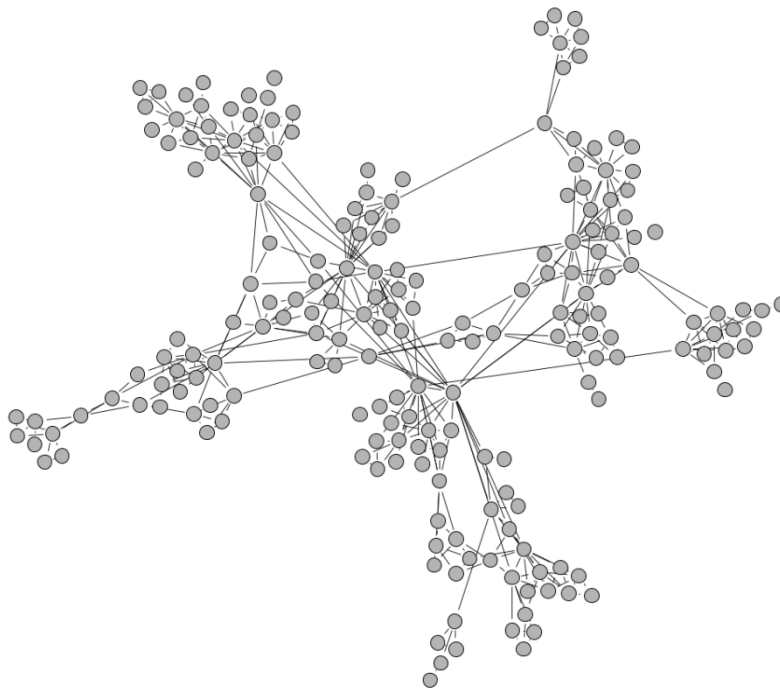# Experiments and Models of Social Networks:
Cooperation, Conflict and Trust

Interdisciplinary Symposium 12-13 May 2016

Videnskabernes Selskab, H.C. Andersens Boulevard 35, 3. sal, 1535 København V, Denmark.

Organizing Committee:
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Thursday 12th May

1st theme: Evolutionary and hierarchical aspects of Conflict and Cooperation

09.00 – 09.15   Introduction by organizers.

09.15 – 10.00   **Elizabeth Hobson**, Santa Fe Institute, USA

10.00 – 10.45   **Christina Pawlowitsch**, Université de Paris 2, France

10.45 – 11.15   Coffee

11.15 – 12.00   **Arne Traulsen,** Max Planck Institute, Plön, Germany

12.00-13.30   Lunch

2nd theme: Interactions and Structural issues of Cooperation, Conflict and trust

13.30 -14.15   **Stefan Bornholdt**, University of Bremen, Germany

14.15 – 15.00   **Karolina Safarzynska**, University of Warsaw, Poland

15.00 – 15.30   Coffee

15.30 -16.15   **Simon Dedeo**, Santa Fe Institute / Indiana University Bloomington, USA

16.15 – 17.00   Open discussion/Poster session

Friday 13th May

3rd theme: Networks interactions (including themes 1 and 2)

09.15 – 10.00   **Milena Tsvetkova**, Oxford Internet Institute, UK

10.00 – 10.45   **Jorge Pacheco**, University of Minho, Lisboa, Portugal

10.45 – 11.15   Coffee

11.15 – 12.00   **Christian Waldstrøm**, Aarhus University, Denmark

12.00 – 13.30   Lunch

4th theme: Network interactions (including themes 1 and 2) and Synthesis followed by open discussion.

13.30 - 14.15   **Sune Lehmann**, Danish Technical University / Copenhagen University

14.15 - 15.15   Open discussion of implications and future directions and challenges.

Abstracts

1st theme: Evolutionary and hierarchical aspects of Conflict and Cooperation

Title

Elizabeth Hobson, Santa Fe Institute, USA

Title

Christina Pawlowitsch, Université de Paris 2, France

Modelling cooperation and punishment in public goods games

Arne Traulsen, Max Planck Institute, Plön, Germany

Cooperation can be enforced by peer-punishment. While it has argued that punishment itself is a public goods problem, being known as somebody who is a responsible punisher can be valuable. With such reputation involved, cooperation becomes a winning strategy. Often, models are restricted in the sense that only cooperators can punish. Extending the strategy sets to all possible strategies shows that known results in restricted models are robust and punishment can prevail in the face of second order free-riders, antisocial punishment, and spite. Also in the case of institutional punishment, to establish such an institution can be a costly signal that induces cooperation. Even here, going beyond the usual assumption that only institutions that punish defectors exist shows that previous results are robust: Good, but no evil institutions should emerge.

2nd theme: Interactions and Structural issues of Cooperation, Conflict and trust

Title

Stefan Bornholdt, University of Bremen, Germany

Between-group conflict and cooperation in the common-pool resource experiment

Karolina Safarzynska, University of Warsaw, Poland

Title

Simon Dedeo, Santa Fe Institute / Indiana University Bloomington, USA

3rd theme: Networks interactions

The Dynamics of Disagreement

Milena Tsvetkova, Oxford Internet Institute, UK

Disagreement and conflict are a fact of social life. However, negative interactions are rarely explicitly declared and recorded and this makes them hard for scientists to study. We overcome this challenge by using complex network methods to investigate the patterns in the timing and configuration of contributions to a large online collaboration community. We analyze sequences of reverts of article edits to Wikipedia, the largest online encyclopedia, and investigate how often and how fast they occur compared to a null model that randomizes the order of actions to remove any systematic clustering. We find evidence that Wikipedia editors systematically attack the same person, attack back their attacker, and come to defend an attack victim. We further find that high-status editors are more likely to attack many others serially, status equals are more likely to revenge attacks back, while attacks by lower-status editors trigger attacks forward; yet, it is the lower-status editors who also come forward to defend third parties. Our results reveal that certain social dynamics that have not been previously explored underlie the knowledge collection practice conducted on Wikipedia. Our method can be applied to other large-scale temporal communication and collaboration networks to identify the existence of negative social interactions and other social processes.

Linking Individual and Collective Behavior in Adaptive Social Networks

Jorge Pacheco, University of Minho, Lisboa, Portugal

Title

Christian Waldstrøm, Aarhus University, Denmark

4th theme: Network interactions and Synthesis

The fundamental structures of dynamic social networks

Sune Lehmann, Danish Technical University / Copenhagen University

Social systems are in a constant state of flux with dynamics spanning from minute-by-minute changes to patterns present on the timescale of years. Accurate models of social dynamics are important for understanding spreading of influence or diseases, formation of friendships, and the productivity of teams. While there has been much progress on understanding complex networks over the past decade, little is known about the regularities governing the micro-dynamics of social networks. Here we explore the dynamic social network of a densely-connected population of approximately 1000 individuals and their interactions in the network of real-world person-to-person proximity measured via Bluetooth, as well as their telecommunication networks, online social media contacts, geo-location, and demographic data. These high-resolution data allow us to observe social groups directly, rendering community detection unnecessary. Starting from 5-minute time slices we uncover dynamic social structures expressed on multiple timescales. On the hourly timescale, we find that gatherings are fluid, with members coming and going, but organized via a stable core of individuals. Each core represents a social context. Cores exhibit a pattern of recurring meetings across weeks and months, each with varying degrees of regularity. Taken together, these findings provide a powerful simplification of the social network, where cores represent fundamental structures expressed with strong temporal and spatial regularity. Using this framework, we explore the complex interplay between social and geospatial behavior, documenting how the formation of cores are preceded by coordination behavior in the communication networks, and demonstrating that social behavior can be predicted with high precision.