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Name: Brent Simpson Email: bts@mailbox.sc.edu Phone Number: 8037773123 Principal: Y

Organization:University of South CarolinaAddress:1600 Hampton Street, Columbia, SC 292080001Country:USADUNS Number:041387846EIN:576001153Report Date:16-Jan-2019Final Report for Period Beginning 17-Apr-2015 and Ending 16-Oct-2018Title:Topic Area 8.5: The Social Structural Foundations of Reputation, Cooperation and Prosocial BehaviorBegin Performance Period:17-Apr-2015Report Term:0-OtherSubmitted By:Brent SimpsonEmail:bts@mailbox.sc.edu
Phone:(803) 777-3123

Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees:

STEM Participants:

Major Goals: Major Goals: A fundamental issue confronting any group or society is the problem of social order: how to reconcile tensions between individual and collective interests to achieve cooperative and prosocial outcomes ? As Kollock (1998) notes, these conflicts between individual and collective interests are ubiquitous, occurring in everyday interpersonal exchanges, the mobilization of team efforts, the de-escalation of intergroup-conflicts, and international agreements. Given both the ubiquity and the stakes, understanding the mechanisms through which these conflicts can be resolve has been a critical question for the biological and social sciences.

Existing research has yielded a number of critical insights into how these conflicts between individual and collective interests get resolved. These insights have largely followed disciplinary lines. For instance, while there are obviously exceptions, psychologists have largely focused on other-regarding (or "altruistic") values and emotions. Economists and political scientists, on the other hand, have tended to focus on incentives. Perhaps because much of the theoretical and empirical work on cooperation and prosocial behavior developed outside of sociology, it traditionally assumed unstructured populations, in which any given actor has an equal chance of meeting any other actor in a population. But researchers have recently begun to address how social structure – or the pattering of ties between actors – impacts cooperation or prosocial behavior more generally. This project addresses four general questions about social structure and social order via multi-methods, namely computer simulations (i.e., agent based models) and laboratory and web-based experiments.

Question 1: How do social structure and structural dynamics influence cooperation?

Question 2: How do social structures impact generalized trust and generalized trustworthiness, i.e., cooperative interactions with strangers outside of those structures?

Question 3: How do social structure, prosocial reputations, and reputation-based cooperation coevolve? Question 4: How does the strength of ties connecting individuals in structured populations shape the development of cooperation and structural dynamics?

We address these questions and propose a series of agent-based models and experiments with human participants designed to answer them. Within these general questions, a number of key puzzles in the literature are being addressed. For instance, we have clear evidence of heterogeneous social preferences, such that some humans are relatively "prosocial" (and take into account others' welfare when making decisions that impact themselves and others) whereas other humans are more "egoistic" (and concerned primarily about their own welfare). Part of our research will address the interaction of social structure and structural dynamics with how these "agency" variables. This will insight into how social structures promote more or less prosocial types, as well as how network dynamics creates clusters of more or less prosocial types. The ability of prosocials to exclude egoists and interact primarily together is considered a key mechanism for the evolution of cooperation. But since these agency variables have been studied separately from social structure and network dynamics, we currently do not know how

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this mechanism plays out. The fundamental contribution of our research is to address this interplay of agency and structure to better understand what kinds of networks humans form, how these networks shape human cooperation and how cooperation, in turn, further modifies these networks.

Accomplishments: Our work in tackling the major goals of this paper can be summarized as follows: i) Refining our theories of networks and cooperation, ii) Testing these theories with large web-based experiments, and iii) "scaling up" the results of these web-based experiments via the use of agent based models.

This activity has resulted in a total of four published papers and a paper currently under review (at American Journal of Sociology) that sheds new light on primary research questions.

Two of the published papers (one at Proceedings of the National Academy of Sciences; one at Science Advances) were completed and accepted since the last interim report. Thus, here I focus on those two papers, as well as the paper that we just completed and submitted for review.

In the paper "Cooperation, Clustering, and Assortative Mixing in Dynamic Networks." published in Proceedings of the National Academy of Sciences we two large web-based experiments to address whether the emergent structures that promote cooperation are driven by reputation or can emerge purely via dynamics, i.e., the severing of ties to noncooperators and the formation of new ties irrespective of reputational information. Our behavioral results show that dynamic networks yield very high rates of cooperation even without reputational knowledge. Further, we identify realistic conditions under which static networks (where ties cannot be altered) yield cooperation rates as high as those in dynamic networks. These findings help us to answer Questions 1, 3 and 4 outlined in our original proposal and in the above "major goals" section of this final report.

