ADAPTATION IN SOCIAL DILEMMAS

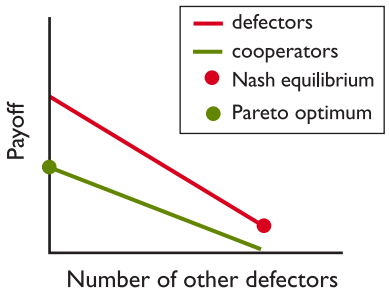
Luis Izquierdo, Nick Gotts and Gary Polhill: The Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH, UK • e-mail: luis@izquierdo.name

THE PROBLEM — Social dilemmas: Games with Pareto inefficient Nash equilibria.

Pareto inefficiency: An outcome is Pareto inefficient if there is an alternative in which at least one player is better off and no player is worse off.

Nash equilibrium: An outcome constitutes a Nash equilibrium if no player can get a higher payoff by changing their strategy while the other players keep their strategies unchanged.

The best-known social dilemma is the two-player "Prisoner's Dilemma". My research concerns a multi-player version, in which all players share a renewable but limited resource (a "Common-Pool Resource Dilemma").

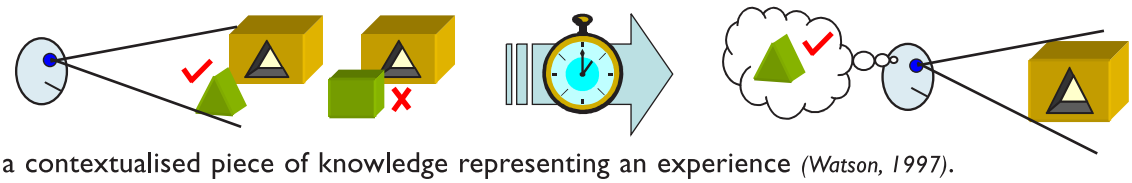


THE QUESTION — What factors promote cooperation?

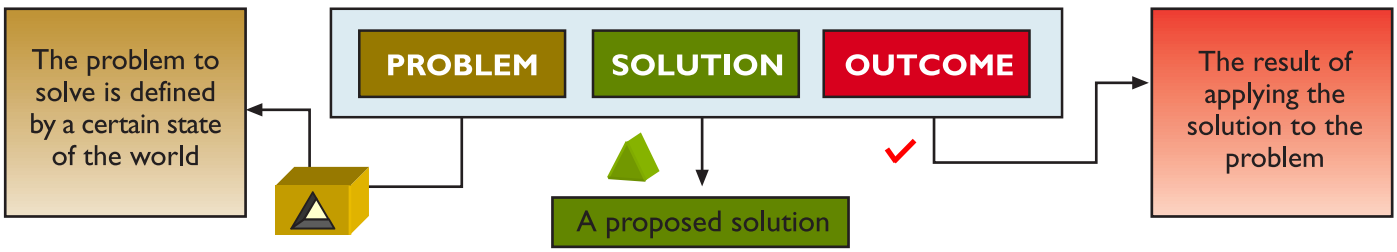
- **Adaptive rationality**
  What is the outcome of these games when played by rational and adaptive players?
- **Multiple dimensions of utility**
  How do other incentives, apart from the payoffs, influence the outcome of these games?

ADAPTATION — Case-Based Reasoning

CBR is a problem-solving technique and a learning mechanism consisting of solving a problem by remembering a previous similar situation and reusing information and knowledge from that situation. *(Aamodt, A. & Plaza, E. 1994)*

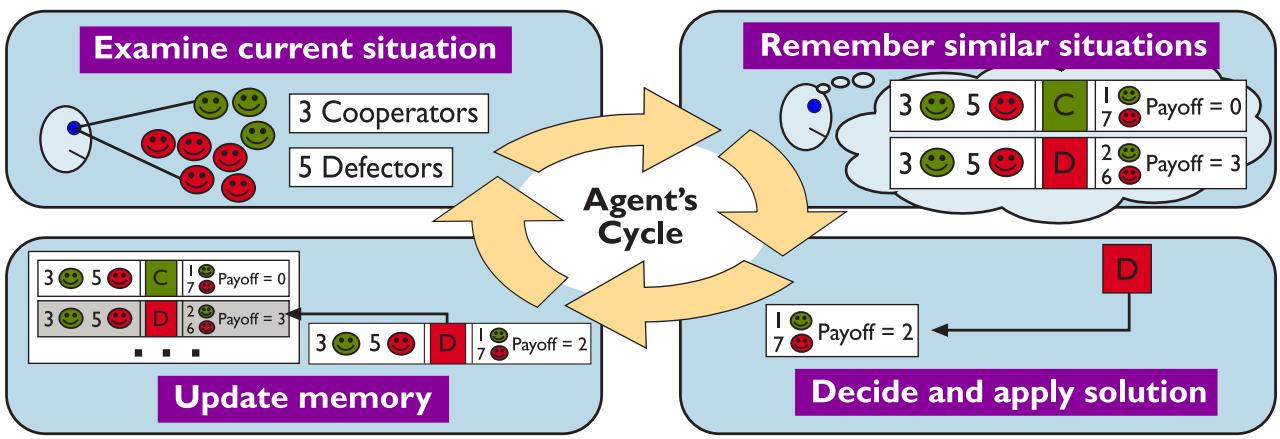


A **case** is a contextualised piece of knowledge representing an experience *(Watson, 1997)*.



THE APPROACH — Agent-based modelling

Individuals and their interactions are explicitly represented in the model.



References: Aamodt, A. and Plaza, E., 1994. Case-Based Reasoning: Foundational Issues, Methodological Variations, and System Approaches. *AI Communications*. IOS Press, Vol. 7, no. 1, pp. 39-59.
Watson, I., 1997. *Applying Case-Based Reasoning: Techniques for Enterprise Systems*. Morgan KaufmanPublishers.