Evolution and Cognitive Cost of Ethnocentrism

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Kaznatcheev (2010)
CAS – AAAI Fall Symposium

Ethnocentrism

- Seeing in-group as superior and out-groups as inferior

Cashdan (2001) *Current Anthropology*

Brown (2004) *Daedalus*

Ethnocentrism

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- Commonly thought to involve substantial cognitive ability

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- But ethnocentrism is observed in individuals with minimal cognition!
  - Human placenta, ants, microbes (Biology: known as Green-beard effect)

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Ethnocentrism

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- Commonly thought to involve substantial cognitive ability
- But ethnocentrism is observed in individuals with minimal cognition!
  - Human placenta, ants, microbes (Biology: known as Green-beard effect)
- Ethnocentrism may have a basis in evolution

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Method

- How can we ask theoretical questions about evolution?

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- Build computational models and simulate them

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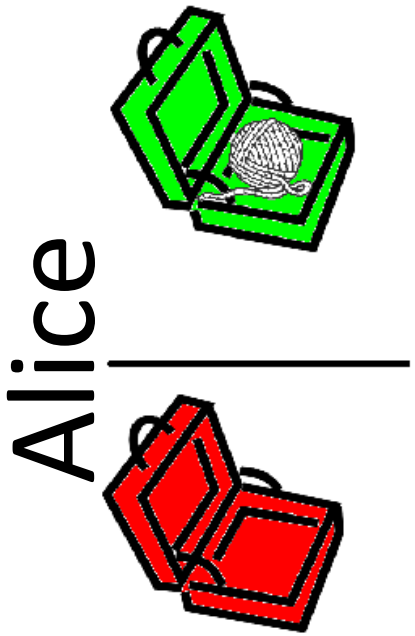
- Build computational models and simulate them
- Use tools from evolutionary game theory to model interactions between agents

Competitive Environment

Prisoner's dilemma



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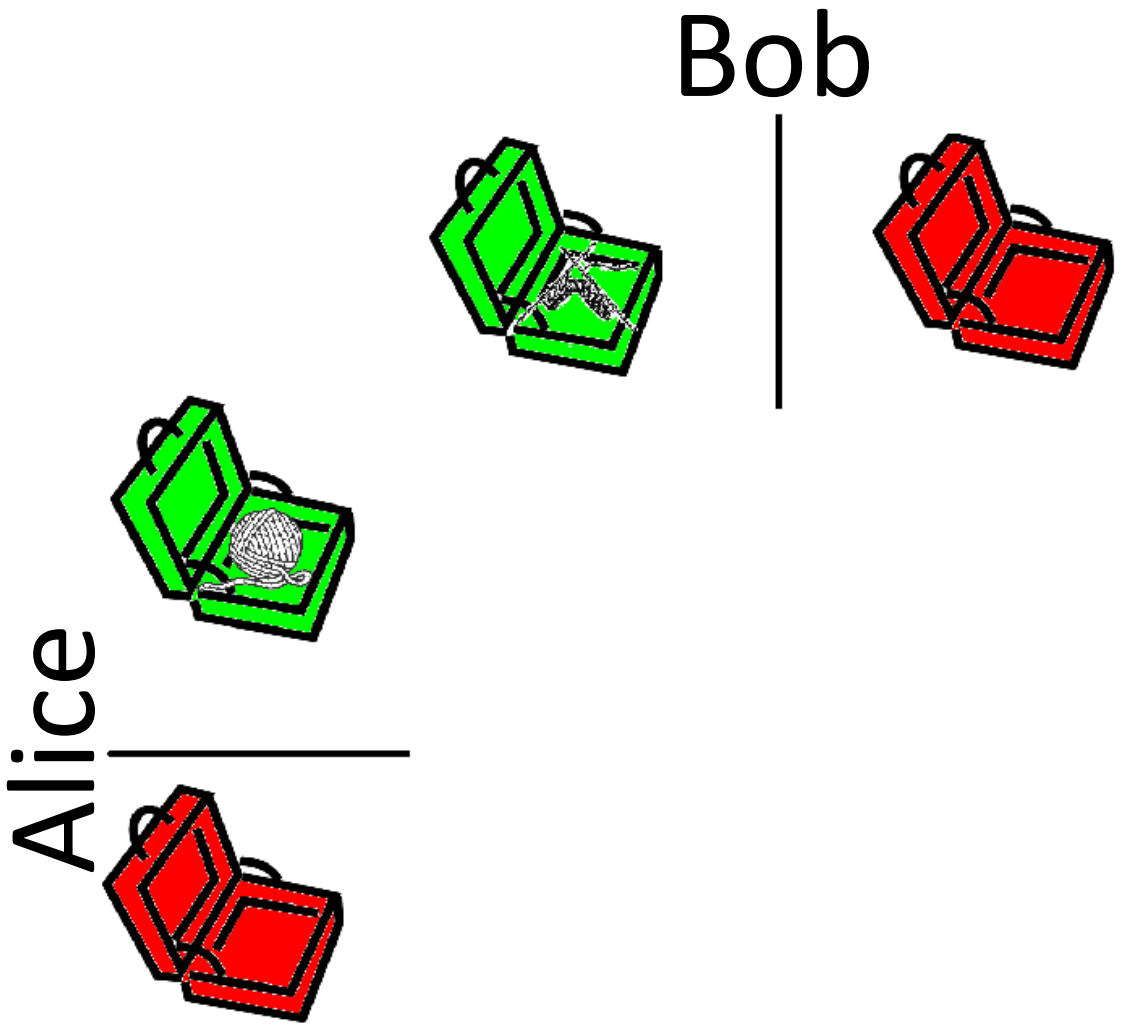


