Introduction to Agent-Based Modeling for Social Scientists

DAY 3

with your host:

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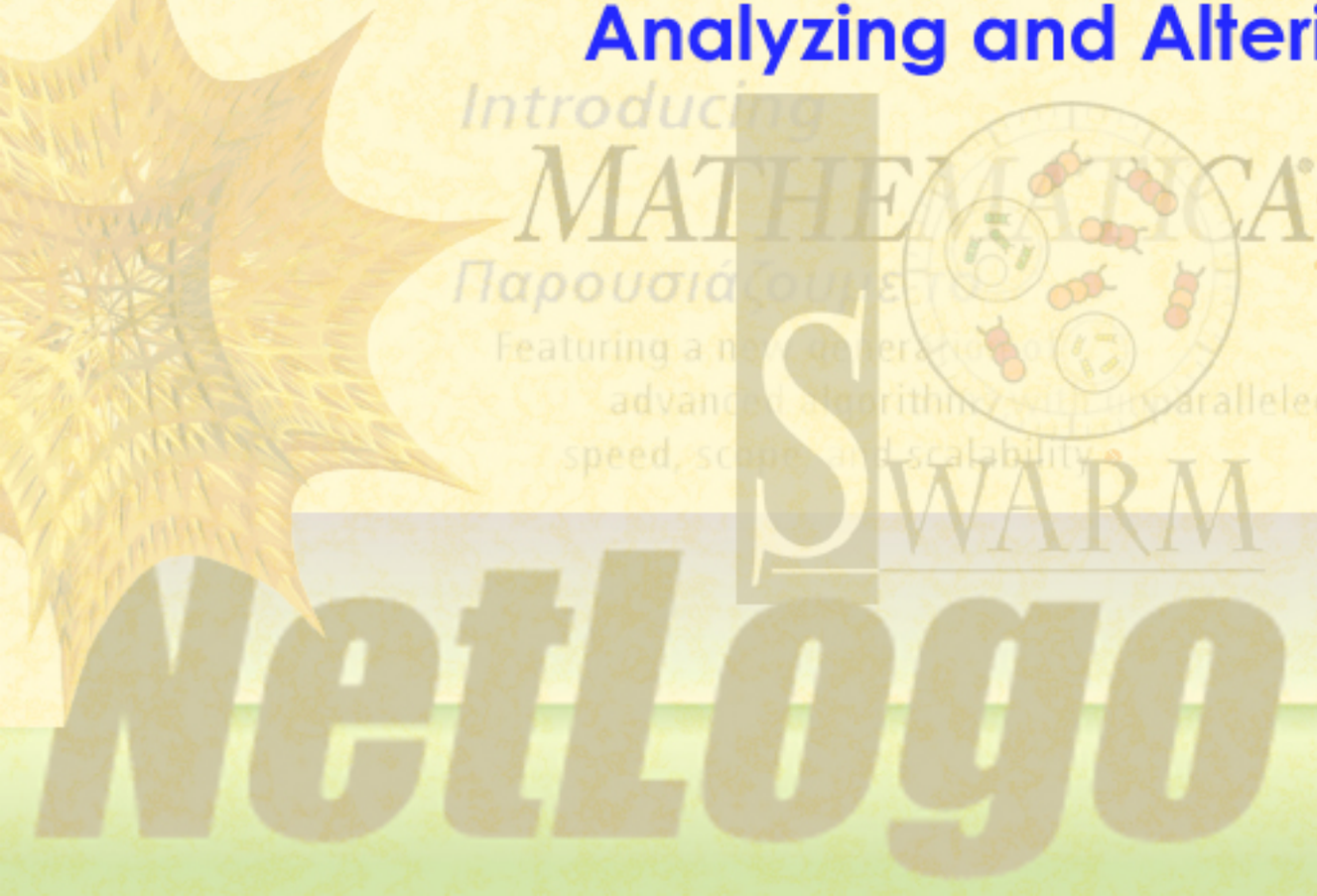
Survey of Agent-Based Modeling Packages

Do It Yourself from Scratch (e.g. C, MatLab, Java, etc.)

Comparison of Swarm, Ascape, NetLogo, & Repast

Getting Down and Dirty Netlogo:
Analyzing and Altering Model Behavior



Survey of Agent-Based Modeling Packages

Do It Yourself from "Scratch"

Using a Language Like C, Java, Python, etc.

