CoCo Seminar Series Fall 2025

Nonlinear Dynamics of Beliefs over Social Networks

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Hybrid (EB-T1 & Zoom; meeting link available on http://coco.binghamton.edu/)

Motivated by the study of complex socio-cognitive and technological networks, we introduce a nonlinear dynamic model of belief formation dynamics. According to our model, belief updates of individuals are informed by the complex interplay of external factors, i.e. social network effects, and internal factors, i.e. internal biases, networked relationships between an individual's belief representations, and nonlinear processing of social information. We rigorously show how groups overcome deadlock to form strong beliefs when it is urgent to do so, how the structure of social relationships and of the underlying belief system shapes social decisions in the group, and how group-level beliefs can be highly sensitive to the personal biases of a small number of individuals. This work provides novel insights into the dynamics of complex social systems and motivates a new approach for the design of distributed behavior in engineered networks of social agents.

Anastasia Bizyaeva is an assistant professor in the Sibley School of Mechanical and Aerospace Engineering at Cornell University. Her research explores mathematical connections between collectively intelligent behavior in biological and social systems, and the design of autonomous and artificially intelligent behaviors in engineered teams. Prior to joining Cornell she was a Postdoctoral Scholar with the AI Institute in Dynamic Systems at the University of Washington. She received her Ph.D. in Mechanical and Aerospace Engineering from Princeton University in 2022, and her B.A. in physics with a minor in mechanical engineering from the University of California, Berkeley in 2016. Her research has been recognized by the NSF Graduate Research Fellowship, the Princeton University Larisse Rosentweig Klein Memorial Prize, and the Princeton School of Engineering and Applied Science Award for Excellence. At Cornell, she is a member of the Mechanical Engineering, Aerospace Engineering, Theoretical and Applied Mechanics, and Applied Mathematics graduate fields.

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