Session 5: Morning

Criticisms of ABM
Part I: Criticisms of ABM
  - Ontological
  - Micro Validity
  - Transparency

Part II: Work on tutorial/prototype
Part I: Criticisms
Three Criticisms

1. **Ontology:** Hidden and strong assumptions
2. **Micro Validity:** Agents do not make decisions like actual people
3. **Transparency:** ABMs often are opaque, difficult to replicate
Criticism 1: Ontology

- Complex Adaptive Systems
  - Massively parallel
  - Local decision rules
  - Patterned interdependencies
  - Noisy
  - Adaptation and learning

- Social systems
  - Hierarchical
  - Universal decision rules
  - Interdependencies may or may not exist
  - Noise is minimized
  - Goal is stability, not change
“Social Authority”

- **Definition?**
- **Two elements**
  - Make allocative decisions for actors in the system
    - Weber: monopoly on the use of violence to enforce the law
  - Add or remove actors from the system
    - E.g. “citizenship”
Social Authority

➢ Seeks to **minimize** complexity

➢ “Third order” emergence
  ▶ First: emergent phenomena
  ▶ Second: social actors react to emergence
  ▶ Third: social actors attempts to manage emergence

Social Authority
Seeks to minimize complexity
“Third order” emergence
First: emergent phenomena
Second: social actors react to emergence
Third: social actors attempts to manage emergence
How can one reconcile our understanding of authority with the decentralized decision-making of complex systems?
Agent-based modeling (particularly of social systems) requires “thick assumptions”

- Pepinsky’s criticism
- These assumptions themselves may disguise important theoretical disagreements
Ontological Challenges

- Social systems as “proto” systems
  - Boundaries of membership constantly changing
  - Actors continually negotiate and contest rules
Thick Assumptions

Example 1: who are the relevant actors in a social system?
Thick Assumptions

- Example 2: what are the rules that govern the interaction of units of analysis in a social system?
**Physical vs. Social Systems**

**Physical Systems**
- Fixed systems
- Clear causal pathways
- Deterministic or systematically probabilistic
- Strong assumptions are unproblematic

**Social Systems**
- “Proto” systems
- Recursive processes (agent-structure)
- Contingency from human volition, biases, etc.
- Strong assumptions at the expense of validity, generality
Imagine a bridge . . .
Imagine a bridge . . .

. . . where we weren’t entirely confident predicting how gravity would work

. . . for which cables were present some days, but not others

. . . for which cables could determine which other cables bear loads on a given day
Actor contingency

➤ “Thick” ontological commitments of ABM
  ➤ Agents exist a priori

➤ But social actors have
  ➤ Latent identities, attributes or values that are
    ➤ Context dependent
    ➤ Spatio-temporally dependent
Modeling Social Authority

- ONE: Build it into the model
  - A “super agent”

- Concerns?
  - Cannot tell us about the origins of authority
  - Strong and restrictive assumption
    - Analogous to assumption of linearity in OLS
  - The “drunkard’s search”
Examples of Approach #1

- Vote choice models
- Cederman (1997)
- Earnest (2008)
Modeling Social Authority

- TWO: Allow authority to “emerge” from interactions
- Concerns?
  - Very hard to do
  - The gold standard
Examples of Approach #2

- Axelrod 1997
- Cederman 1997
- Lustick 2000, 2001
- Bhavnani 2003
Criticism 1: Ontology

» Questions?
Criticism 2: Validity

- ABMs model actor decision-making in simplistic and unrealistic ways
  - *Ab initio* distribution of values matters
  - Not valid representations of human agents
Wilson’s Typology

**Benefits**
- Concentrated
- Distributed

**Costs**
- Concentrated
- Distributed

- **Interest-group**
- **Entrepreneurial**

- **Client**
  - **Majoritarian**

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5th am Intro
5th pm NetLogo
7th am Theory
7th pm Modeling
12th am Emergence
12th pm Systems
14th am Design
14th pm Experiments
19th am Criticisms
19th pm Validation
21st am Smart Agents
21st pm Networks
26th Applications
28th Presentations

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Distribution of preferences

- Assumptions about costs and benefits drive emergent behavior
- Results are “built in”
Agent based models are too “simple”

Cognition depends (partly) on interests

- Confirmation bias
- Sunk costs
- Prospect theory
What is the rule?

(2, 4, 6)
Confirmation Bias

Infant mortality (deaths per 1000 live births)

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Confirmation Bias

July 19: AM
Sunk Costs
Prospect Theory

- People overvalue losses relative to gains: “loss aversion”
- People internalize gains quickly: “endowment effect”
- Risk-averse in the domain of gains
- Risk-acceptant in the domain of losses
- Framing effect
Prospect Theory

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Utility

Gains

$U(+x)$

$U(-x)$

$U'(−x)$
Implications

- Decision-rules depend upon
  - Distribution of costs and benefits
  - Framing

- Cognition depends upon
  - Interests
  - Specific payoffs
Why Rational Choice?

- Simple rules for perception
- Simple rules for utility calculations
Recall

» ABM partially inverts the assumptions of rational choice theory

» Yet behavior and interests may interact

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<th>ABM</th>
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<tr>
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<td>Behavior</td>
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Questions?
Criticism 3: Transparency

- Results are “built in”
- Construction lacks protocols, standards
- May be brittle
- Difficult to test
Difficult to Test

- Taber: analytic methods preferable to algorithmic ones
Problem of hidden assumptions

Do we really understand our models?

“I recall one conference panel a few years ago where I was happily informed by the proud parents of a fractal model of something or other that they had ‘no earthly idea’ how their model worked.”

— Taber, p. 24
Criticism 3: Transparency

Questions?
The Challenge

- Does emergence arise endogenously?
- Or does it result from thick ontological assumptions about agents and decision-making?