

# Modelling the Dynamics of Collective Cognition: A Network-Based Approach to Socially-Mediated Cognitive Change

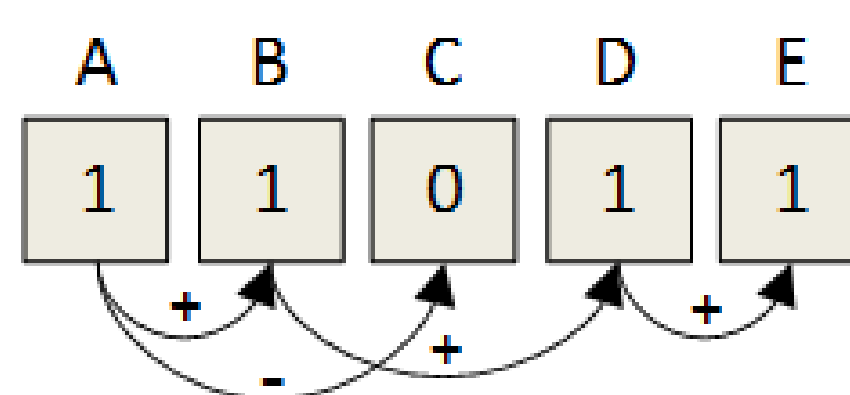
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### Overview

- A multi-level network model was developed to support the network scientific analysis of cognitive state fluctuations in social systems.
- The model is intended to support our understanding of how psychological, social and cultural forces contribute to the dynamics of collective cognition.
- The model attempts to integrate ideas and concepts from a number of disciplines, most notably psychology, evolutionary biology and complexity science.

### Individual Level

At the level of individual agents belief systems are modelled as 'epistatic binary belief systems'.



#### Cognitive Consistency Rules:

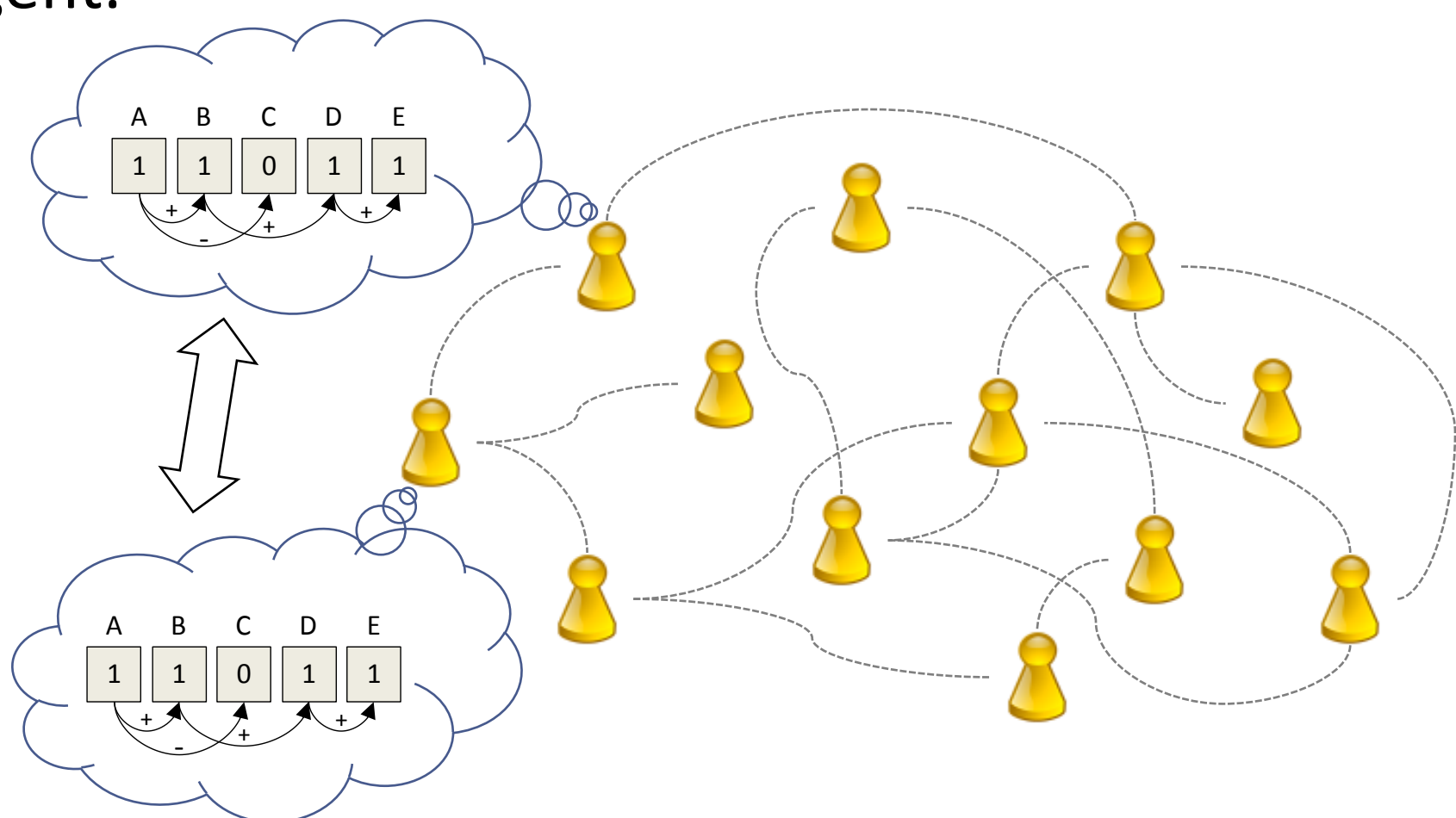
- IF A = true, then B = true
- If A = true, then C = false
- If B = true, then D = true
- If D = true, then E = true

We can derive a measure of 'fitness' for any given belief system based on the 'cognitive consistency' of the beliefs.

