



DHB: Flows of Information and Influence in Social Networks

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General Overview

This project investigates **flows of information and influence in social networks**, using agent-based modeling and studies with human participants. Our general goal is to explore the outcomes of influence examined over time when each individual is both a source and recipient of influence, using up-to-date theoretical models of the details of social influence processes. Two **sub-projects addressing specific areas** are described to the right. Our **overall framework** builds on the idea that when people draw on information from their individual experiences and use it to make a decision or judgment, some individuals may obtain biased or inadequate samples of information. Pooling informational resources may help the group as a whole arrive at a better decision. This process is dynamic, for each individual's decisions in turn provide additional information to the network. Our research considers the relationships of variables at several levels, from individual agents' decision rules, to inter-agent interactions, to the overall structures of social networks, as individuals share information and influence each others' attitudes and behaviors, or assess each other as potential cooperators or mates. Overall, this work promises to make major conceptual contributions to the field of social psychology by showing how to embed its theories about micro-level processes of social influence, person perception, etc. within the context of social networks over an extended time course.

General Publications

We have written a paper introducing and advocating the use of **agent-based modeling (ABM) techniques** for social psychological issues.

Reference: Smith, E. R., & Conrey, F. R. (2007). Agent-based modeling: A new approach for theory-building in social psychology. *Personality and Social Psychology Review, 11*, 87-104.

Abstract: Most social and psychological phenomena occur not as the result of isolated decisions by individuals, but rather as the result of repeated interactions between multiple individuals over time. Yet the theory-building and modeling techniques most commonly used in social psychology are less than ideal for understanding such dynamic and interactive processes. This paper describes an alternative approach to theory-building, agent-based modeling (ABM), which involves the simulation of large numbers of autonomous agents that interact over time with each other and with a simulated environment, and the observation of emergent patterns from their interactions. We believe that the ABM approach is better able than prevailing approaches in our field, variable-based modeling (VBM) techniques such as causal modeling, to capture the types of complex, dynamic, interactive processes that are so important in the social world. The paper elaborates several important contrasts between ABM and VBM, and offers specific recommendations for learning more and applying the ABM approach.

Other publications:

Smith, E. R., & Conrey, F. R. (in press). The social context of cognition. To appear in P. Robbins & M. Aydede (Eds.), *Cambridge Handbook of Situated Cognition*. Cambridge University Press.

Smith, E. R. (in press). Social relationships and groups: New insights on embodied and distributed cognition. *Cognitive Systems Research*.

Smith, E. R., & Semin, G. R. (2007). Situated social cognition. *Current Directions in Psychological Science, 16*, 132-135.

Social Influence

Social influence occurs when one person's attitude or behavior has an impact on the attitude or behavior of a second person. For example, if person B sees A purchase a particular product or brand, B may become more likely to make the same purchase.

We have published a **review of models of social influence** drawn from disciplinary areas ranging from sociology and economics to cognitive science and physics. We will build on this review to construct models that incorporate the detailed, micro-level understanding of influence processes derived from focused laboratory studies, but contextualized in ways that recognize how multidirectional, dynamic influences are situated in people's social networks and relationships.

Reference: Mason, W. A., Conrey, F. R., & Smith, E. R. (2007). Situating social influence processes: Dynamic, multidirectional flows of influence within social networks. *Personality and Social Psychology Review, 11*, 279-300.

Abstract: Social psychologists have studied the psychological processes involved in persuasion, conformity, and other forms of social influence, but they have rarely modeled the ways influence processes play out when multiple sources and targets of influence interact over time. However, workers in other fields from sociology and economics to cognitive science and physics have recognized the importance of social influence and have developed models of influence flow in populations and groups—generally without relying on detailed social psychological findings. This article reviews models of social influence from a number of fields, categorizing them using four conceptual dimensions to delineate the universe of possible models. The goal is to encourage interdisciplinary collaborations to build models that incorporate the detailed, microlevel understanding of influence processes derived from focused laboratory studies, but contextualized in ways that recognize how multidirectional, dynamic influences are situated in people's social networks and relationships.

