

Introduction to Agent-Based Modeling for Social Scientists

Day 4

with your host:

Aaron Bramson

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)?

Getting Started with NetLogo

Phenomenal Changes in Voting Behavior

- 1) Open the Voting Model from the Model Library.
- 2) Setup with 'change-vote-if-tied' and 'award-close-calls-to-losers' off.
- 3) Run 'go' until it settles down.
- 4) Switch 'change-vote-if-tied' on...what happens?
- 5) Switch 'award-close-calls-to-losers' on... holy cow!!!
- 6) Run 'setup' and 'go' again (with both on).
How is it different?
- 7) Look, we have a model of voter-behavior path dependence from institutional change!!!!

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?



Getting Started with NetLogo

Elements of the Interface

MODEL TIME

PERSPECTIVE

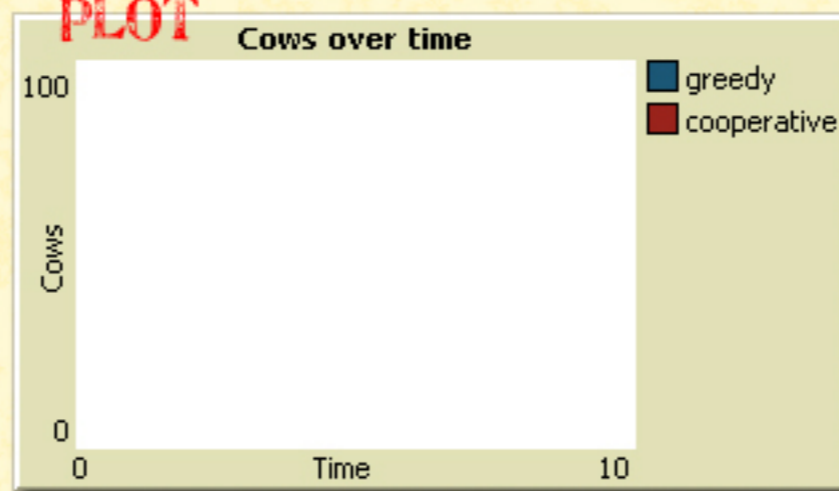
VIEWING SPEED

CHANGE WORLD SIZE

The toolbar contains several controls: 'Edit', 'Delete', 'Add', a 'Monitor' dropdown menu, a 'view updates' checkbox, a 'normal speed' slider, a 'view updates' dropdown menu set to 'on ticks', and a 'Settings...' button. Annotations with red lines point to the 'ticks: 0' display and the '3D' perspective button.

WORLD/VIEW SETTINGS

PLOT

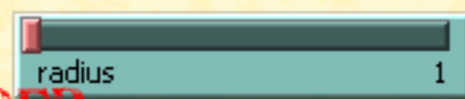


BUTTONS

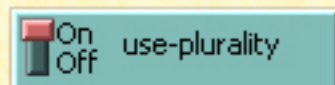


ONCE FOREVER

SLIDER



SWITCH



A dropdown menu titled "connection-rule" with options: "give-to-friends", "take-from-friends", and "switch-with-friends".

CHOOSE

MONITOR

A monitor box displaying "total population" with the value 81.

ADJUST SCREEN SIZE & RESOLUTION

The "Model Settings" dialog box. The "World" tab is active, showing a 2D coordinate system with origin (0,0) and corners at (-10,10), (10,10), (-10,-10), and (10,-10). The "View" tab is also visible, showing "Patch size" (15) and "Font size" (10). The "Tick counter" section has "Show tick counter" checked and "Tick counter label" set to "ticks".