- Total Control over Every Aspect
- Must Build Every Aspect Yourself
- Fine if You Don't Need a GUI
- Usually Run Very Fast (Or At Least Much Faster)

Using a Program Like Mathematica, Matlab, etc.

- Not Really Designed for Complicated ABMs
- Some Convenient Measures Are Included
- GUIs Exist but Are Limited
- Very-Fast-Running

Survey of Agent-Based Modeling Packages

Comparison of Swarm, Ascape, NetLogo, & RePast

Swarm

- Written in Objective C, Java Interface Available
- GrandFather of All ABM Packages
- Developed at Santa Fe Institute by Chris Langton
- www.swarm.org/wiki/Main_Page

Survey of Agent-Based Modeling Packages

Comparison of Swarm, Ascape, NetLogo, & RePast

Ascape

- Based on Java
- Used for Sugarscape and other Axtell/Epstein Models
- Developed at Brookings Institute
- www.brook.edu/es/dynamics/models/ascape/default.htm

Survey of Agent-Based Modeling Packages

Comparison of Swarm, Ascape, NetLogo, & RePast

NetLogo

- Based on Java, Extended from StarLogo
- Focused on Pedagogy, Especially High School
- Developed at Northwestern University
- ccl.northwestern.edu/netlogo/

Survey of Agent-Based Modeling Packages

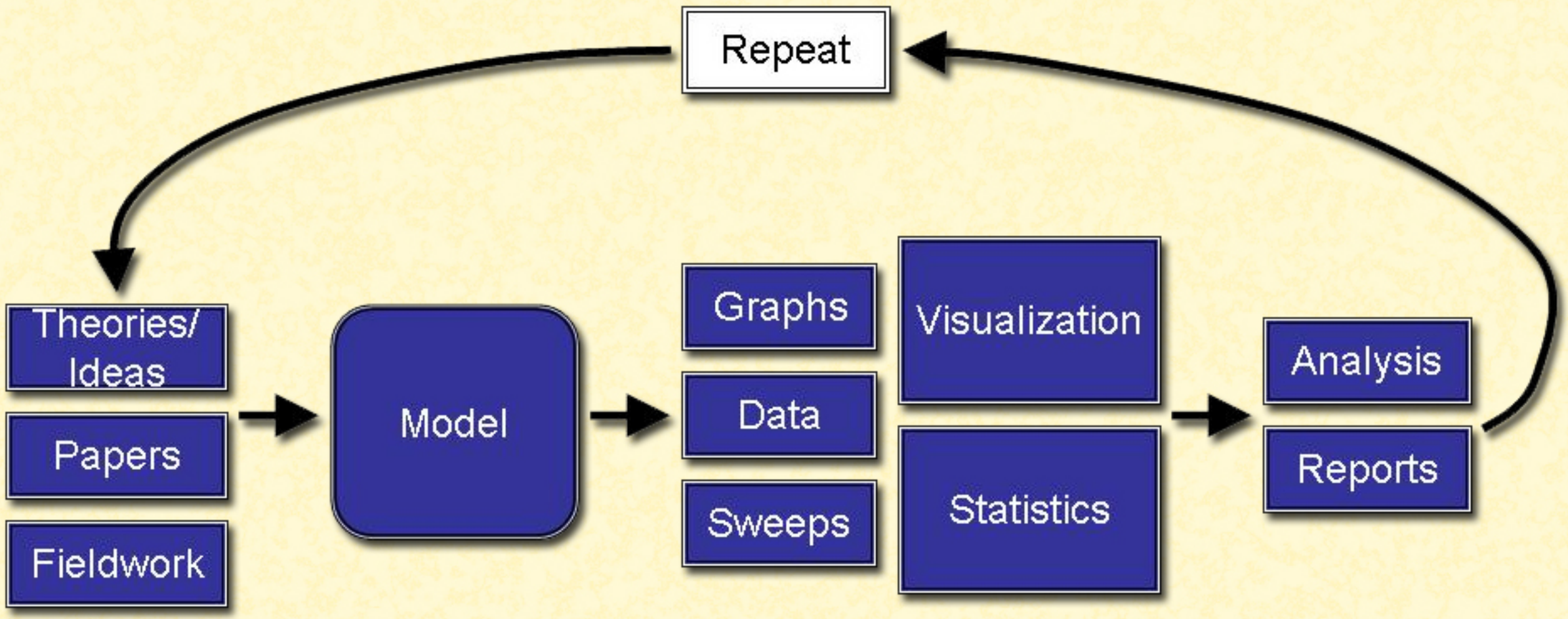
Comparison of Swarm, Ascape, NetLogo, & RePast

