



CoCo Seminar Series Spring 2021

[Extra CoCo Seminar]

Analyzing the El Farol Bar Problem as a Complex Dynamical System

**Shane St. Luce, PhD Candidate in Systems Science,
Binghamton University**

**(This seminar will be part of the speaker's formal
dissertation defense)**

Wednesday May 12, 2021 2:00-3:00pm EDT

Online (Zoom meeting link available on

<http://coco.binghamton.edu/>)



The El Farol Bar Problem presents a coordination problem where agents must independently decide whether or not to utilize a limited resource, a bar. Given a set of decision-making strategies, the agents learn over time which strategies perform better and choose accordingly. This can be represented as a complex dynamical system focusing on the distribution of strategies utilized and how this changes over time. Doing so reveals an attractor in the phase space of strategy distributions. We are able to explore how other system metrics, such as average agent happiness and bar attendance changes along with strategy distributions. We are also able to show two different ways of visualizing the phase space of strategy distributions, with Euclidean-space and a network-based approach. These approaches are still effective when some of the constraints of the original problem are relaxed. The latter is shown as more robust and provides additional possibilities to explore the complex dynamics of the problem. This requires the introduction of a new network-based approach for measuring and identifying attractors in a network. In solving this final problem, we find a solution that is applicable generally to discretized complex systems.

Shane St. Luce is a Software Development Engineer and a PhD candidate in the Systems Science Graduate Program at Binghamton University. He obtained his Bachelor's degree in Software Engineering and his Master's degree in Systems Engineering and Management at the University of Texas at Dallas. His research interests include complex systems, dynamical systems, game theory, network science and their applications to interdisciplinary problems.

For more information, contact Hiroki Sayama (sayama@binghamton.edu).

<http://coco.binghamton.edu/>