Arthur S. Iberall Distinguished Lecture on Life and the Sciences of Complexity
December 5, 2008 ⌘ University of Connecticut ⌘ 4:00 p.m.
Alvin M. Liberman Room, Bousfield Psychology Building

Social Physics: Networks and Causal Chains

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Abstract

In the 1975 paper "On nature, man, and society: A basis for scientific modeling," Arthur Iberall outlined a basis for social dynamics as a result of exchange forces. Two major types of bonds are pertinent: "ionic" sexual force and "van der Waal" covalent exchange force (which provides internal "cohesive group" associations in the likely range of 10-200 empathetically shared views). These bondings take place through sensory contact, within a nominally 20-mile radius of a person's "territory" (now becoming more dispersed through electronics). In Iberall's and my view of complexity, atomisms at one level (e.g., persons) may be transient but also form higher-level cohesive units (e.g., couples, families, groups) that may overlap or embed in one another. Instabilities and supply/demand disequilibria at all levels are modulated through near-equilibrium couplings of feedback cycles, with different time scales for normal balancing of material and energy budges, and with characteristic failures (e.g., cultures that endure in the range of 200-1200 years and are then replaced by others; Iberall & White 1988). Temporal processes, accumulation points and short-term runaway imbalances are modeled, to rephrase Iberall, within network structures and dynamics. How, nearly 35 years later, might we build upon Iberall's vision?

The causal chains in Iberall's work operate through networks. Among the implications of his proposals is the need to reconcile the concept of bonded groups and open networks, how to conceive and measure the boundaries of cohesive units, and in doing so investigate the dynamics and causal effects of cohesive groups. I show a novel approach that can capture, with formal empirical modeling, the boundaries and properties of cohesive units at different levels of grouping and use these properties and relationships in time series to study social dynamics.

Looking at kinship groups and organizations over time, and at the historical dynamics of monetized commodity exchange, cities, states and empires, the central thesis explored in this lecture is that (cf. Kelso's 1995 lecture) the empirical data on dynamics "points to metastable dynamics (meta = beyond) as essential. Metastability is characterized by partially coordinated *tendencies* (not states) in which individual coordinating elements are neither completely independent of each other ('locally segregated') nor fully linked in a fixed mutual relationship ('globally integrated')."
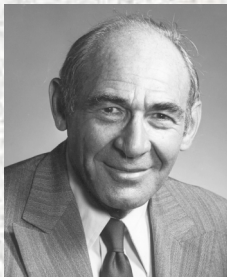
ARTHUR S. IBERALL DISTINGUISHED LECTURE SERIES

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.

Douglas R. White, Professor of Anthropology at UC Irvine and External Faculty at the Santa Fe Institute, is a former Humboldt Awardee. He works on theoretical and empirical models of the fundamentals of network structure and dynamics in connecting levels of societal and social interactions (e.g., kinship and organizational networks, the world economic networks, and historical dynamics of cities and states). He heads UCI's Social Dynamics and Complexity group in the Institute of Mathematical Behavioral Sciences and runs their Videoconference series in human complexity.