Competitive Environment

Prisoner's dilemma

Bob

b - c

Alice

b

Competitive Environment

Prisoner's dilemma

Bob

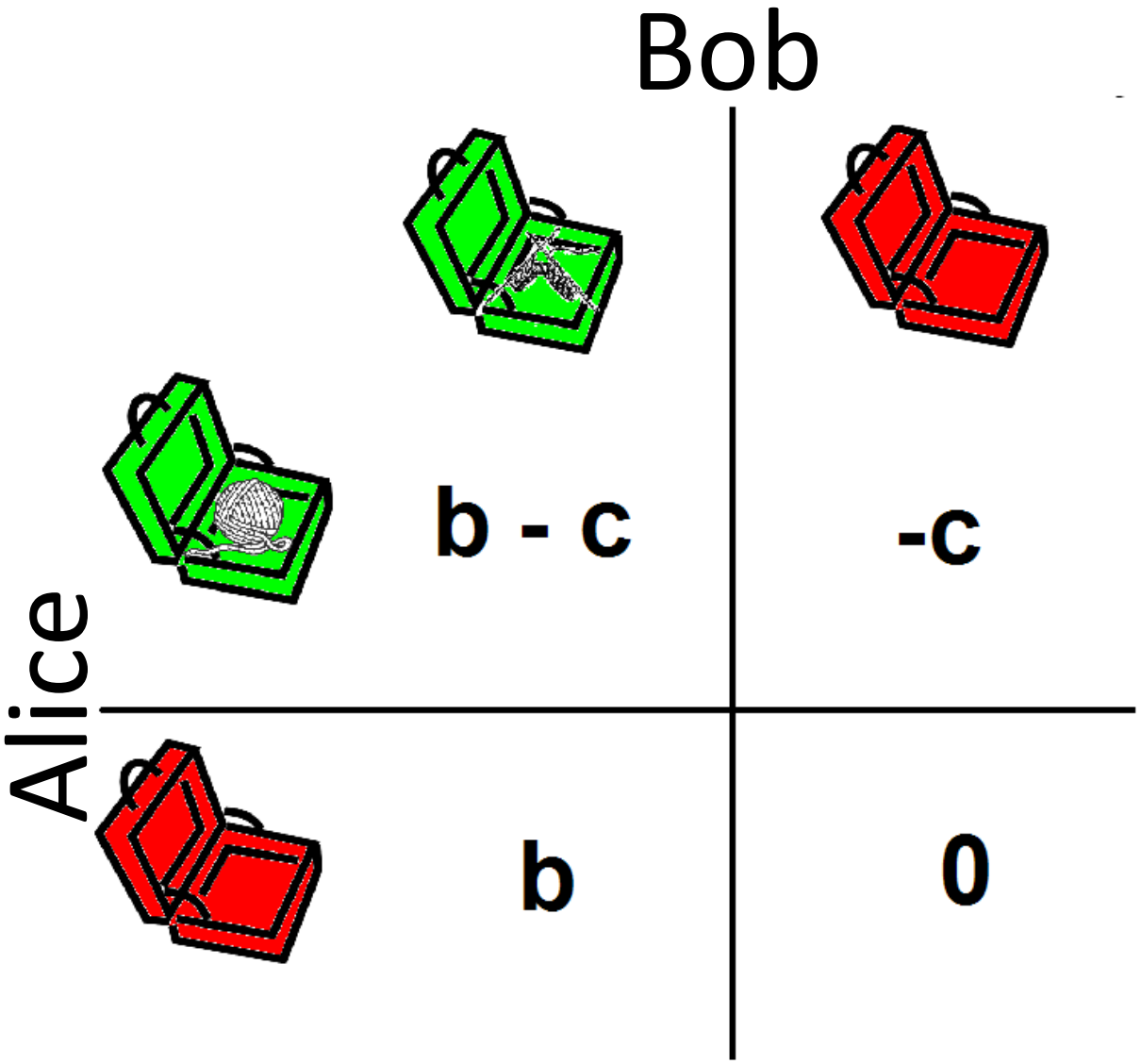
-c

Alice

0

Competitive Environment

Prisoner's dilemma

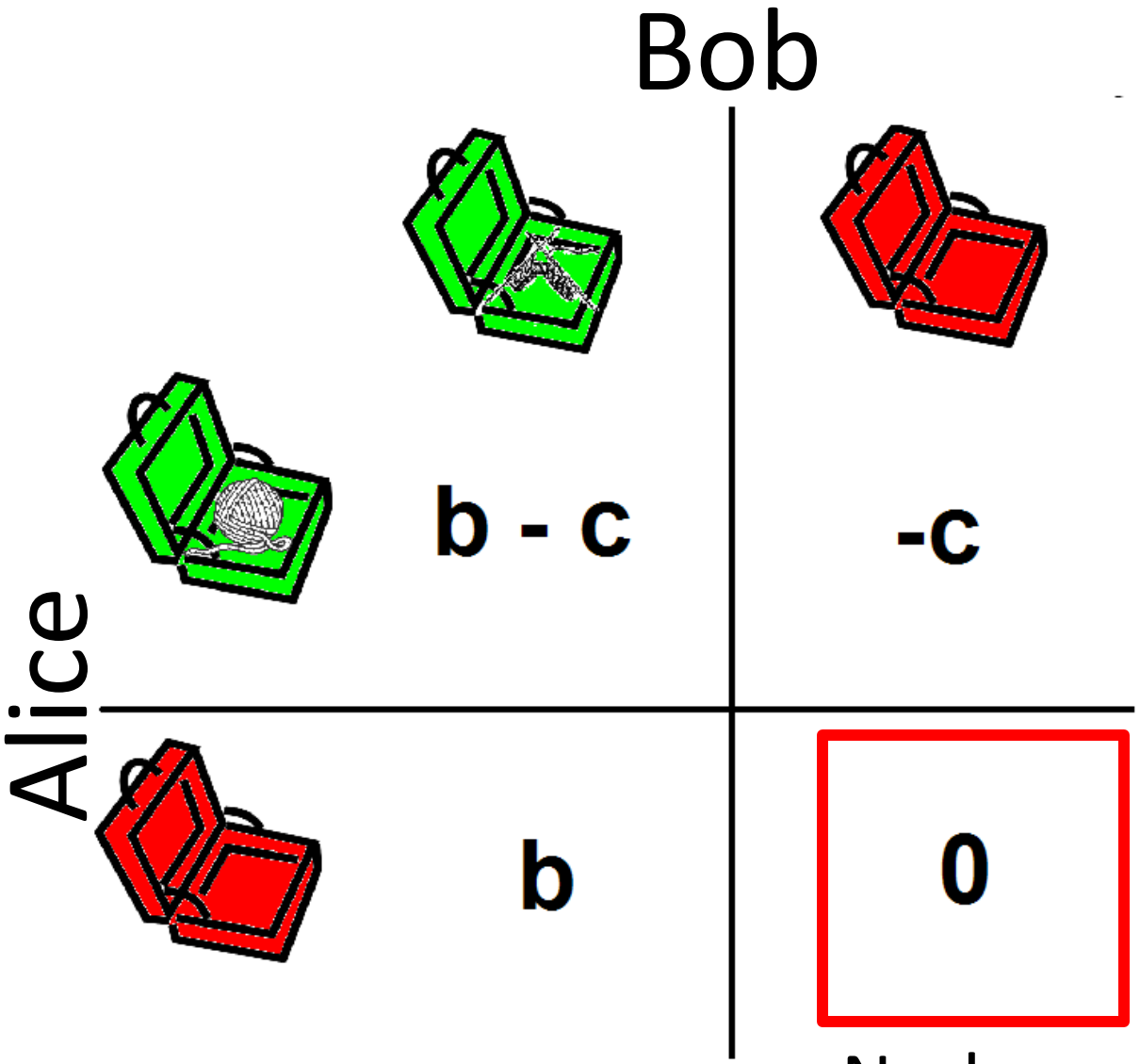


b - benefit of cooperation

c - cost of cooperating

Competitive Environment

Prisoner's dilemma



b - benefit of cooperation

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Nash equilibrium

Competitive Environment

Prisoner's dilemma

Bob

Alice

Pareto optimum

b - c

-c

b

0

Nash equilibrium

b - benefit of cooperation

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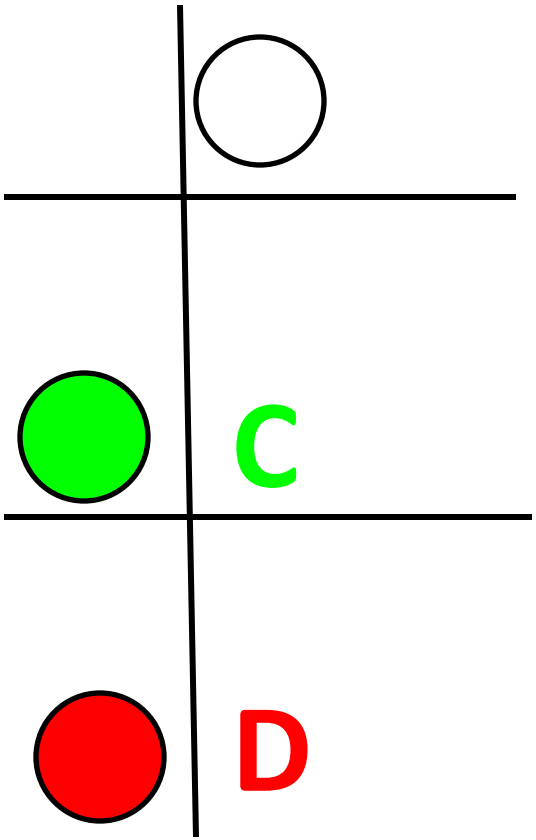
Strategy Space



