

Exploring Information Exchange and Universals in Social Organization

Are there universal constraints on the networks of human interaction that govern how we build our complex societies? Might there be such universals that explain the details of the transition from prime chiefdoms to the first administered and centralized economies 6000 years ago? Can they help us understand the structure found in modern hierarchical yet distributed collaborations, such as guerilla rebellions, or industrial firms? This REU opportunity is for a talented student to assist a project that examines the effect of constraints on networks of information and material exchange among decision-making agents. We will focus in particular on how the structure of such a network that optimizes the response of the network to environmentally imposed stress varies with that stress, and varies with those constraints. This project will combine model development and analysis with ethnographic and archaeological studies of social structure and decision-making, especially focusing on how microscale dynamics can form the macroscale patterning we identify in the rise of complex, urban-based society, such as those which arose in southern Mesopotamia (ca. 4000 BC), central China (ca. 2000 BC), and Mesoamerica (ca. 200 BC). This project will best engage a student with a quantitative background who is interested in applying information theory and the optimization of communication networks to understanding social dynamics and cultural evolution. The primary SFI faculty advising the student is David Wolpert (<http://www.santafe.edu/about/people/profile/David%20Wolpert>), with additional advising by Henry Wright (<http://www.santafe.edu/about/people/profile/Henry%20T.%20Wright>) and Eric Rupley (<http://www.santafe.edu/about/people/profile/Eric%20Rupley>).