

Complexity in the 'Sandbox' Classroom

**Explores the teaching goals and in-class activities of my course in
computational modeling for social scientists.**

**Professor Greg Marfleet
Dept. of Political Science**

The Complexity of Politics

Complexity Concepts

- Emergence
- Non-linearity
- Co-evolution
- Self-Organized Criticality
- Scale Invariance
- Fitness and Adaptation
- Perpetual Novelty
- Heterogeneity
- Social Networks

Modeling Concepts

- Models as maps, heuristics or theory
- Dynamic models: States and transition functions
- Equilibrium
- Optimization
- Absorbing states
- Chaos
- Communication and information
- Agent Ontology

Visualization

- Exploring existing models
- Flowchart representation
- Experimenting
- Sharing New Models

Political Science Topics

- Interstate war, Two-level security dilemmas
- Empires: Expansion and Collapse
- Ethnic Secessionism and Civil Conflict
- Insurgency and Asymmetric Conflict
- Norms of Cooperation and Cheating
- Forming and Destroying Social Networks
- Identities and Nationalism
- Voting, Elections and Institutions
- Group Decision Making

Course goal: To introduce students to computational agent-based modeling in political science and use this tool to explore non-linear social phenomenon.

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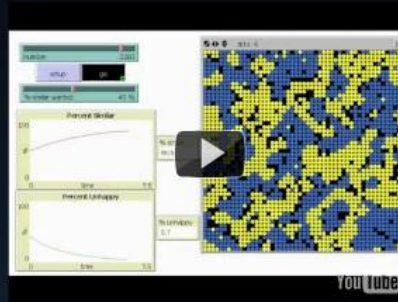
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Political Science Topics

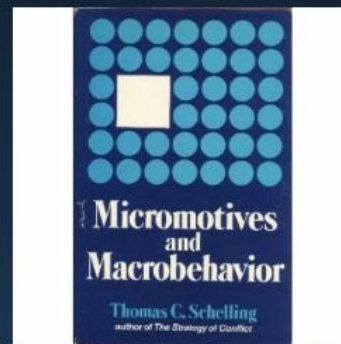
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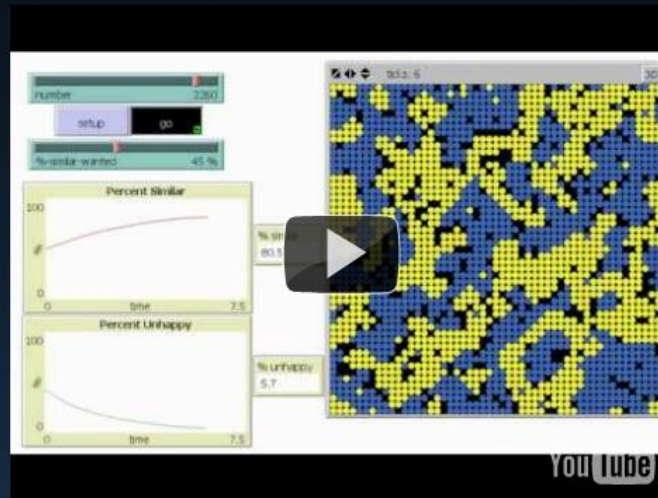
Exploration



Getting familiar with the program
interface while exploring early, classic models