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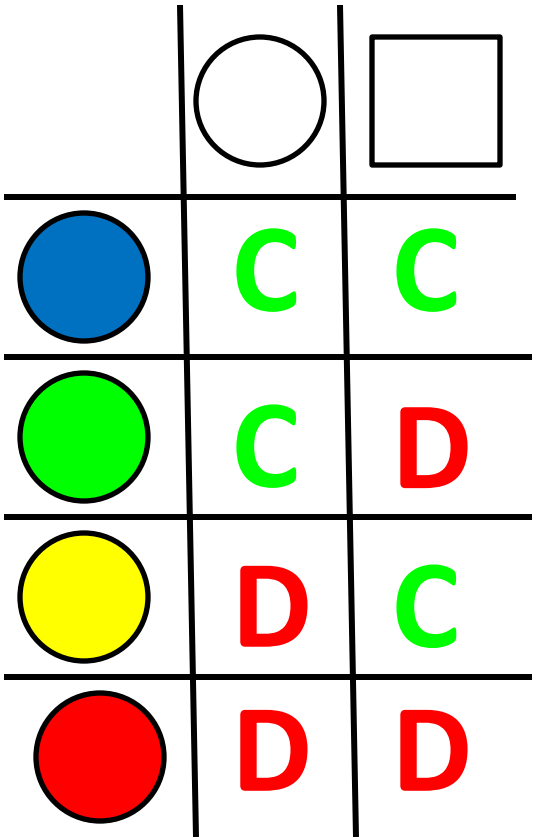

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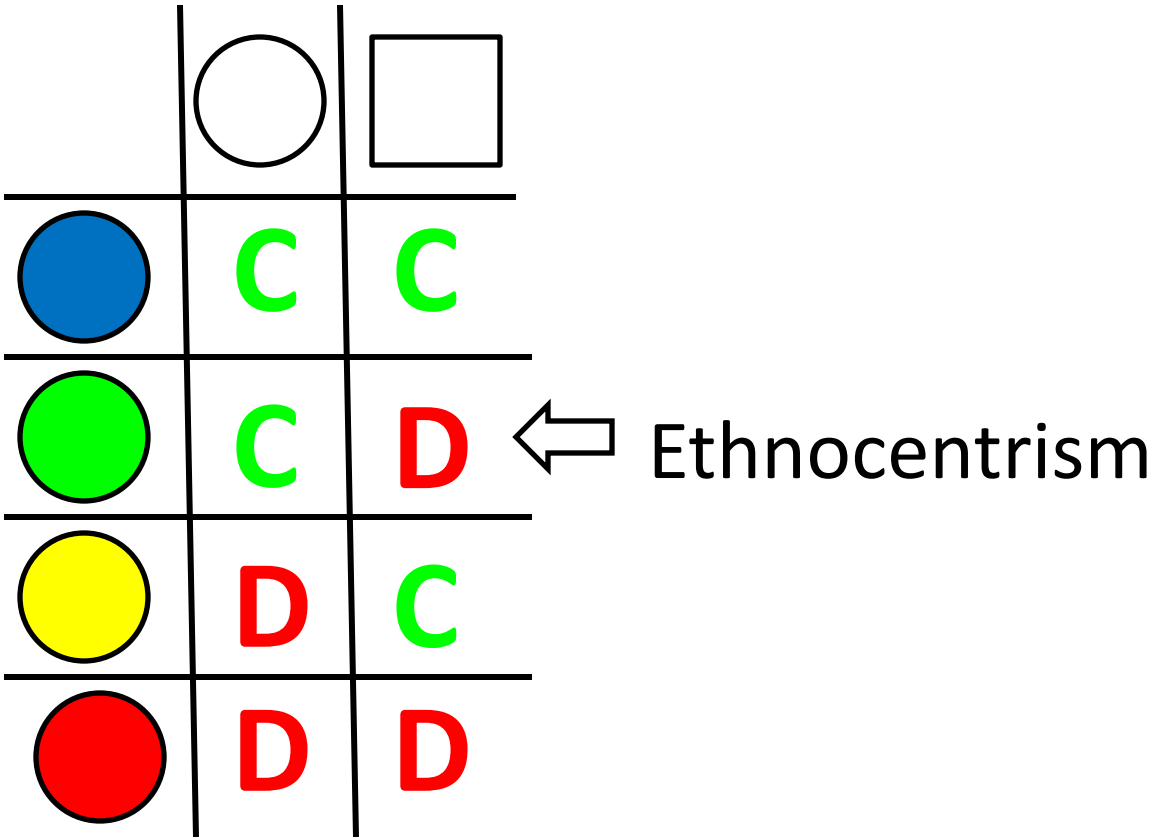
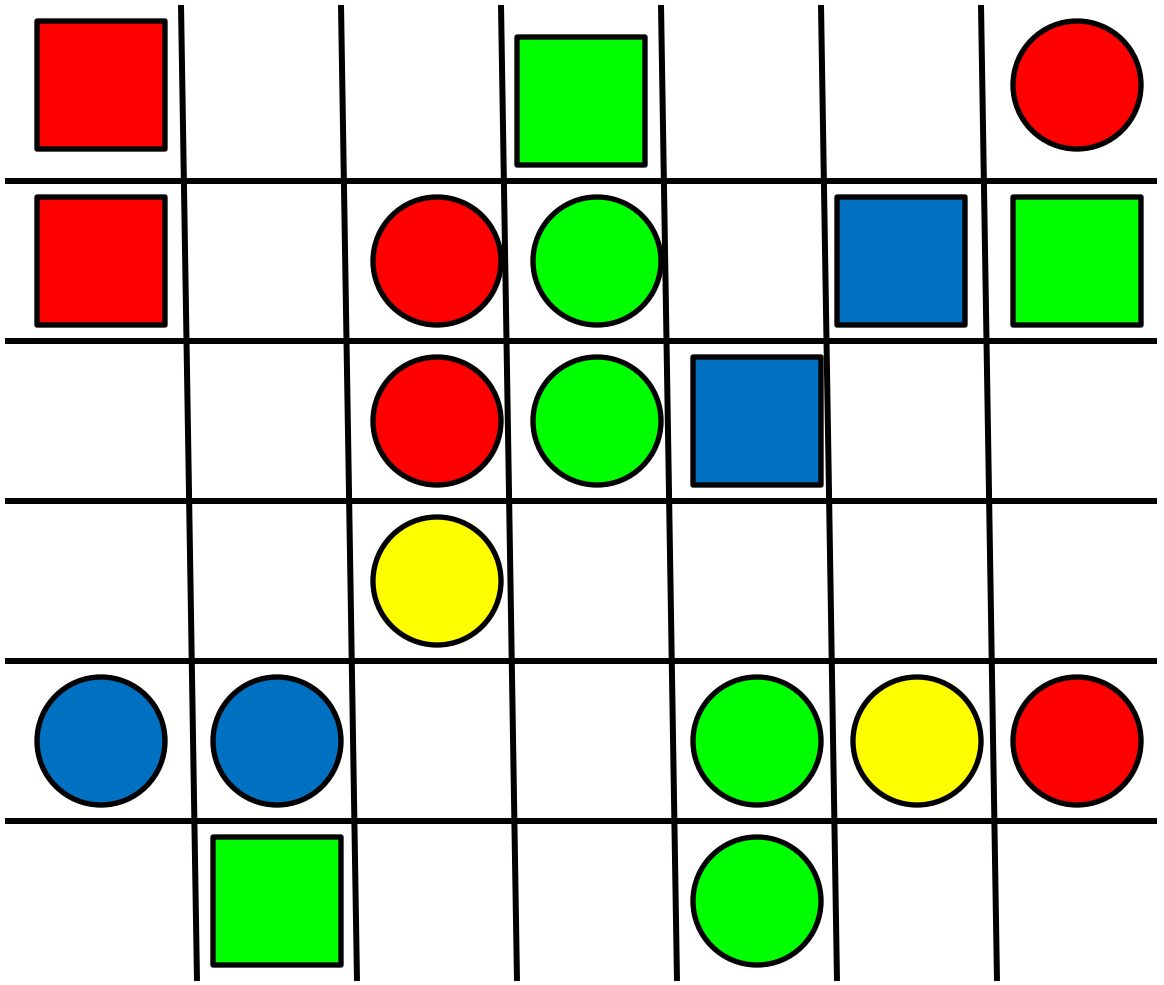
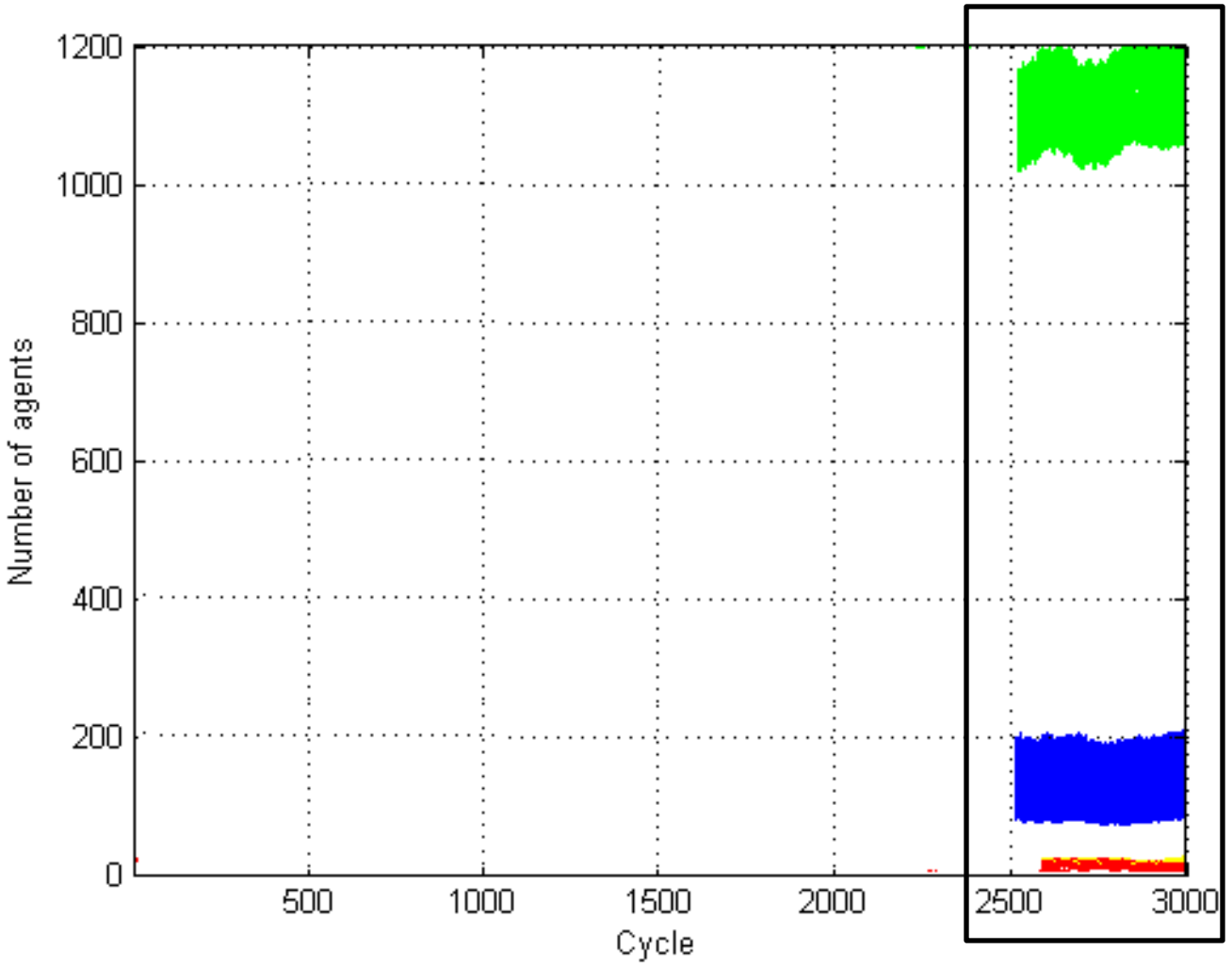