TOGGLE TURTLE SHAPES

Getting Started with NetLogo

Elements of the Interface

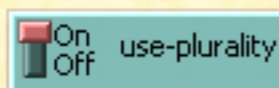
BUTTONS



ONCE

FOREVER

SLIDER

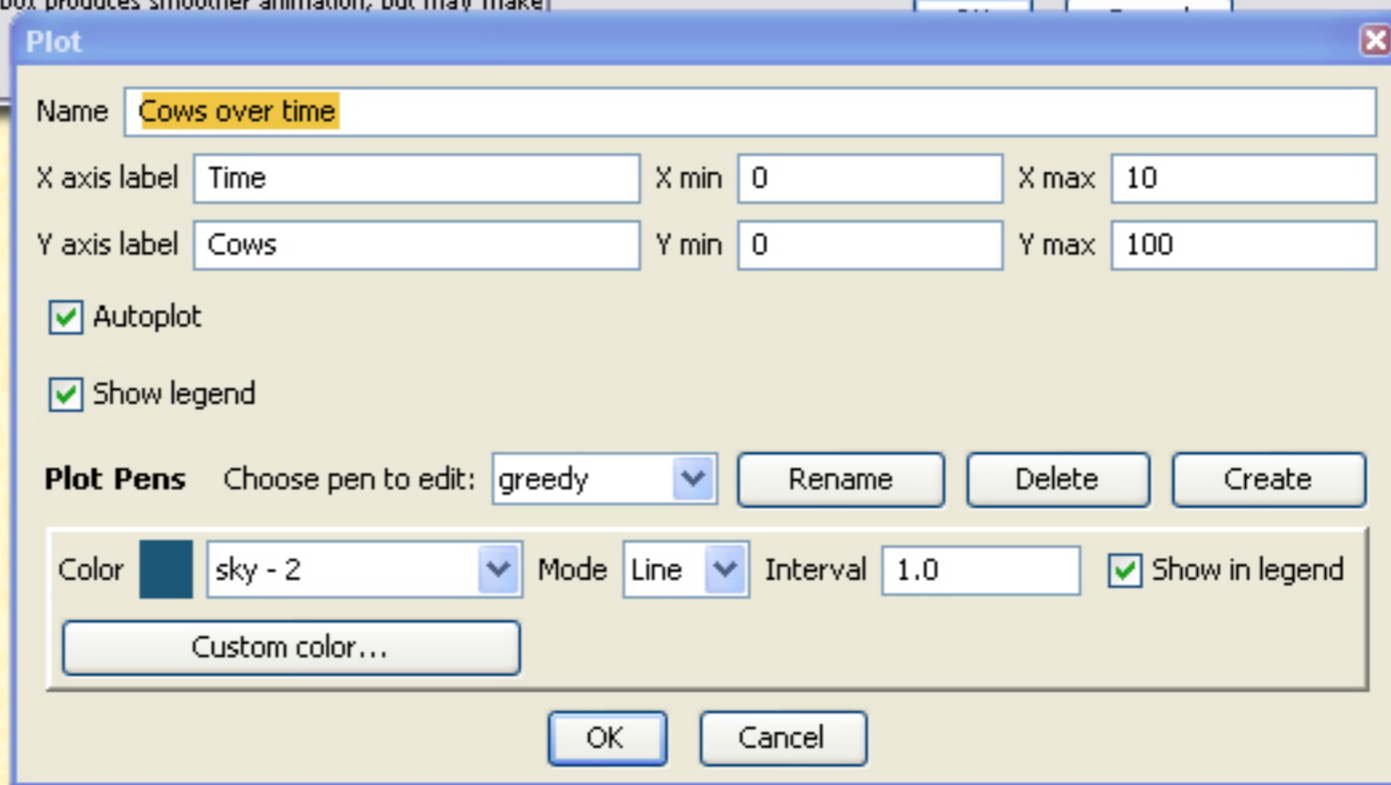
