TAG Models with Emotion

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Abstract

In this talk we describe a class of models of social interaction called TAG models – trust, advice, and gossip. We expand this model by incorporating a computational model of emotion, called the ACT emotion engine derived from mathematical sociology and cognition.

Summary

Our work focuses on understanding the relationship between information exchange, behavioral choices, and organization performance in informal, message-based, settings. Associated with this are reputation effects and events that can impact those, such as gossip. This has generated a program for testing rudimentary forms of what we call TAG models. TAG models are informal (generally) models of communication and emergent structures that are primarily involved with *trust* (as a construct and decision variable), *advice* (as a currency of exchange in the structure), and *gossip* (as a mechanism to influence both trust and advice).

The methods we employ center on crafting cognitive-based computational models of individual agents interacting in group settings (Carley & Prietula, 1994a,b; Prietula, Carley & Gasser, 1998). Building upon a series of research efforts, we describe an expansion that takes into account emotional states capable of influencing, and being influenced by, agent behavior and task events. We adopt (and adapt) two theoretical models that can explain and predict emotional-cognitive aspects of agent behaviors. We also begin to craft a third theoretical framework that melds and extends the two to group emotional states and events.

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As one might well imagine, there are a host of definitions for "emotion." However, as we focus on the cognitive influences of agent affect, emotion, and behavior, our view of *emotion* is most similar to that articulated by Ortony, Core and Collins (1988) as "valenced reactions to events, agents, or objects, with their particular nature being determined by the way in which the eliciting situation is construed (p. 13)."

In fact, their theory forms the basis for the elicitation structure of emotion in our model. Under certain conditions, Agents can have emotional responses to events. Basic affective reactions are differentiated with respect to cognitive constraints (as conditions) defining a fundamental set of emotional types.

In our model, however, we must account for four kinds of additional phenomena not addressed by their theory. First, the ET model provides guides for the elicitation functions, but we must incorporate some qualitative or quantitative representations that provide the specification of the underlying scales onto which differential values can be mapped. Second, we must handle *multiple* events. The Agents in our model define a repetitive game with memory and consequence. Third, a substantive result of an *emotional* response (as defined by the eliciting conditions) is often a subsequent *behavioral* response to the eliciting conditions (in the contexts of those conditions and emotional state). As emotional states are influenced by events, they too influence event choices by the Agent. Given the situation and emotional state of an Agent, what is the likelihood of specific subsequent behaviors?

To address these first three phenomena (scaling, multiple events, behavioral responses) we turn from a cognitive model to a model from sociology – affect control theory. Affect Control Theory (Heise 1987) provides the theoretical substrate and mathematical articulations of how events, agents and objects are perceived (socially) and how those perceptions influence and are influenced by social interactions (or descriptions of interactions).

Finally, the last phenomenon we explore is the *collective effect* of the previous three phenomena over time. Though informal considerations of "group emotions" have often been discussed, little empirical or theoretical guidance is provided for rigorously defining and predicting collective emotional states and behavior as we are considering them. To this end, we are striving to define such models, metrics and theoretical apparatus that can subsume the set of phenomena and explanations woven in the models we are crafting and the theoretical stance we are adopting. We explore the extent to which ACTS theory (Carley & Prietula, 1994b) may provide such an integrative theoretical framework.

We will demonstrate the fundamental TAG software called TrustMe (Prietula, 2002) and indicate how the ACT emotion engine is being integrated into the model.

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