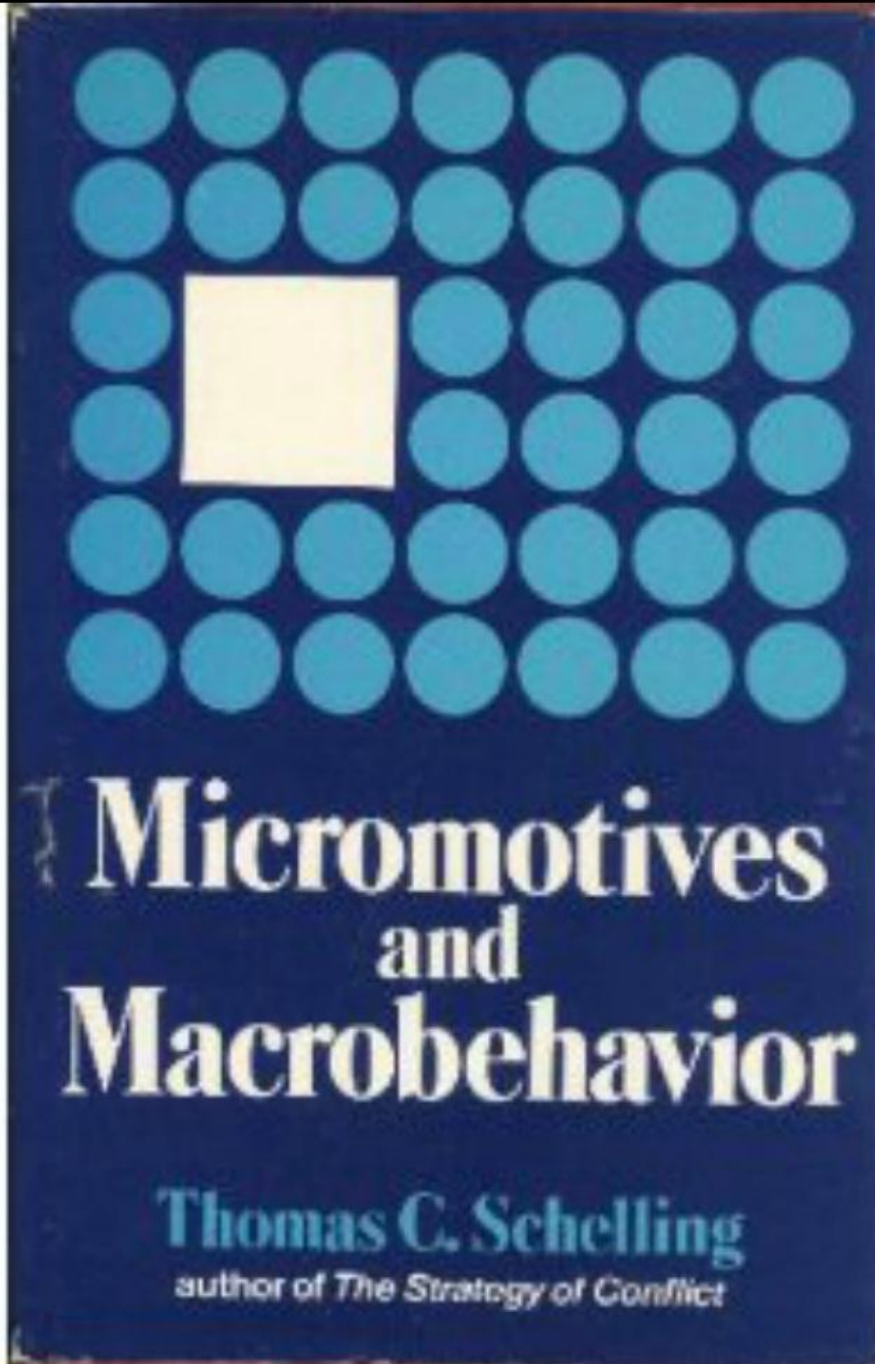


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**Micromotives
and
Macrobehavior**

