

# Introduction to Agent-Based Modeling for Social Scientists

Day 5

*A Practical Guide to Building Models*

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## *A Practical Guide to Building Models in Netlogo*

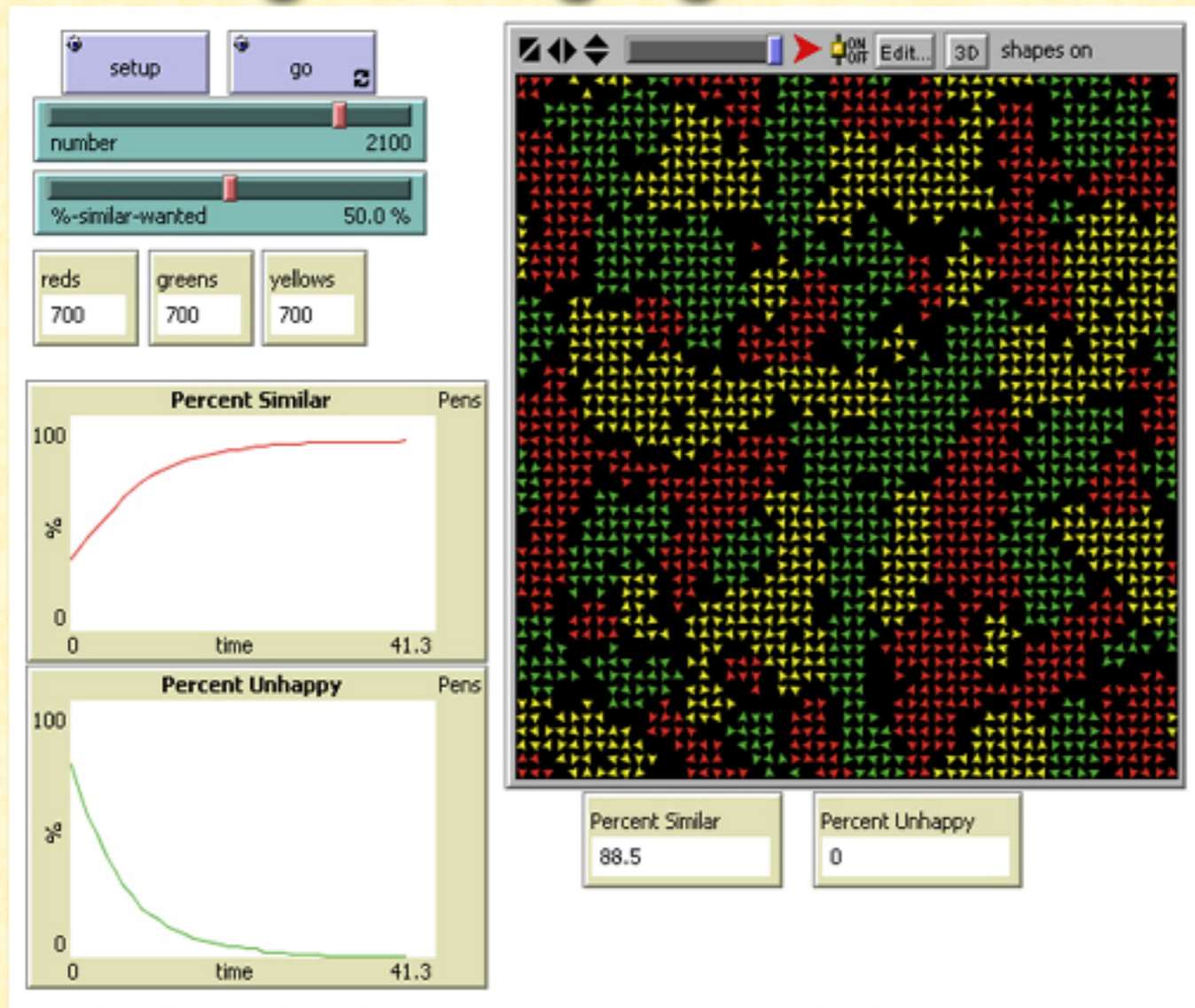
### **Altering the Segregation Model**

- Open the Segregation Model from the Model Library.
- Add another kind (**color**) of agent in the easiest way imaginable.
- What is (potentially) wrong with that technique?
- To fix it, add a **monitor** to check the number of each color of agent, set **number** to 2100 and fix the ratios.
- Change the **percent-wanted** to **50%** and find colors that make the display look like **camouflage**
- The best camo (when time runs out) wins a

**PRIZE**

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### Altering the Segregation Model



**Beat This!!!**

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### **Demonstration of Setting Up a Model**

- Create Buttons for **setup**, **step** and **go**
- Create Methods for **setup** and **go**
- Create Turtles (**cct # []**) in **setup**, Move Forward (**fd #**) in **go**
- Too Many Turtles - Clear Turtles (**ca**) in **setup**
- Let Turtles Wiggle (**rt**) and Trace their Trajectory (**pd**)
- Too Few Turtles - Add **population** Slider
- Change Shape, Size, Color, Heading, etc. at Creation
- Add Time, Ticker, and Monitor; Add Breeds and Populations
- Add Eating Behavior with Color and Size Change
- Add Poisonous Butterfly
- What Else Would Be Cool?