Spatial Model



Previous Results



ptr = 0.1
death = 0.1
b = 0.025
c = 0.01

Hammond & Axelrod (2006)
Journal of Conflict Resolution

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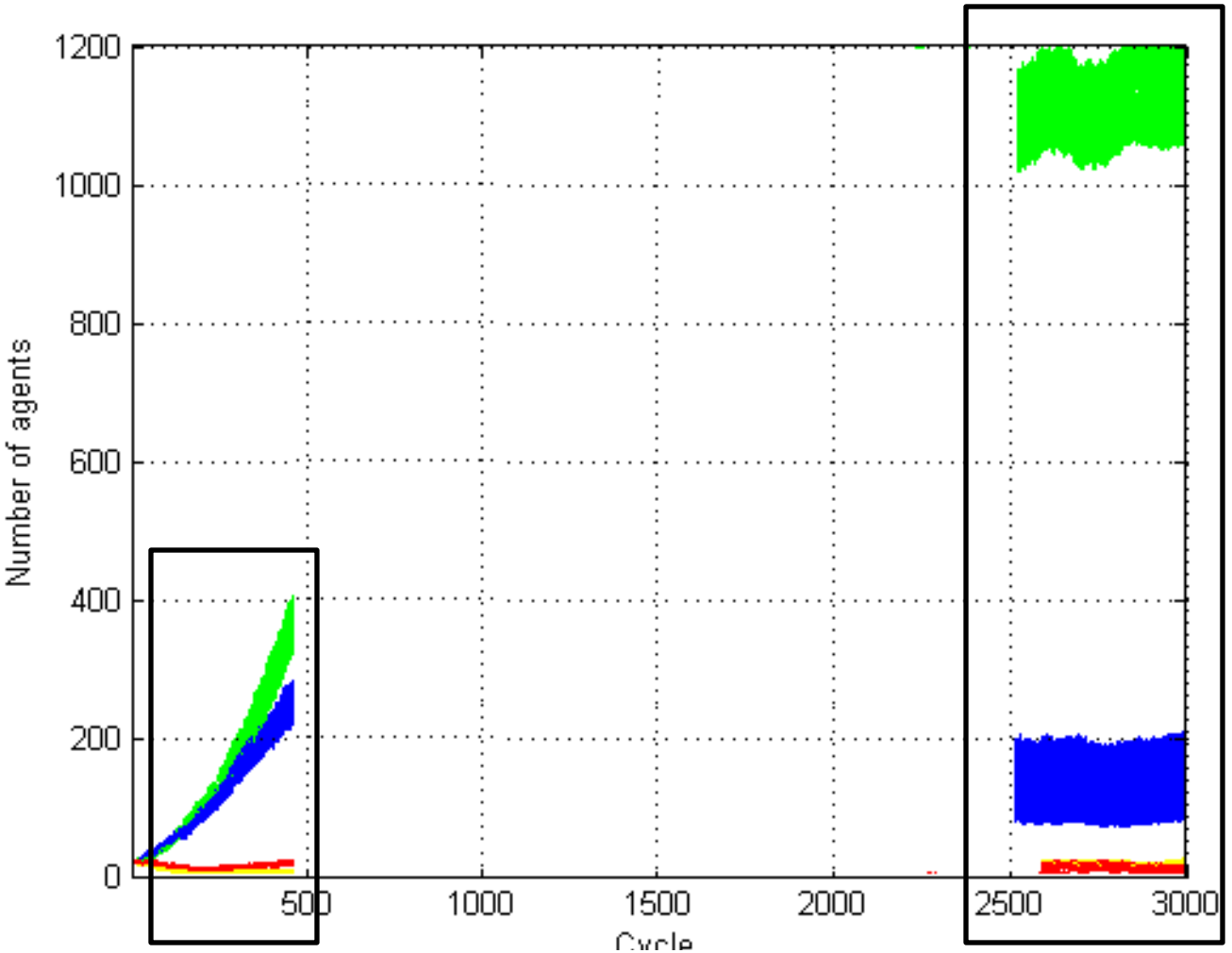

