

# Abstract

The present work is intended as a response to multi-agent systems designers' needs to validate models of collective behavior, to model individual strategies, to implement agents interactions and to determine the conditions of emergence of collective solutions. The agent-based participatory simulations are experiments conducted to explore, model and reproduce, within agent-based systems, the innovation capabilities exhibited by social groups when collectively solving problems. In these experiments, human participants access the simulation like software agents. All interactions are agent-based interactions and they are recorded. Such simulations can be used to validate models of collective problem solving, to elicit participants' strategies and to determine necessary conditions for the emergence of collective strategies. Using the experiment logs, a technique to automatically extract interaction patterns was developed, and three properties a language requires to describe these interactions were isolated. Further agent-based simulations confirmed that the emergent behaviors that appear in experiments can prove more efficient than behaviors from the original model.

**Keywords :** participatory simulations, multi-agent systems, collective problem solving, validation, collective behavior, interaction patterns.