EVERYTHING CLEAR?

I PITY THE FOOL  
WHO DON'T ASK  
QUESTIONS



# INTRODUCTION TO AGENT-BASED MODELING

## *A Practical Guide to Building Models in Netlogo*

### Creating the Hatfield and McCoy Model



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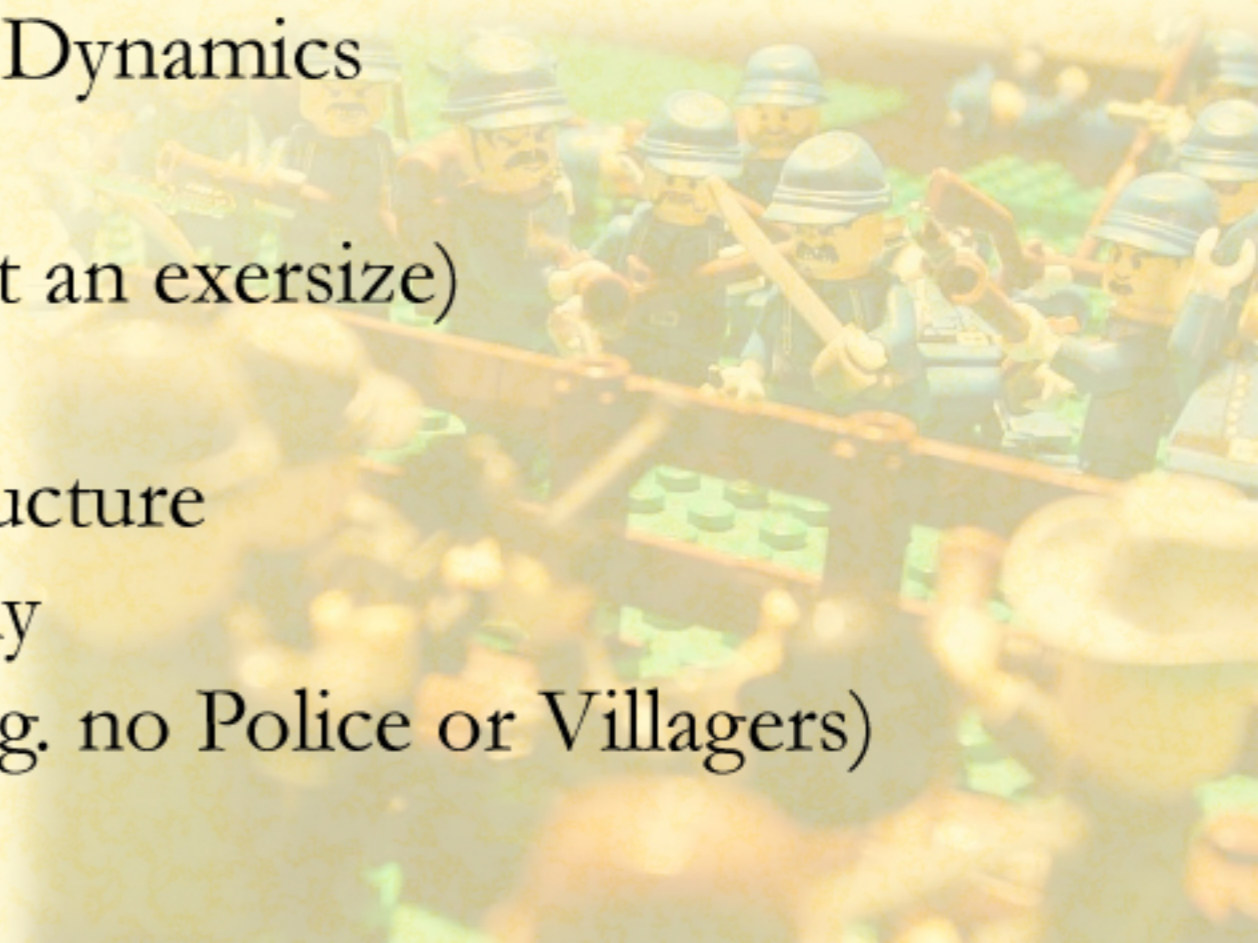
### **Creating the Hatfield and McCoy Model**

#### **What Are We Modeling?**

- Can Inter-Group Marriage End Inter-Group Conflict?
- Two Feuding Factions (the Hatfield and McCoy Families)
- Rules for Marriage, Fighting, Birth, and ...?
- Measure(s) of Conflict Level and Tolerance
- Visualization(s) of the System Dynamics