In the paper "The Strength of Dynamic Ties: The Ability to Break Some Ties Promotes Cooperation in Ties that cannot be Broken" published in Science Advances, we aim to move our understanding of network dynamics and cooperation further by addressing more realistic networks which contain a mix of static ties (i.e., ties that are difficult to change) and dynamic ties (i.e., those that can be changed more easily). Past research had only compared networks where all ties can be severed to those where none can, confounding the benefits of fully dynamic networks with the presence of some dynamic ties within the network. We argued and found that the presence of dynamic ties in networks promotes cooperation even in static ties. Consistent with previous work demonstrating that cooperation cascades in networks, our results show that cooperation is enhanced in networks with both tie types because the higher rate of cooperation that occurs following the dynamics process "spills over" to those relations that are more difficult to alter. Thus, our findings demonstrate the critical role that dynamic ties play in promoting cooperation by altering behavioral outcomes even in non-dynamic relations. These findings help answer Question 1 by identifying which types of dynamics are necessary and sufficient for promoting cooperation in human populations.

The final paper for our project (currently under review at American Journal of Sociology) adds further clarity to these questions by addressing a puzzle in our understanding of how humans form cooperative and productive relationships in the real world. Specifically, a key explanation for the high levels of cooperation observed among humans is that more cooperative types selectively sort with one another. But in the real world, sorting is driven instead by homophily, i.e., preferential associations among those sharing an ethnicity, religion, social class, or other socially meaningful distinction. Given its central role in real world networks, homophily is a critical omission in empirical research on the evolution of cooperation. In particular, in dynamic networks, where the underlying network structure can change, homophily-based assortment should result in segregated network components, with relatively high levels of in-group cooperation. To test this logic, we conducted an experiment where participants could sort with one another based on identities, reputations for cooperation, or both. We find that homophily promotes cooperation, net of network dynamics and reputations, two prominent forces in the evolution of cooperation. Further, as anticipated, homophily drives the selection of new alters, increasing clustering in dynamic networks. To assess the consequences of our findings for segregation, we then used estimates from our behavioral data to inform an agent-based model. Taken together, the findings from the experiment and agent-based model shed light on how cooperation can evolve in networks, even when actors sort on something other than cooperative dispositions, and how this process contributes to network-level segregation. As such, it addresses Questions 2 and 3 identified in the major goals section above.

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Training Opportunities: The main PhD student who had been working on the grant (Ashley Harrell, USC) completed

her PhD and received a job offer from the University of Michigan. This was the best placement ever by the University of South Carolina. Dr. Harrell co-authored the majority of papers from the grant and that work undoubtedly played a role in her receiving a number of high profile job offers.

Two additional PhD students have also been supported and/or involved in the research on this grant: Jered Abernathy (USC) and Chris Nunn (OSU). This work has entailed data collection, and processing. These students were also trained in how to analyze these relatively complex data. They are coauthors on the piece currently under review.

Results Dissemination: We have a total of five papers (four published, one under review). In addition, we have presented findings from this research at the Sunbelt Social Networks conference, Group Processes conference, and at invited talks. Some of the published research, especially our PNAS paper, has received media attention (the current altmetric sore of that paper is 90).

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI Participant: Brent Simpson Person Months Worked: 10.00 Project Contribution: International Collaboration: International Travel: National Academy Member: Y Other Collaborators:

Participant Type: Co PD/PI Participant: David Melamed Person Months Worked: 10.00 Project Contribution: International Collaboration: International Travel: National Academy Member: N Other Collaborators: Funding Support:

Funding Support:

 Participant Type:
 Graduate Student (research assistant)

 Participant:
 Ashley Harrell

 Person Months Worked:
 9.00
 Funding Support:

 Project Contribution:
 International Collaboration:
 International Travel:

 National Academy Member:
 N

 Other Collaborators:
 Other Collaborators:

Participant Type:Graduate Student (research assistant)Participant:Jered AbernathyPerson Months Worked:9.00Project Contribution:Funding Support:

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International Collaboration: International Travel: National Academy Member: N Other Collaborators:

Participant Type:Graduate Student (research assistant)Participant:Christopher MunnPerson Months Worked:6.00Project Contribution:Funding Support:International Collaboration:International Travel:National Academy Member:NOther Collaborators:

All five papers have been uploaded.