Chapter VII

The Intelligence of Rumors: A Cross-Methodological Approach to Social Belief Dynamics

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Abstract

This chapter presents a theory of reputation seen as the result of evaluation spreading in a multi-agent system (MAS). In particular the capacities of agents that spread reputation have been analyzed and decomposed in their atomic parts (pragmatic, memetic, epistemic). For each decision we state and verify several claims, using the methodologies that allowed best to capture the relevant aspects of the theoretical statements. Our major claim is that only when considering agents' architectures and roles it is possible to find out which regulatory patterns cannot emerge. Reputation is argued to be no exception to this rule. Therefore, in order to interact with each other, agents need evaluation concerning which partner to choose. We will describe how by using various kinds of methodologies that account for theory fragments a
coherent picture can be observed and how interdisciplinary can help to account for complex intelligent phenomena among adaptive social systems.

Introduction

The topic of our study is social reputation, seen as a fundamental mechanism for the diffusion and evolution of normative behavior in a complex adaptive system (see also Coleman, 1990; Dunbar, 1996; Merry, 1984; Milgrom & Roberts, 1992; Yamagishi & Matsuda, 2002).

We propose a definition of reputation as socially transmitted higher level beliefs concerning properties of agents, namely, their attitudes towards some socially desirable behavior, be it cooperation, reciprocity, or norm-compliance.

Such a definition leads us to investigate reputation as a crucial mechanism in the evolution of these behaviors: Reputation transmission allows cooperation to emerge and persist even with low probability of repeated interaction.

In the first part of the paper, therefore, we will establish the fundamental ingredients needed to describe the action of reputation mechanism in a MAS, by decomposing the notion of reputation and relating it to more basic ones from cognitive and social sciences, like evaluation, belief, goal, ability, and so forth. In particular we will refer to the theoretical discussion in Conte and Paolucci (2002), which considers reputation as the main tool for establishing social order among intelligent agents, and we will analyze the pragmatic, memetic, and epistemic operations that allow reputation to function.

In the second part, instead, we will verify the hypotheses put forward by using a cross-methodological approach. The motivations for the application of each methodology will be justified and results will be analyzed with respect to both their soundness and generalizability. Therefore, we will firstly deal with pragmatic choice—which is the decision to cooperate or not to cooperate with another agent—by showing via computer simulation the effects of overoptimistic and overpessimistic evaluation both in presence and absence of reputation. Secondly, we will deal with memetic choice—which is the decision to pass or not to pass (good or bad) reputation—by showing via natural experiments how different initial experimental condition can lead to the diffusion of different patterns of reputation. Thirdly, we will deal with epistemic choice—which is the decision to accept or not an incoming information concerning reputation—with the instrument of multimodal dynamic epistemic logic, of which the KARO framework (Van der Hoek et al., 1997) represents the richest elaboration from an agent theory perspective, and which is capable to show how agents that communicate social image instead of reputation will tend to take more responsibility than the others. Finally, we will describe how by using various
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