Agents are under internal pressure to avoid dissonant cognitions (or states of low cognitive consistency). Cognitive consistency is often determined by an agent's understanding of the causal (or logical) dependencies that inhere in a particular domain.

### Social Level

At the social network level, the fitness contributions of individual beliefs are determined by the beliefs of other actors as well as the other beliefs held by the agent.

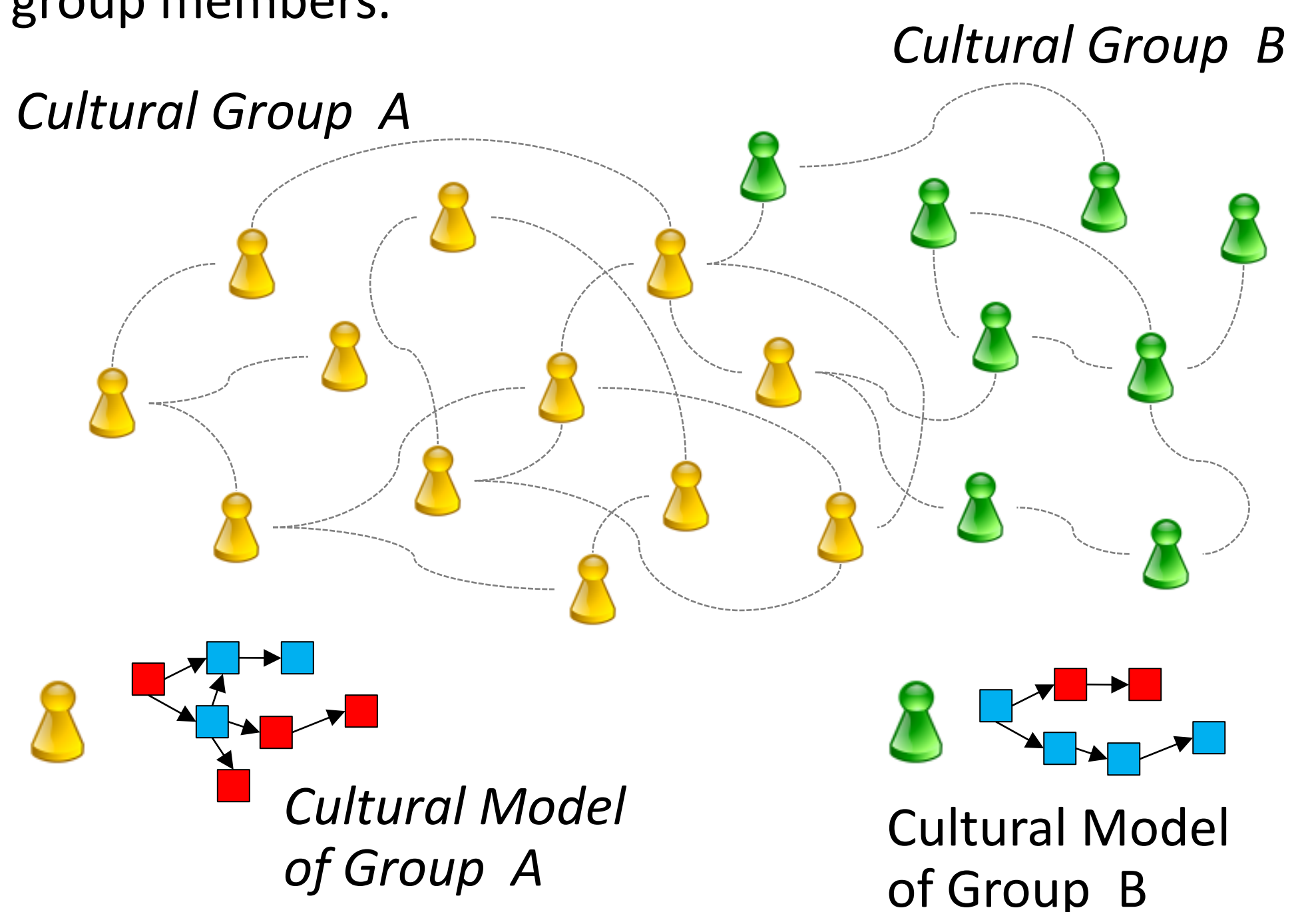


Belief systems are thus *coupled*. Any changes to the belief profile of one agent influences the fitness landscapes against which the beliefs of other agents are evaluated.

**Research Question:** How does the profile of inter-agent interaction at the social network level contribute to the emergence, modification and dissolution of cultural groups?

### Cultural Level

At the cultural level, belief system dynamics are influenced by cultural models. Cultural models act as an additional source of influence on the cognitive dynamics of cultural group members.



**Research Question:** How do cultural-level influences affect individual cognitive change?

**Research Question:** Do forces at the inter-cultural level contribute to the cognitive stability of culturally-heterogeneous groups?