We have also conducted three studies examining potential **social influence from implicit attitudes**, which are automatic evaluations that occur spontaneously and are difficult or impossible to control. Existing evidence shows that implicit attitudes can be relatively independent of explicitly reported attitudes, and can affect subtle (especially nonverbal) forms of behavior. Thus, it is possible that implicit attitudes might be able to influence other people.

Reference: Mason, W. A. (2007). *Implicit social influence*. Unpublished doctoral dissertation, Indiana University, Bloomington.

Abstract: Prior work has shown that social influence, whether it is intentional persuasion or incidental influence, usually leads the recipient of the influence to change his or her attitudes to be closer to the attitudes of the source of the influence. This work has focused on the effect of the explicit attitudes of the source of influence but ignored the possible effect of the source's implicit attitudes. Results of three studies revealed that implicit attitudes have an influence on a recipient, but in unexpected ways. In the first study, the sources' implicit attitudes led to a contrast effect on the recipients' explicit attitudes. In the second and third study the manipulation of the sources' attitudes did not work as expected, and the influence of the sources' implicit attitudes on the recipient was not detected. Thus, a person's implicit attitudes can influence another person's attitudes, but the conditions in which implicit attitudes lead to influence deserve further research.

Ongoing work in collaboration with Elizabeth C. Collins, Elise P. Hall, and John K. Kruschke is examining **how people weight information coming from other people (social sources) versus nonsocial cues** that they obtain for themselves. For example, you may hear several financial advisors (social sources) give positive or negative opinions about a particular stock, and you may also obtain direct information about the firm's sales or market share (nonsocial cues). One experiment has been completed and another is planned testing the hypothesis that Kruschke's model of how people learn to adaptively allocate attention to multiple cues will also describe the way they allocate attention to different social sources of information.

Social Flows of Information About People

It is estimated that as much as 50% of the information that we exchange in daily conversation is **information about other people**. These flows of social information can strongly affect our impressions of other people and our behaviors toward them. We have written a paper presenting our theory of this process and results of multi-agent modeling.

Reference: Smith, E. R., & Collins, E. C. (2007). *Active social cognition*. Unpublished manuscript, Indiana University, Bloomington.

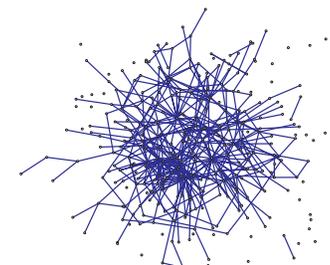
Abstract: Current theory on how people form impressions of other people emphasizes that people are active in selecting and interpreting information to form such impressions, but has neglected other ways in which perceivers are active. Instead of passively receiving pre-packaged information, we hold that social perceivers are active in eliciting and creating the information on which they base their impressions and judgments (as the socially situated cognition perspective would suggest). We describe a theoretical model of processes of active social cognition, and present results of a multi-agent simulation of selected processes. Our model assumes that perceivers can actively decide whether to obtain information about a social target; that they elicit as well as interpret impression-relevant information; that social targets as well as perceivers are active (for example, in self-presentational processes); that perceivers can solicit information from third-party sources who are linked to perceivers and targets in social networks; and that perceivers may actively attempt to correct biases stemming from impression formation processes. Extensions and implications of the model are discussed, for example for the active social cognition of the self, and for the nature of underlying mental representations of persons.

As an interesting special case, people often socially transmit **information about potential dates or mates**. Existing theory of mate search assumes that a person's desirability as a mate can be assessed almost at once (based mostly on immediately visible characteristics), but research on romantic relationships shows that people also care about other, less immediately knowable characteristics of a partner (aspects of personality, for example). That harder-to-acquire information can be transmitted as gossip through social networks, influencing people's choices of dates or mates. We have developed a multi-agent model of this process.

With Luis Rocha, we are conducting a study of users of the Facebook social networking website, examining both **friendship networks and dating patterns** in a group of college students.



Example of a Facebook profile.



Social network of students in Facebook sample (Kamada-Kawai layout).