Thomas C. Schelling
author of *The Strategy of Conflict*

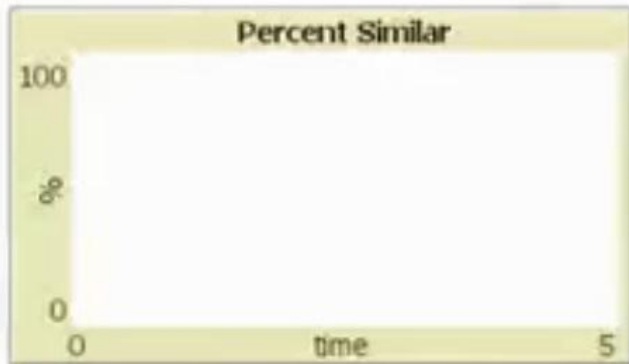


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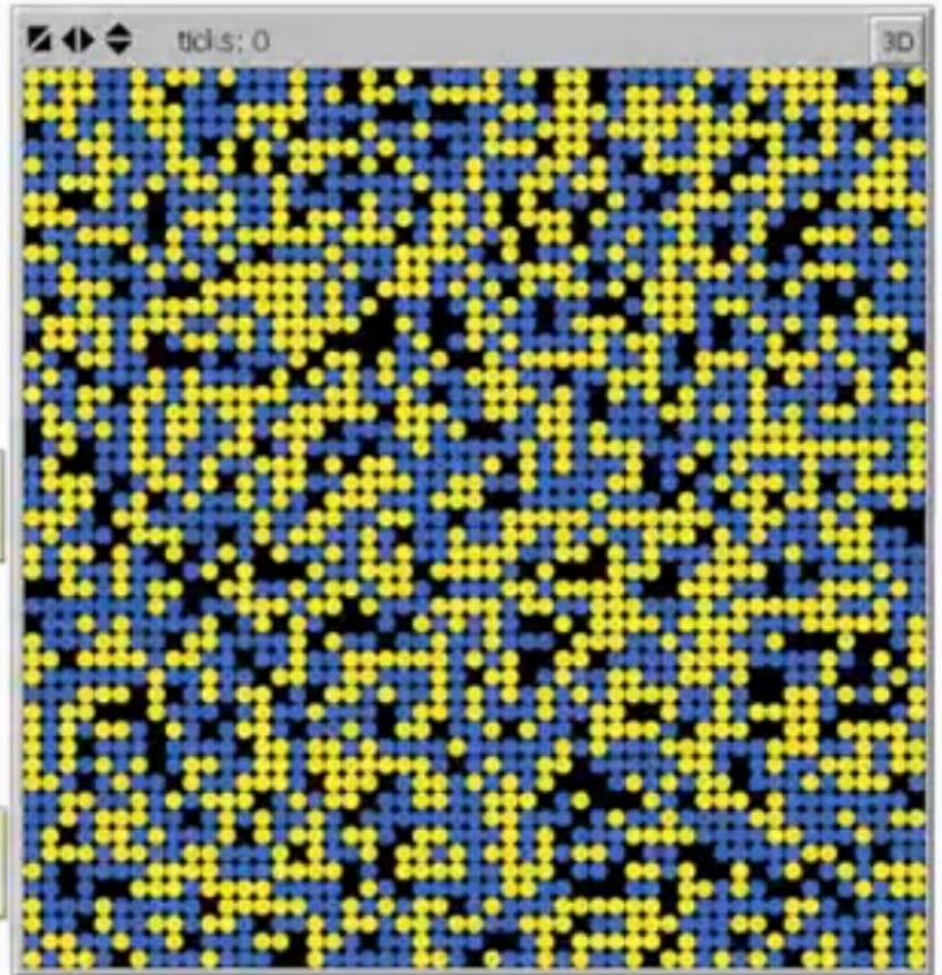
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% similar
49.5



% unhappy
42.2

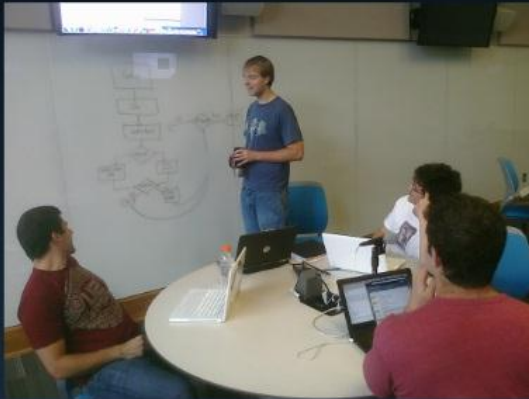









YouTube



More

Collaboration



	An oval is used to indicate the beginning or end of an algorithm.
	A parallelogram indicates the input or output of information.
	A rectangle indicates a computation, with the result of the computation assigned to a variable.
	A diamond indicates a point where a decision is made.
	A hexagon indicates the beginning of the repetition structure.
	A double-lined rectangle is used at a point where a subprogram is used.
	An arrow indicates the direction of flow of the algorithm. Circles with arrows connect the flowchart between pages.

Learning Basic Modeling Skills Via Team Assignments

Collaboration



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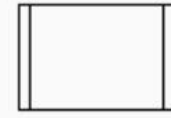
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A double lined rectangle is used where a subprogram is used.



An arrow indicates the direction of flow.
Circles with arrows connect to other symbols.

Learning Basic Modeling Skills Via Team Assignments





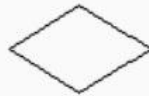
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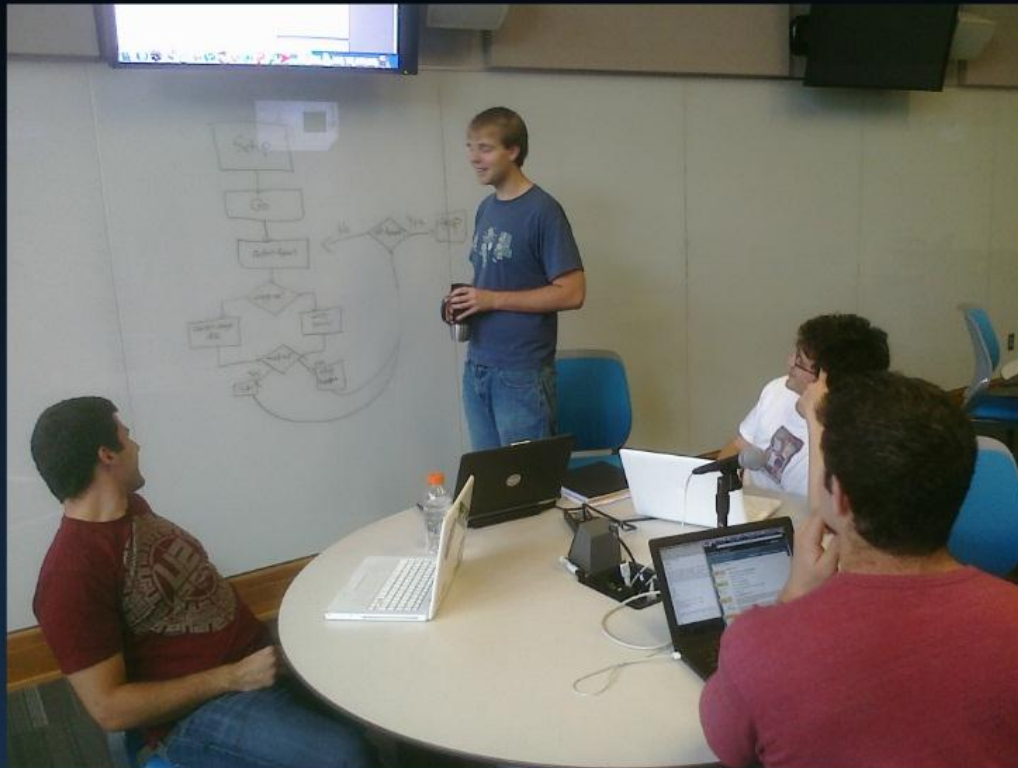
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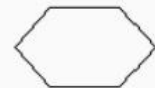
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Learning Basic Modeling