#### **Modeling Considerations**

- Keep it Simple (after all it's just an exercise)
- Not Really Spatially Explicit
- Don't Worry about Family Structure
- Forget the Effects of Economy
- No Other Kinds of Agents (e.g. no Police or Villagers)



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### Creating the Hatfield and McCoy Model

#### Start from the Beginning

- Open a New (Blank) Netlogo Application
- Open ANOTHER Netlogo Application (to look at other code)
- Open a Browser to the Netlogo User Manual
- Save the New Model as 'Hatfields and McCoys.nlogo'
- Delete Text from the Information Tab

#### First Step: Create the Bare Skeleton of a Model

- Create a **population** slider (up to 300)
- Create Buttons for **setup**, **step**, and **go**
- Create Simple Methods for **setup** and **go**
- Create a **global variable**, **ticker**, and **monitor**, for **time**
- Set **patch-size** to **10** and **screen-size-x** and **y** to **30**

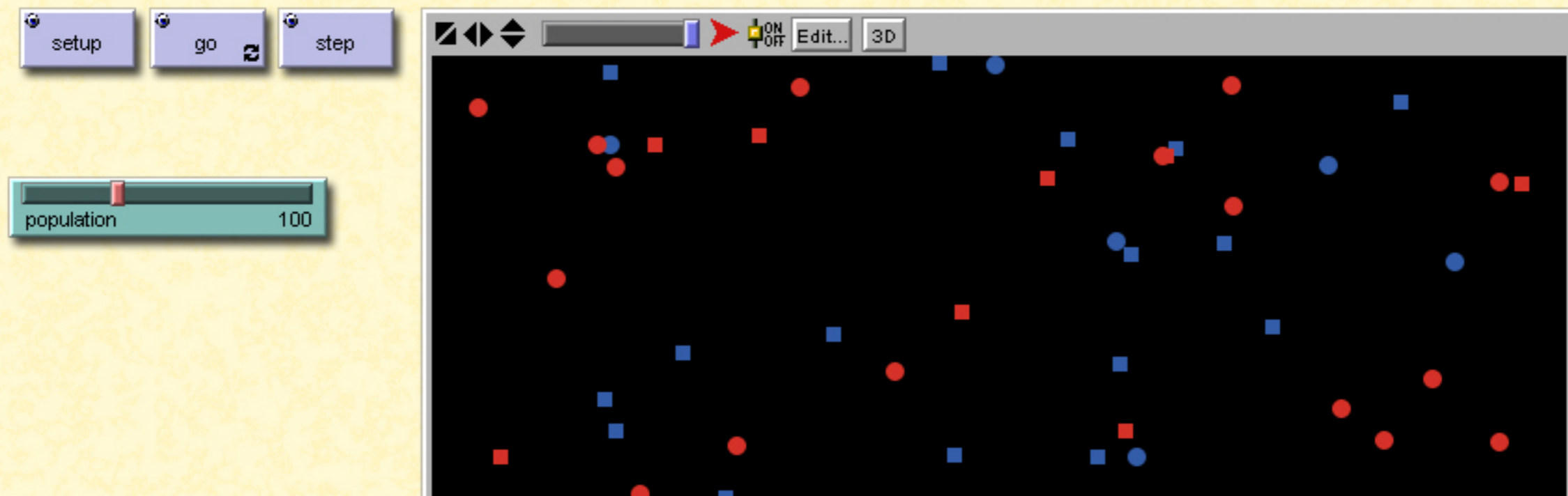


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### Creating the Hatfield and McCoy Model

#### Creating Agents for the Model

- Create Three Breeds: **hatfields**, **mccoys**, & **tolerants**
- Make Hatfields and McCoys each **Half** the Population
- Set Hatfields Blue and McCoys Red (and Tolerants Yellow)
- Create a **turtles-own** variable for **alignment** (0-9)
- Give Agents Sex and Set Shapes by Sex
- Set Random Initial Locations for each Agent (**Hatch**)



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### Creating the Hatfield and McCoy Model

#### Agent Behavior: With Whom Do Agents Interact?

- Random Agents - Physical Location Irrelevant?
- Agents on the Same Patch (using larger patches)?
- Agents within a Radius (one or all agents nearby)?
- Agents in Front of the Active Agent (using heading)?
- ...I recommend **one-of turtles in radius radius** (# from slider).

#### Agent Behavior: Actions Depend on Types

- Create Conditionals for All 21 Types of Agents (nested **ifelse**)
- Use Systematic Properties to Limit Necessary Rules
- Still Need Nesting, Consider Optimal Nesting Order
- Write a Separate Method for Each Behavior
- Take Baby Steps: Minimize Change between Runnable Versions