology, Dynamical Systems Theory, and Ecological Psychology will be exploited to provide additional insights into different questions within physical activity science. Applications of this approach (e.g., in the development of life support systems for Beyond Low Earth Orbit and for Undersea Exploration) will be provided, and the portability of homeokinetics across different temporal-spatial scales will be discussed.



ARTHUR S. IBERALL DISTINGUISHED LECTURE SERIES

Dedicated to the exploration of connections between physical processes and their manifestations in nature, life, humankind, mind, and society. The series honors the physicist, Arthur S. Iberall (1918-2002), whose intellectual legacy includes homeokinetics, a method of applying the laws of thermodynamics to all self-organizing systems. His applied research contributed significantly to the development of the first space suit, the high-speed dental drill, stove surface burners, the fancy-stitch sewing machine, and the electric knife.

Christopher Palmer is Survival Systems Portfolio Lead (U.S. Naval Special Warfare Command), Adjunct Professor of Kinesiology and board member at the Center for Personalized Health Monitoring (UMass, Amherst). He directs the development of advanced life support technologies for human survival and performance in extreme environments. Wearable electronics feature prominently in his efforts to understand how human-in-the-loop technology development is contextualized by environmental and task constraints. A current collaboration with NASA's Johnson Space Center is directed at developing a Systems-of-Systems Ecology framework for human performance in far-from-supported, highly constrained, no-fail environments (under sea and Mars exploration). His work relies on a multi-disciplinary approach (including exercise physiology, sensory-motor control, ecological psychology, and engineering) to advanced technology to ensure appropriate ecological embedding.