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Experimentation



Investigating
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variables
effects
outcomes



Experimentation



Investigating
how altering
variables



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Investigating
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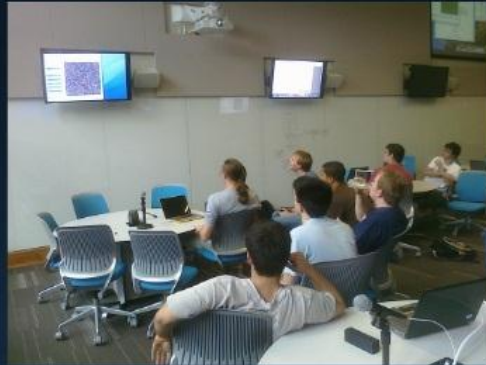
Experimentation



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Presentation



Sharing new
creations and
insights




Presentation



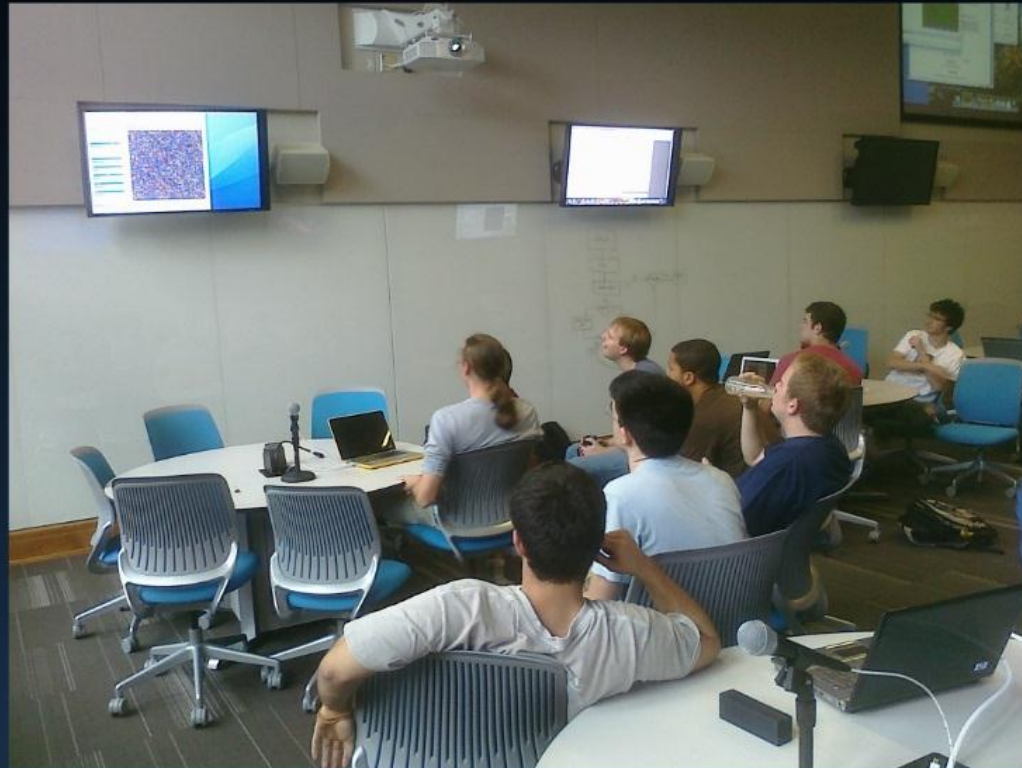
Sharing new



More



Sharing new creations and insights



Sharing
creative
insights



More