

*present an Interdisciplinary Seminar with*

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### **Components of cooperation: Synergy in structured populations and the evolution of guilt**



**3:30 PM\*, SEPTEMBER 10, 2019**

Hallam Auditorium, Room 206@NIMBioS · 1122 Volunteer Blvd.

*\*Reception & refreshments at 3 pm*

*Theoretical work in evolutionary biology, economics, anthropology, and other fields has revealed that prosocial and cooperative behavior in humans and other animals is dependent on a few fundamental elements that allow the benefits of cooperation to accrue disproportionately to other cooperators. These elements include: genetic population structure, behavioral plasticity, and ecological synergy. In this talk, I will first review how these elements separately enhance the evolution of prosocial behavior and present a model of how these elements interact in social groups. With a few simple restrictions, the model surprisingly shows that results from two-player games or pairwise interactions are almost completely predictive of results in groups of arbitrary size. This suggests that while large groups may have complex social dynamics, intuition derived from pairwise interactions can be very useful. Second, I will present a model expanding on how behavioral plasticity can generate cooperation with a specific focus on the evolution of social norms. Norms are ubiquitous and are easily stabilized by punishing individuals who deviate from the norm. However, norm following in humans appears more complex in that internal psychological mechanisms are also important where individuals may ascribe inherent value to following a norm. I will present a model of the evolution of the internalization of norms via social preferences where an individual may receive positive psychological utility from following a norm or negative utility (e.g., "guilt") from deviating. The model reveals that the evolution of internalized prosocial norms is possible but it requires some amount of punishment by other individuals in order to be stable. This suggests that externally punished norms evolved first followed by internalized norms and accords with some notions of moral development and reasoning.*