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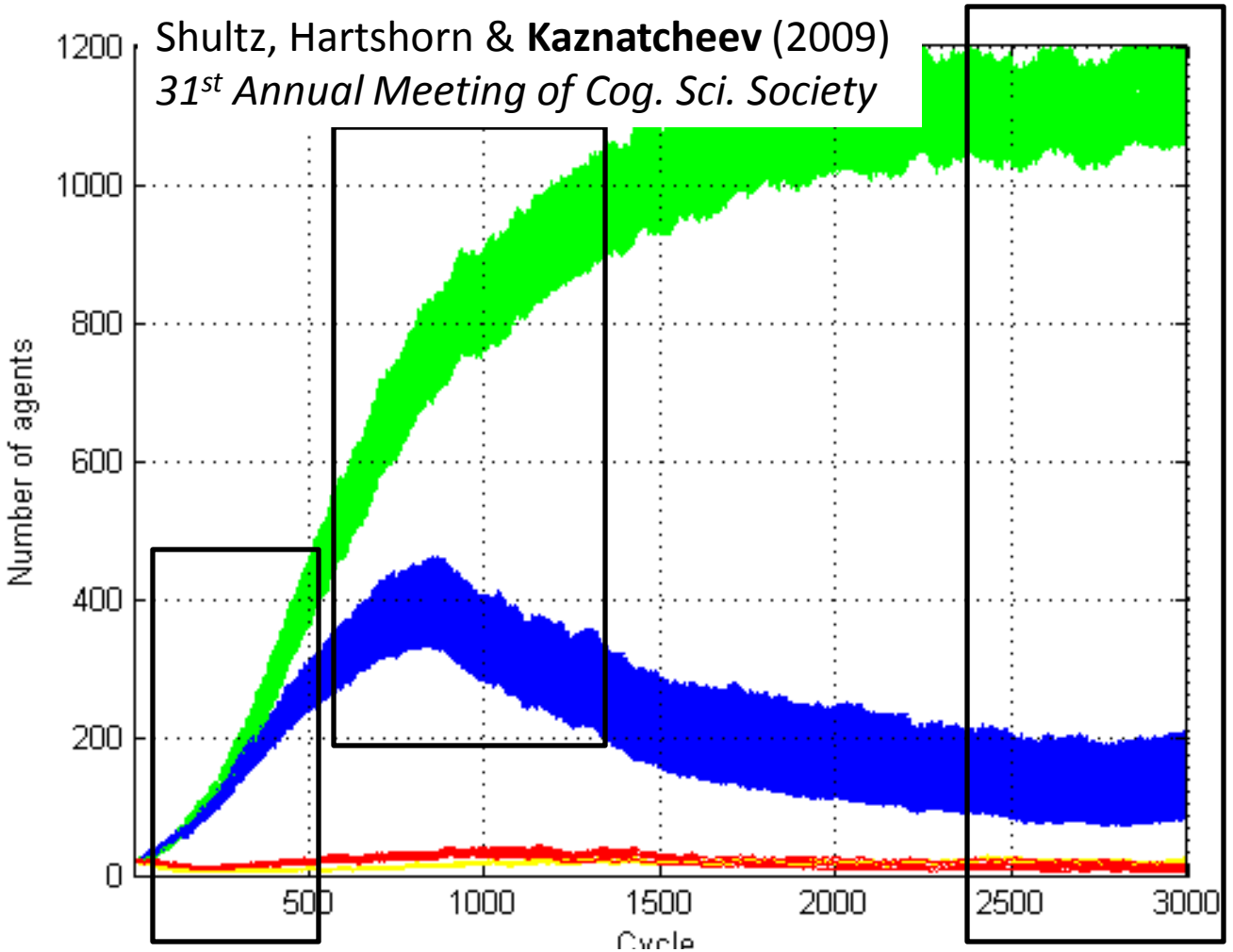

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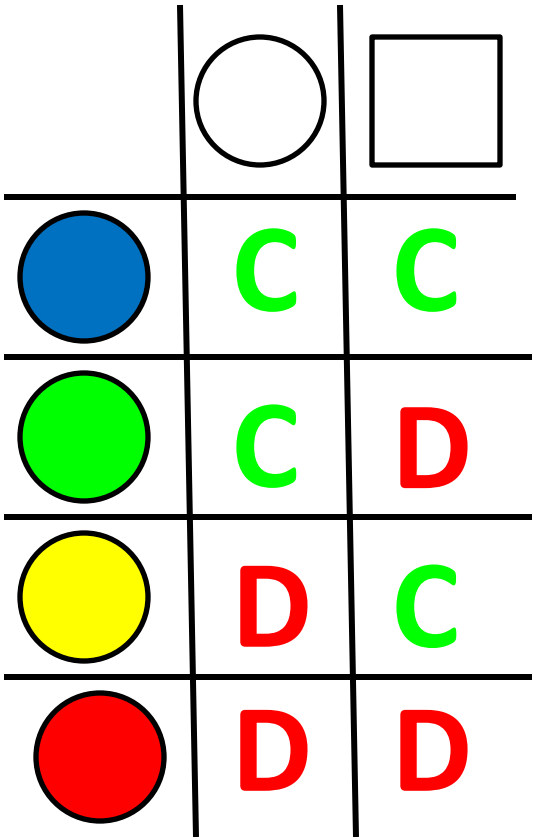
Cognitive Complexity



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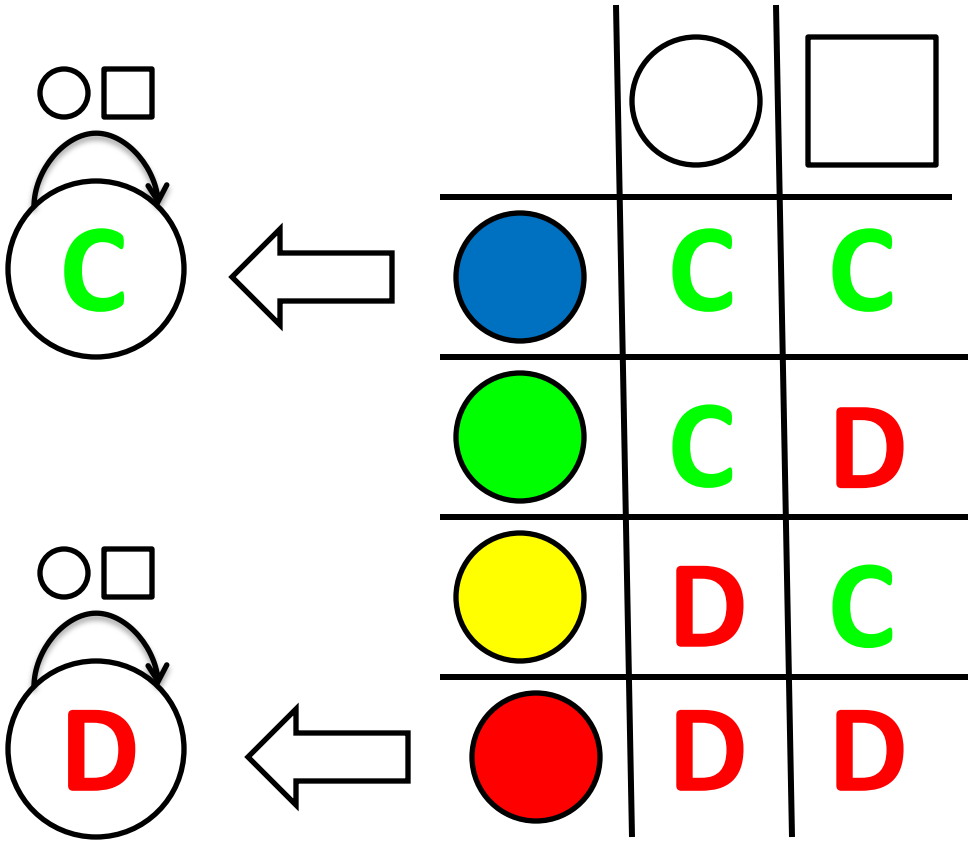