RePast (Recursive Porous Agent Simulation Toolkit)

- Based on Java, Also in Python and .NET
- Most Extensive Development Platform
- Developed at University of Chicago
- repast.sourceforge.net/

The Modeling Process

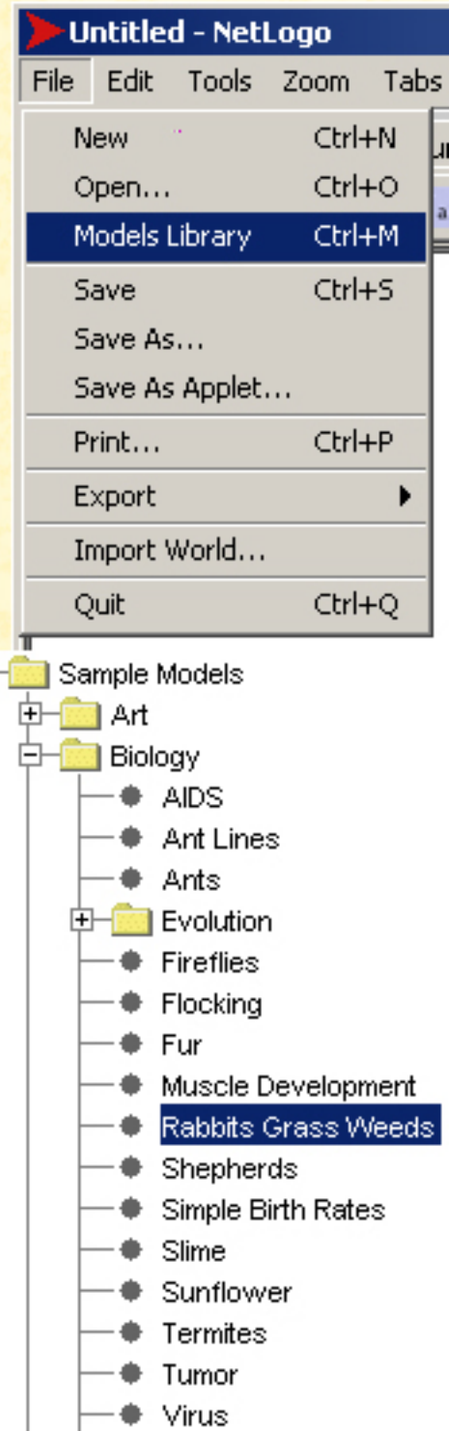
- Use Baby Steps in an Iterated Process
- Exploratory Models are often Built for Revision
- "Lemma Models" Might Change Larger Goal



Hands-On Modeling Examples

Opening and Running a Model in NetLogo

- If You Have an .nlogo File, Just Double-Click It
- Go to the File Menu, Click "Models Library"
- Search through the Models *and* Code Examples
- Double-Click One or Select It and Click "Open"



Running a NetLogo Applet

- Click the Link to a NetLogo Applet
- Wait for the Java Run Time Environment to Load
- Rejoice if it Works

Hands-On Modeling Examples

Identify Characteristics of Rabbit Grass Weeds

- What Type(s) of Models? CA, Free Agents, Network, Hybrid
- What Kinds of Agents Are there?
- Any Agent-Agent Interaction? Describe.
- Any Agent-World Interaction? Describe.
- Bounded or Toroidal World? Does the World Hold Values?
- What Are the Parameters? Any Hidden Parameters?
- What Does the Model Report?
- How Does Changing the Parameters Effect Model Behavior?
- How Does It Effect Model Performance?
- What Else Could You Use this Model for (in Whole or Part)?

Hands-On Modeling Examples

Adjust Parameters to Achieve Cooperative Outcome

- How do the Parameters Effect Agent Behavior?
- How do the Parameters Effect World Behavior?
- Are there Long Term/Short-Term Trade Offs?
- What Set(s) of Parameters Yield the Cooperative Outcome?
- Would Looking at the Code Make this Easier?