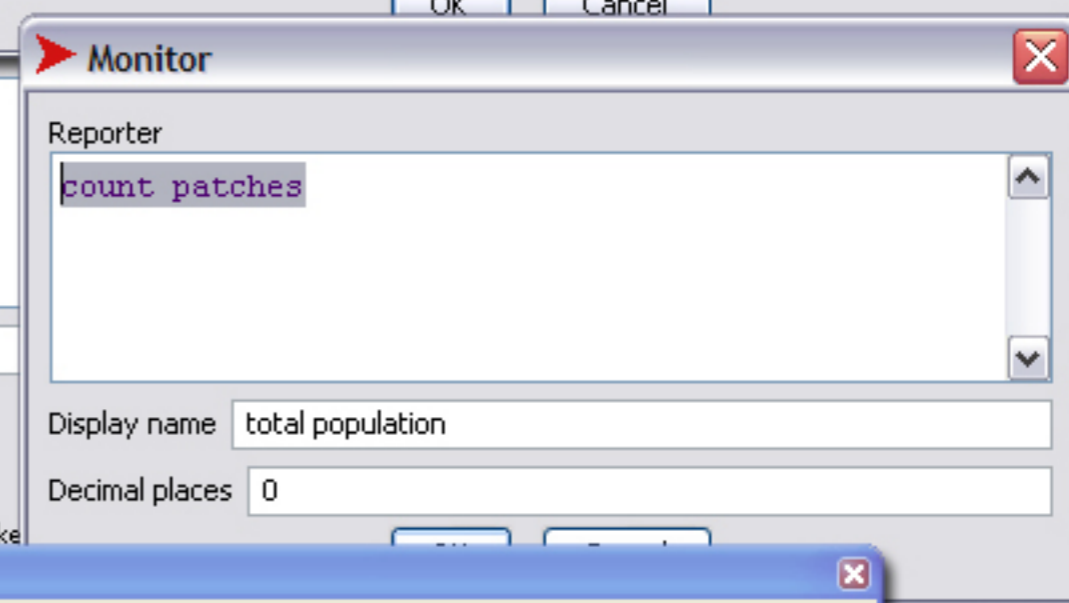
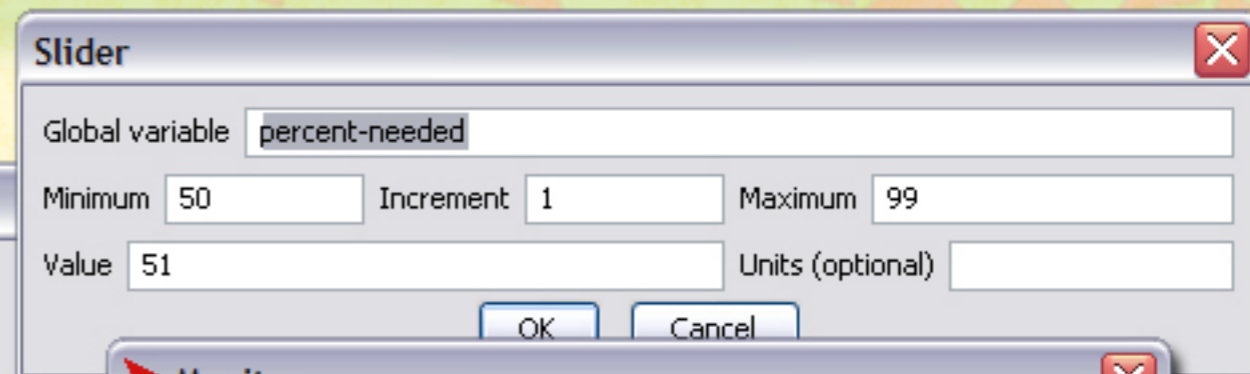
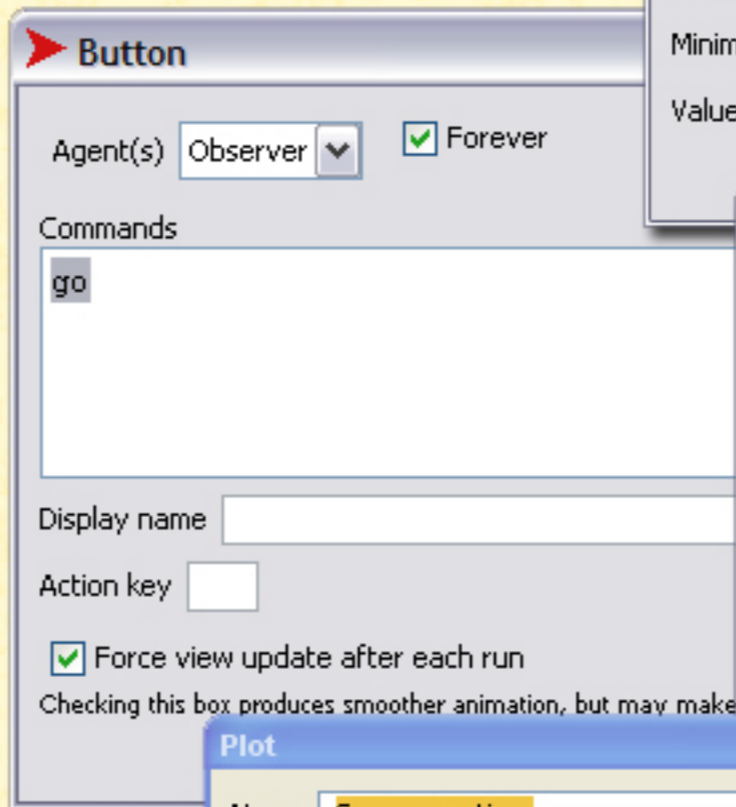
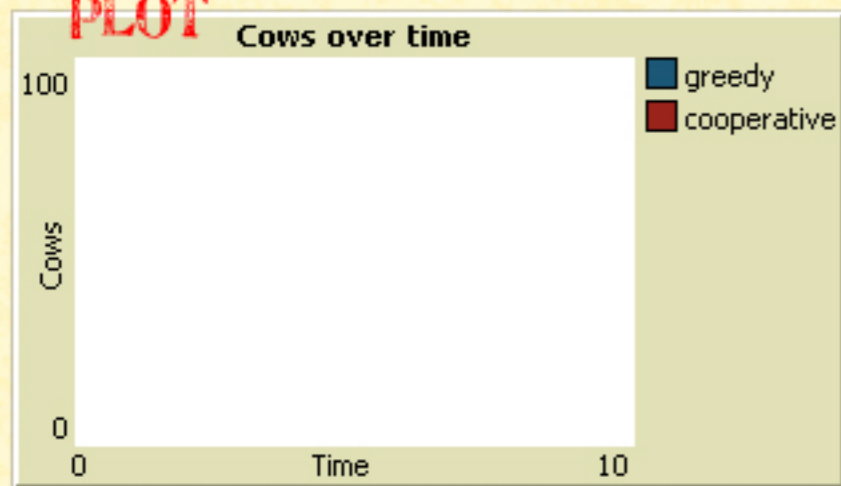


