

# Collective Intelligence in Human Communities: Some Exploratory Experiments

Fabio Boschetti <sup>(1)</sup> and David Batten <sup>(2)</sup>

<sup>1</sup> *CSIRO Marine Research, Private Bag 5, Wembley, WA 6913, Australia; Visiting address: CSIRO Marine Research, Underwood Ave (cnr Brockway Rd), Floreat WA, 6014*

<sup>2</sup> *CSIRO Agent-Based Modelling Working Group, CSIRO Manufacturing and Infrastructure Technology, Graham Road, Highett, Victoria 3190, Australia*

Corresponding author e-mail: [Fabio.Boschetti@csiro.au](mailto:Fabio.Boschetti@csiro.au)

We address the problem of optimal resource allocation among a population of potentially competing agents within the framework of Collective Intelligence (COIN). Broadly speaking, this is the opposite of traditional Agent Based Modeling involving human decision-making. Instead of assigning strategies to agents and modelling their aggregate behavior, we choose the desired global outcome in advance and consider what strategies the agents need to adopt in order to achieve it.

Coordinated global behavior in communities of agents is hard to achieve when the agents aim to collaborate for a shared outcome ('Team Game') or when the agents compete ('Minority Game', for example). In both cases, the agents find it difficult to distinguish the effect of their action from the interactions between all other agents. Consequently, they are unable to extract useful information from the dynamics and learn to adapt in a convergent manner. This problem is addressed in COIN by designing behaviors which allow the individual agents to learn and the desired global outcome to arise.

We compared the COIN approach to three different implantations of a general Minority Game, with the aim of maximizing resource exploitation. We show that:

- 1) COIN can achieve optimal resource exploitation under different conditions of resource distribution and availability.
- 2) Under COIN implementation, each individual agent's gain is maximized. Said differently, selfish interest is achieved by not acting selfishly. This is crucial if we aim to apply this method to human communities, because it shows that, under certain conditions, the selfish interest of each agent and of the community as a whole can converge.
- 3) The mathematics behind the COIN approach can be simplified considerably. In principle, our proposed method could be implemented by real human agents – who only need to keep track of past resource allocations and to perform elementary calculations which can be easily executed with pen and paper.