2022 CSH Spring School on the Evolution of Social Complexity

During the Holocene (roughly, the last 10,000 years) human social life has been transformed from small-scale relatively egalitarian groups to large-scale complex societies characterized by sophisticated governance institutions, elaborate information systems, extensive division of labor, and deep social and economic inequalities. Thinkers of the past and modern social scientists have proposed a multitude of theories to account for this profound transformation. However, whereas new explanations continue to be proposed, the theoretical corpus only grows, while deficient explanations have not been rejected in favor of more logically cohesive and empirically adequate theories. This situation is about to change due to the proliferation of new modeling approaches that translate verbal hypotheses into testable quantitative predictions and, especially, the construction of new databases together constituting a massive, and growing corpus of data for empirically testing theoretical predictions.

The 2202 CSH School will offer an intensive week-long course on social complexity science: modeling and data analytics. The participants will learn:

- The goals and challenges of agent-based modeling of social systems
- The strengths and limitations of various databases on social evolution and dynamics
- The approaches to integrating theory with data: parameterizing models and empirically testing model predictions

Content of the Course

The school has two main components: (1) lectures and discussions and (2) team project work.

Lectures will introduce participants to different concepts in the complexity and social sciences needed for modeling social evolution and dynamics, focusing on such processes as agriculture and economy, demography and migration, technological innovation and diffusion, social stratification, evolution of institutions, and the role of religion/ideology. The participants will learn about the existing modeling approaches and best practices in building models and relating theory to data. Students will receive supplementary readings, which they will need to read before the course starts.

Projects: Students will work in teams, (1) choosing a research question that can be addressed by an integrated models/data approach, (2) developing an agent-based model that yields testable predictions, and (3) selecting and using a dataset (or datasets) for empirical tests of the model.

Students will be encouraged to use common software: Python and R.

Because model development and testing take time, the week during the Winter School will focus on lectures and discussions, during which participants form teams, declare their research question, and run preliminary analyses. The second phase of the course, completing projects, will be off site, but we will reconvene virtually for research teams reports on their results.

Grades for those taking the course for credit will be based on their reports, written individually. We encourage participants to transform their reports into publications submitted to peer-review journals.

Tentative Schedule

Wednesday May 11

9:00–9:30 Introduction (Turchin). Practical Matters (Hofer)

9:30–10:20 Lecture: Evolution of Social Complexity: Concepts and Theories(Turchin)
10:20–11:00 Discussion
11:00–11:30 Break

11:30–12:10 Lecture: Introduction to the Seshat Global History Databank (Hoyer)
12:10–12:30 Questions and Answers

12:30–14:00 Lunch

14:00–14:50 Lecture: D-Place Databases as a Resource for Testing Cultural Evolution Theories (Kirby)
14:50–15:30 Discussion
15:30–16:00 Break

16:00–18:00 Introduction to agent-based modelling for investigating dynamic processes and social mechanisms of the past. Practical Tutorial on ABMs (Romanowska)

18:00–20:00 Dinner

20:00–21:30 Lightning talks by students (2 min each) on their interests and potential project topics. Students form teams.

Thursday May 12

9:00–9:50 Lecture: Cultural Macroevolution as a Theoretical Framework for the Evolution of Complex Societies (Turchin)
9:50–10:30 Discussion
10:30–11:00 Break

11:00–11:50 Lecture: Floods, Droughts, and Environmental Circumscription in Early State Development: The Case of Ancient Egypt (Mayoral)
11:50–12:30 Discussion

12:30–14:00 Lunch

14:00–14:50 Lecture: Explaining Population Booms and Busts in Neolithic Europe (Kondor)
14:50–15:30 Discussion
15:30–16:00 Break

16:00–17:30 Demonstration of Seshat: Global History Databank (Benam)

Friday May 13

9:00–9:50 Lecture: Agriculture and Warfare as Major Drivers of Social Evolution (Turchin)
9:50–10:30 Discussion
10:30–11:00 Break

11:00–11:50 Lecture: Even Prehistory Never Dies: The persistent impact of Neolithic development on China (Chen)
11:50–12:30 Discussion

12:30–14:00 Lunch

14:00–14:50 Lecture: Retrodicting the Rise, Spread, and Fall of Large-scale States in the Old World (James Bennett)
14:50–15:30 Discussion
15:30–16:00 Break

16:00–17:30 Discussion of student projects

Weekend May 14–15
Students work in groups on their own; enjoy Vienna's amenities

Monday May 16
9:00–9:50 Lecture: Disentangling the Evolutionary Drivers of Social Complexity: A Comprehensive Test of Hypotheses (Turchin)
9:50–10:30 Discussion
10:30–11:00 Break

11:00–11:50 Lecture: Disentangling material, social, and cognitive determinants of human behavior and beliefs (Gavrilets)
11:50–12:30 Discussion

12:30–14:00 Lunch

14:00–14:50 Lecture: The Evolution of the Modern City: technological change, economic complexity, communication and coordination (Neffke)
14:50–15:30 Discussion
15:30–16:00 Break

16:00–16:50 Lecture: Testing Theories about Social Evolution with Ethnographic Databases (Korotayev)
16:50–17:30 Discussion

Tuesday May 17
9:00–9:50 Lecture: Explaining the Rise of Moralizing Religions: A test of competing hypotheses using the Seshat Databank (Turchin)
9:50–10:30 Discussion
10:30–11:00 Break

11:00–11:50 Lecture: Understanding and Modeling the Emergence of Inequalities in Social Networks (Karimi)
11:50–12:30 Discussion

12:30–14:00 Lunch

14:00–14:50 Lecture: Translating the Knowledge of Historians and Archaeologists into Data. Religion Variables in Seshat as an Example of Difficult-to-Quantify Data (Reddish)
14:50–15:30 Discussion
15:30–16:00 Break

16:00–17:30 General Discussion of Post-School Activities (focusing on student projects)