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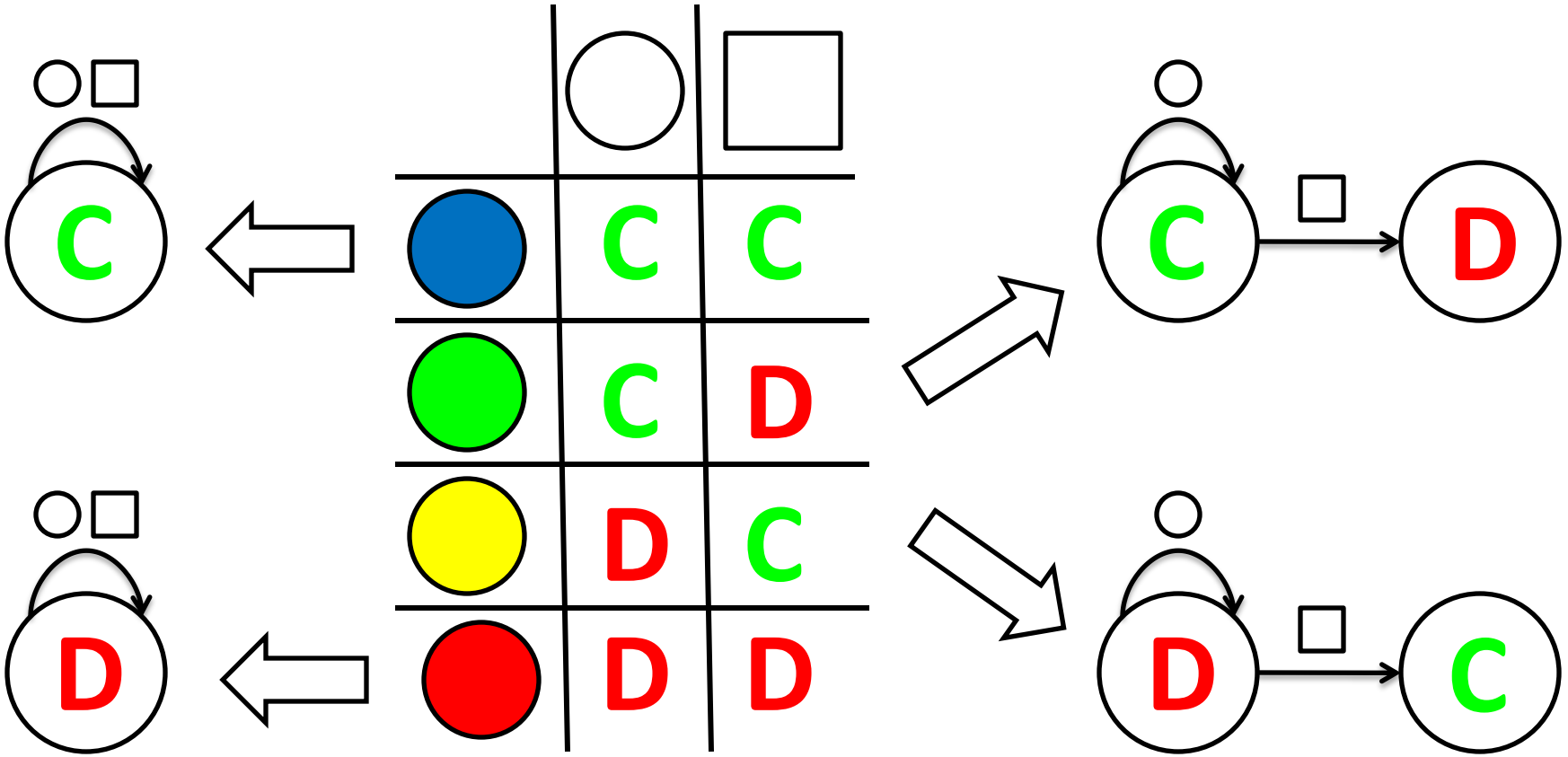
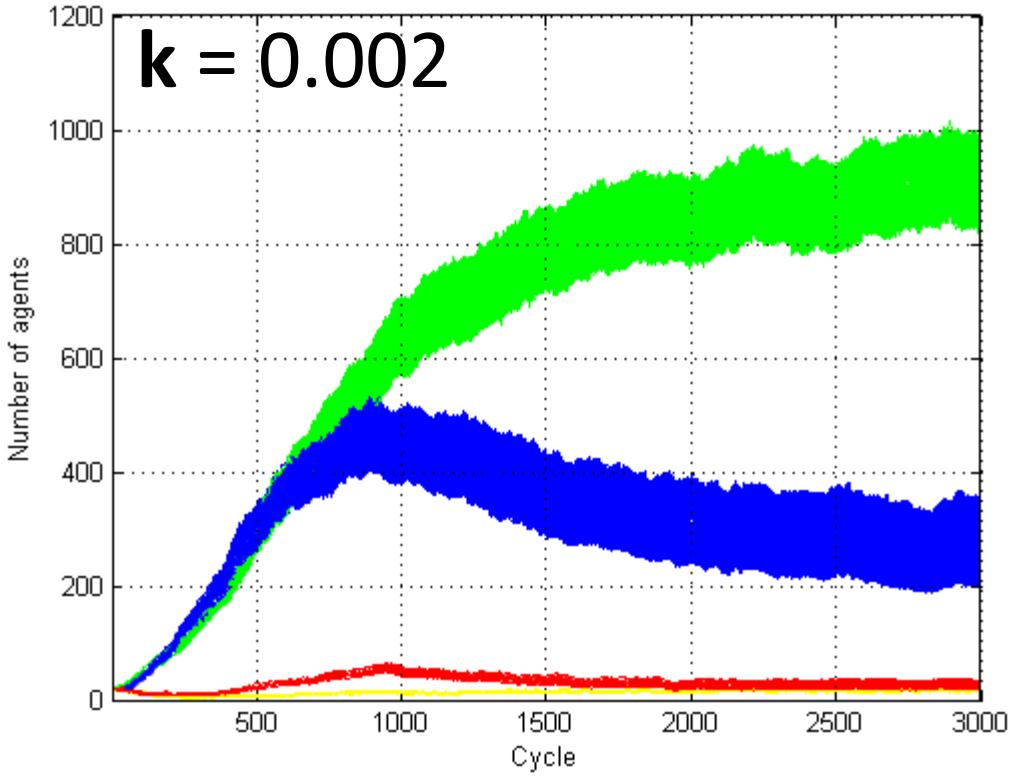


Associate a cost **k** with the extra complexity

Vary **k**



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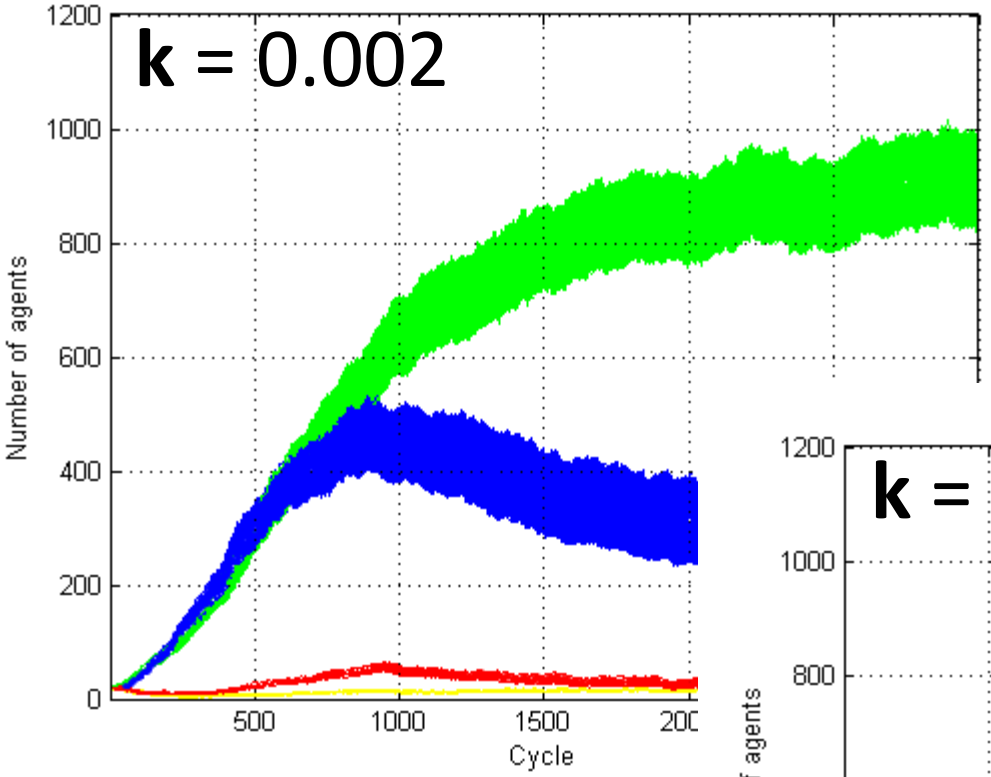

