Uniformity, Bipolarization and Pluriformity Captured as Generic Stylized Behavior with an Agent-Based Simulation Model of Attitude Change

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Abstract

This paper focuses at the dynamics of attitude change in large groups. A multi-agent computer simulation has been developed as a tool to study hypothesis we take to study these dynamics. A major extension in comparison to earlier models is that Social Judgment Theory is being formalized to incorporate processes of assimilation and contrast in persuasion processes. Results demonstrate that the attitude structure of agents determines the occurrence of assimilation and contrast effects, which in turn cause a group of agents to reach consensus, to bipolarize, or to develop a number of subgroups sharing the same position. Subsequent experiments demonstrate the robustness of these effects for a different formalization of the social network, and the susceptibility for population size.

Keywords: attitude dynamics, Social Judgment Theory, agent based simulation

1. Introduction

The spreading of attitudes and opinions through a population is a crucial process in understanding the dynamics of e.g., political changes, shifts in preferences, the rise and fall of interest groups and the like. Whereas the quality of arguments may determine the extend to which one is being persuaded by another person, often people respond quite simple by favoring positions close to their own, and rejecting more distant positions. The Social Judgment Theory (SJT: Sherif and Hovland, 1961) is a theory that describes how individuals change their position after being confronted with another position. The basic idea of this theory is that a change of a person’s attitude depends on the position of the persuasive message that is being received. If the advocated position is close to the initial position of the receiver, it is assumed that this position falls within the latitude of acceptance of the receiver. As a result, the receiver is likely to shift in the direction of the advocated position (assimilation).

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If the advocated position is distant to the initial position of the receiver, it is assumed that this position falls within the *latitude of rejectance* of the receiver. As a result, the receiver is likely to shift away from the advocated position (*contrast*). If the advocated position falls outside the border of the latitude of acceptance, but is not that distant that it crosses the border of the latitude of rejectance, it will fall within the *latitude of non-commitment*, and the receiver will not shift its initial position.

Whereas the Social Judgment Theory has been tested extensively for small laboratory settings, empirical work on how assimilation and contrast effects affect attitude change at the population level has not been done due to methodological limitations. Obviously, multi-agent simulation provides a methodology capable of exploring dynamics of attitude change in large populations. Several researchers have worked on simulating how opinions, attitudes or voting behavior in groups emerges from locally interacting people, some working on binary opinions (e.g., Latane and Nowak, 1997; Galam, 1999) and some using continuous opinions, where influence is dependent on distance (using a threshold, e.g., Deffuant et al., 2001, 2002; Weisbuch et al., 2002; Hegselmann and Krause, 2002).

This paper is aimed at extending this line of research by formalizing the Social Judgment Theory in a multi-agent computer simulation. Whereas previous models incorporated processes of assimilation, and to a lesser extent, processes of non-commitment, the current paper also adds processes of contrast. This introduces an opposite mechanism in the model that may have significant consequences for the generated dynamical processes.

A next extension of the model will focus on the importance of attitudes, which Social Judgment Theory addresses as “ego-involvement”. The basic assumption here is that ego-involvement provides an important anchor for a person’s attitude on an issue. Ego-involvement is being formalized as the distance between one’s own initial position and the borders for the latitude of rejection. The higher one’s ego-involvement is, the closer the borders to one’s own position, and hence the smaller the latitude of non-commitment gets. In a crisis situation, the latitude of non-commitment virtually disappears, and the person either accepts or rejects any attitude toward the topic (O’Keefe, 1990).

### 2. Proposed Model

We have a population with $N$ individuals. Each individual $i$ has got an opinion (an attitude) $x_i$, a threshold determining the latitude of acceptance $u_i$ and a threshold determining the latitude of rejection $t_i$ with $t_i > u_i$. Varying the values of $t_i$ and $u_i$ allows for modeling agents having different attitude structures. For example, an agent having a high ego-involvement can be formalized as an agent where $t_i$ is slightly larger or equal to $u_i$. The agents are scheduled to communicate on a random basis by scheduling random pairs for each time-step of the simulation. During the interaction between individual $i$ and individual $j$, the following rules are applied:

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\begin{align*}
\text{If } |x_i - x_j| &< u_i \quad dx_i = \mu \cdot (x_j - x_i) \\
\text{If } |x_i - x_j| &> t_i \quad dx_i = \mu \cdot (x_i - x_j)
\end{align*}
\]

where the parameter $\mu$ controls for the strength of influence.