

## **Focal Points, Endogenous Processes and Exogenous Shocks in the Autism Epidemic**

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We have previously shown that the diffusion of information about autism through spatially proximate social relations has contributed significantly to the autism epidemic. This study expands on this finding by identifying the focal points for interaction that drive the proximity effect on subsequent diagnoses. We then consider how diffusion dynamics through interaction at critical focal points, in tandem with exogenous shocks, could have shaped the spatial dynamics of autism in California. We achieve these goals through an empirically calibrated simulation model of the whole population of 3-9 year-olds in California. We show that in the absence of interaction at these foci – principally malls and schools – we would not observe an autism epidemic. We also explore the idea that epigenetic changes affecting one generation in the distal past could shape the precise spatial patterns we observe among the next generation.

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## **Information Diffusion through Adaptive Seeding**

Yaron Singer - Assistant Professor of Computer Science, Harvard

### **Abstract:**

Throughout the past decade there has been extensive research on algorithmic and data mining techniques for solving the problem of influence maximization in social networks: if one can incentivize a subset of individuals to become early adopters of a new technology, which subset should be selected so that the word-of-mouth effect in the social network is maximized?

In this talk we will introduce a new paradigm for influence maximization, called adaptive seeding. The framework is designed to dramatically improve influence maximization by leveraging a remarkable structural phenomenon in social networks, related to the "friendship paradox" (or "your friends have more friends than you"), and a novel optimization model. We will discuss this phenomenon and present key algorithmic ideas and some experimental results of adaptive seeding.

### **Bio:**

Yaron Singer is an Assistant Professor of Computer Science at Harvard University. He was previously a postdoctoral researcher at Google Research and obtained his PhD from UC Berkeley. He is the recipient of the 2012 Best

Student Paper Award at the ACM conference on Web Search and Data Mining, the 2010 Facebook Fellowship, the 2009 Microsoft Research Fellowship, and several entrepreneurial awards for work in social networks.

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## **Networks of Military Alliances, Wars, and International Trade**

Matthew O. Jackson and Stephen Nei

Abstract:

We investigate the role of networks of military alliances in preventing or encouraging wars between groups of countries. A country is vulnerable to attack if there is some allied group of countries that can defeat that country and its (remaining) allies based on their collective military strengths. Even with such a demanding notion of vulnerability, we show that there do not exist any networks that are stable against the addition and deletion of alliances. We then show that economic benefits from international trade can provide incentives to form alliances in ways that restore stability and prevent wars. In closing, we briefly examine historical data on interstate wars and trade in which a dramatic (more than ten-fold) drop in the rate of interstate wars since 1960 is paralleled by an unprecedented growth in trade over the same period.

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## **The Problem of Social Control and Coordination of Complex Systems in Sociology**

Noah E. Friedkin

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Abstract:

This paper lays out a central unsettled sociological problem in an effort to encourage a broader interdisciplinary attack on it. The paper's analysis concentrates on a specific instance of the problem that was posed by Abelson, a mathematical social psychologist at Yale, in 1964. The problem simply stated is whether the observed bimodal opinions distributions of community cleavage studies may be generated by a process of endogenous interpersonal influences on opinions. With the recent influx of investigators into the field of social networks from the natural and engineering sciences, Abelson's problem has attracted attention as an interesting problem that might be successfully addressed. The new approaches that have been proposed are similar to Abelson's response to it. He believed that a nonlinear model of endogenous interpersonal influences is required to explain such outcomes. This paper demonstrates that a linear time-

invariant state-space model will suffice, and it contributes observations on the structural conditions under which large-scale social divisions of opinion may appear.