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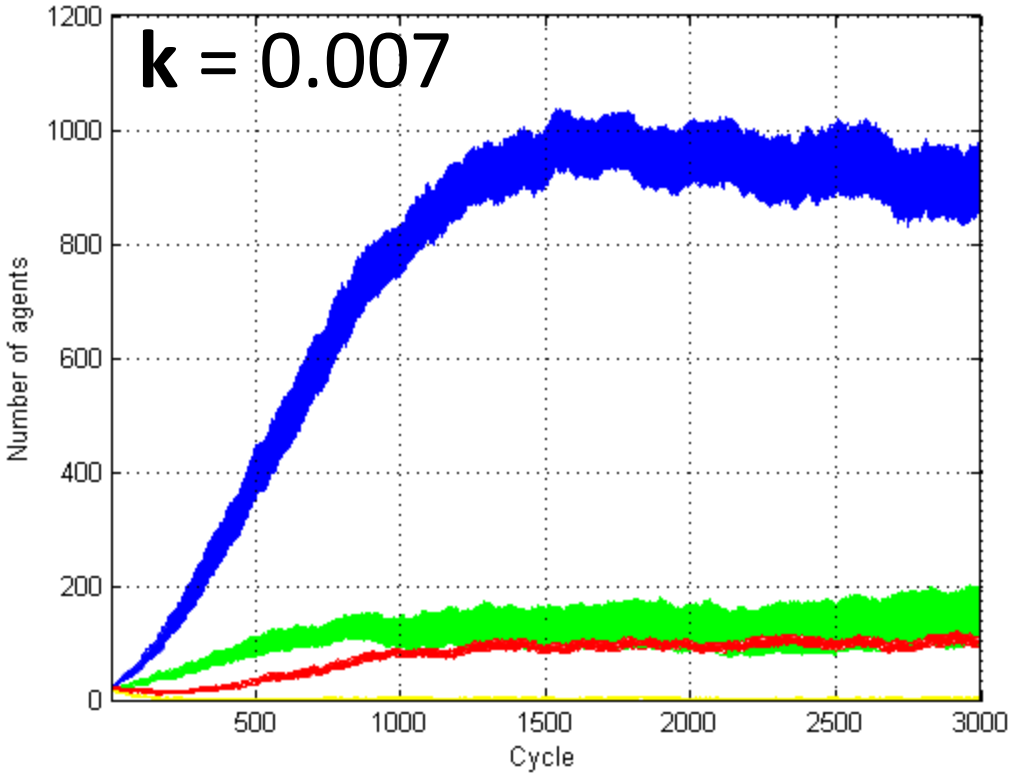
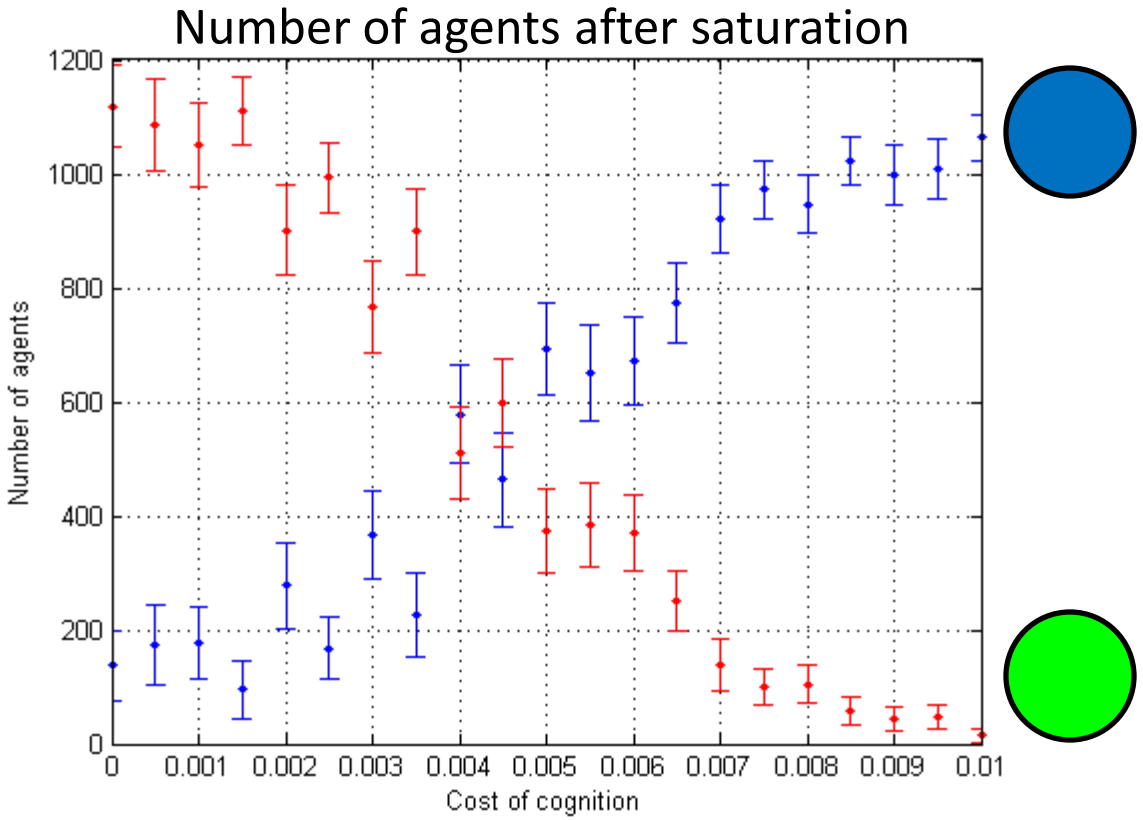


Vary **k**



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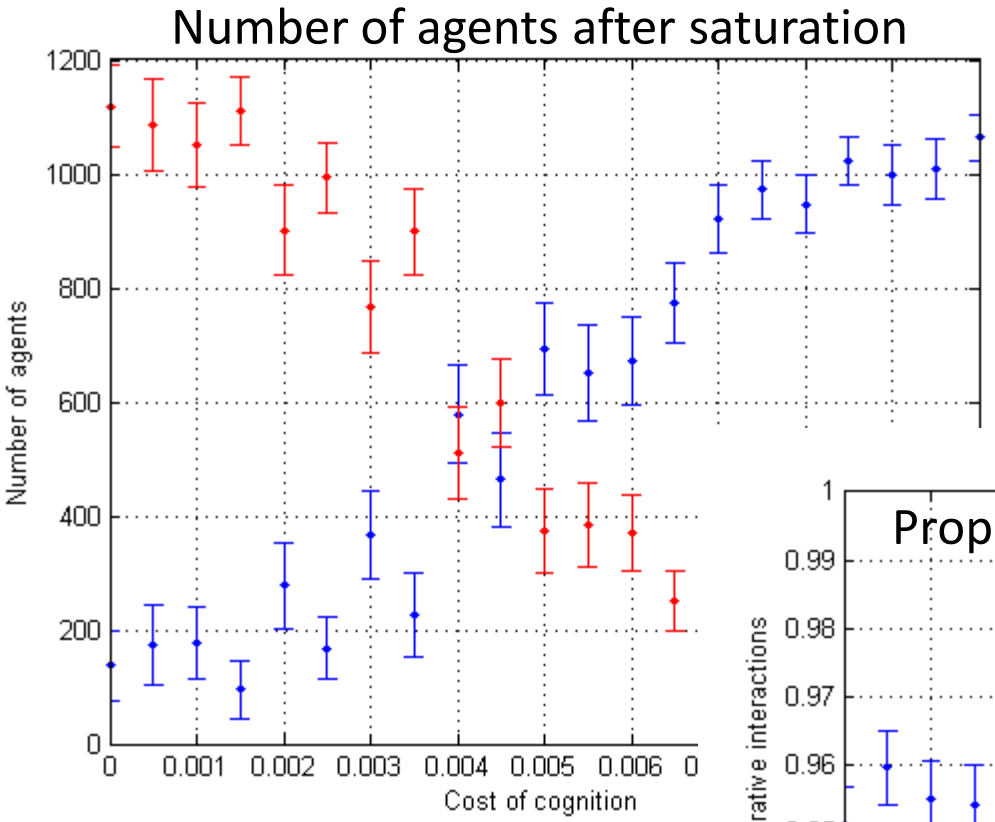