SWITCH

MONITOR

total population
81

PLOT



Getting Started with NetLogo

Locate Sources of Help

- NetLogo Home Page: ccl.northwestern.edu/netlogo/docs/
- Owen Densmore's Page: backspaces.net/
- Yahoo Group: groups.yahoo.com/group/netlogo-educators/
- Google It (Search Personal Websites)
- Aaron Bramson (and other humanoids)

Locate Code to Steal

- Model Library and Code Examples (ctrl+m)
- Above Websites (check links on ComplexityBlog.com)

Can It Be Done in NetLogo?

- Know the Limitations Before Wasting Time
- Doable vs Worth the Effort vs Easy To Do

Getting Started with NetLogo

Tutorials

- Opening, Running, and Altering Models
- Code Basics and Building Blocks of Netlogo
- Become Familiar with Interface and Components

Programming Guide

- How to Use Specific Aspects (Colors, Plotting, Networks)
- Good Reference for Example Implementations
- Closest Thing to a How-To Guide

Primitives Dictionary

- Alphabetical Guide to All Built-In Capabilities
- Brief Descriptions without Good Examples

All Accessible through Help

Getting Started with NetLogo

Planning Algorithms Before Writing Them

- Start with Pencil (or Pen) and Paper
- Describe the Module **in Words** First
- Plan Each Module as an Independent Function
- Write the Code and **ReEvaluate** (Use Lemma Technique)

Reuse as Much Code as Possible (but not more)

- Save Time and Brain Power by Reusing Methods
- Use the **Same Code** for the **Same Behavior**
- Consider Alternate Methods from Time to Time
- The Bottom Line is: **Modularity is Good**

Facilitate Ease of Coding

- Have **Two** Netlogo Applications Running Side by Side
- Learn **Keyboard Shortcuts** and Built-in Functionality