



## Spring 2017 Colloquium Department of Computer and Information Sciences

### *Social Networks and Influence through Prism of Cognition*

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**Abstract:** Ties in social networks are often represented as unweighted solid lines. Yet, human social interactions are driven by temporary events such as meeting and talking to people, exchanging information, or watching the news. Those events leave decaying-in-time traces in human memory. The derived from such traces personal perception of the relevant events, rather than events themselves, drives human decisions and social interactions. In this talk, we discuss how this novel perspective enables us to investigate social tie co-evolution in an attribute-rich social network called NetSense, which was collected on a population of undergraduate students at Notre Dame University for several years. First, we examine the dynamics of co-evolution of two coupled social networks in NetSense. The first is a cognitive network defined by nominations based on perceived prominence collected from repeated surveys of students. The second is built from the behavioral network representing actual interactions between students based on records of their mobile calls and text messages. We address three interrelated questions. First, we ask whether the formation or dissolution of a link in one of the networks precedes or succeeds formation or dissolution of the corresponding link in the other network (temporal dependencies). Second, we explore the causes of observed temporal dependencies between the two networks. For those temporal dependencies that are confirmed, we measure the predictive capacity of such dependencies. Third, we examine whether there are systematic differences in the dissolution rates of symmetric (undirected) versus asymmetric (directed) edges in both networks. Then, we discuss an event-driven temporal complex network model that accounts for the decay mechanism of event memory traces to accurately represent event perception by humans. Using NetSense, we map memory traces of communication events onto the student friendship relations. The results demonstrate that accounting for the human perception of events is essential for understanding dynamics of human interactions in the event driven social networks.

**Bio:** Dr. Boleslaw K. Szymanski is the Claire and Roland Schmitt Distinguished Professor of Computer Science and a Professor of Cognitive Science at RPI. He is the Founding Director of the ARL Social and Cognitive Networks Academic Research Center and of the RPI NEST Center. He received Ph.D. in Computer Science from National Academy of Sciences in Warsaw, in 1976. He published over 400 scientific articles, is a foreign member of the National Academy of Science in Poland, an IEEE Fellow, and a National Lecturer for the ACM. In 2009, he received the Wilkes Medal of British Computer Society and in 2003 the Willey Distinguished Faculty Award from RPI. His current research interests focus on network science and computer and social networks.