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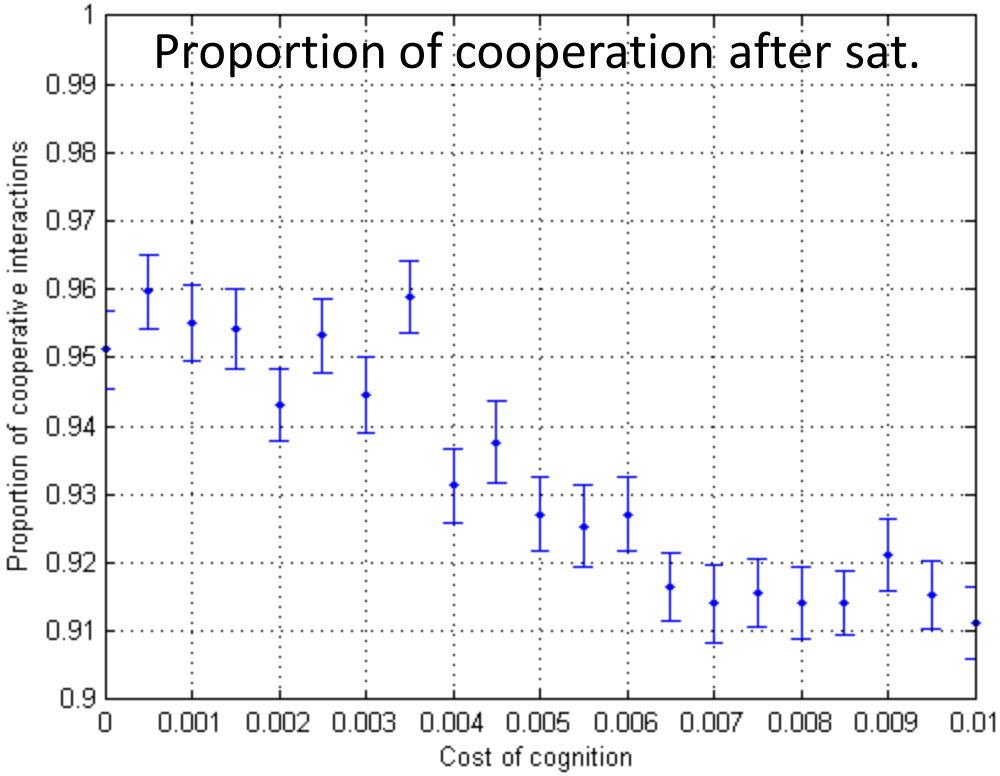
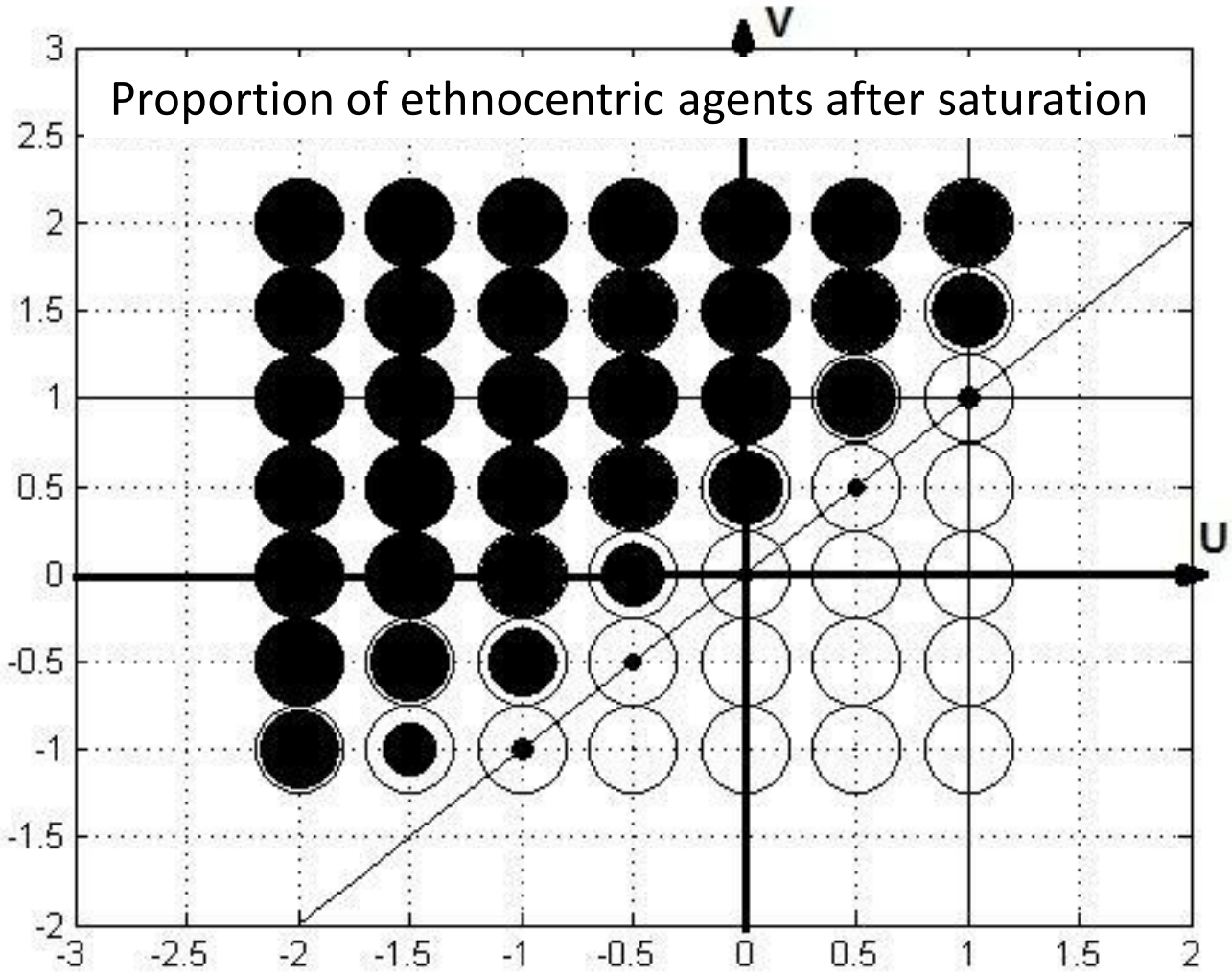


Vary the Game

$$\begin{bmatrix} 1 & U \\ V & 0 \end{bmatrix}$$



Conclusion

- Ethnocentrism evolves in a very simple model
- Low cost of cognition for phase transition suggests ethnocentrism is not robust against cognitive complexity
- Cognitive mechanism must be
  - Really inexpensive, or
  - Be in place already
- Ethnocentrism maintains higher levels of cooperative interactions: should we rethink or biases?
- Ethnocentrism evolves under many games