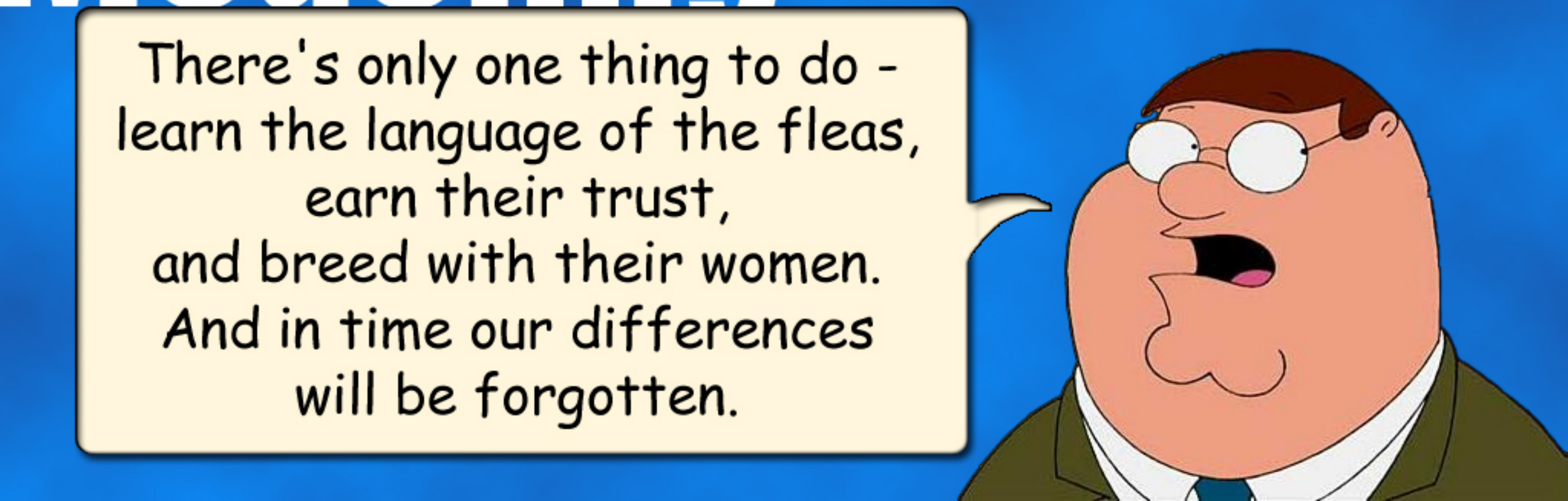
Introduction to Agent-Based Modeling



A Practical Guide to Building Models in Netlogo

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 exersize)
- Not Really Spacially 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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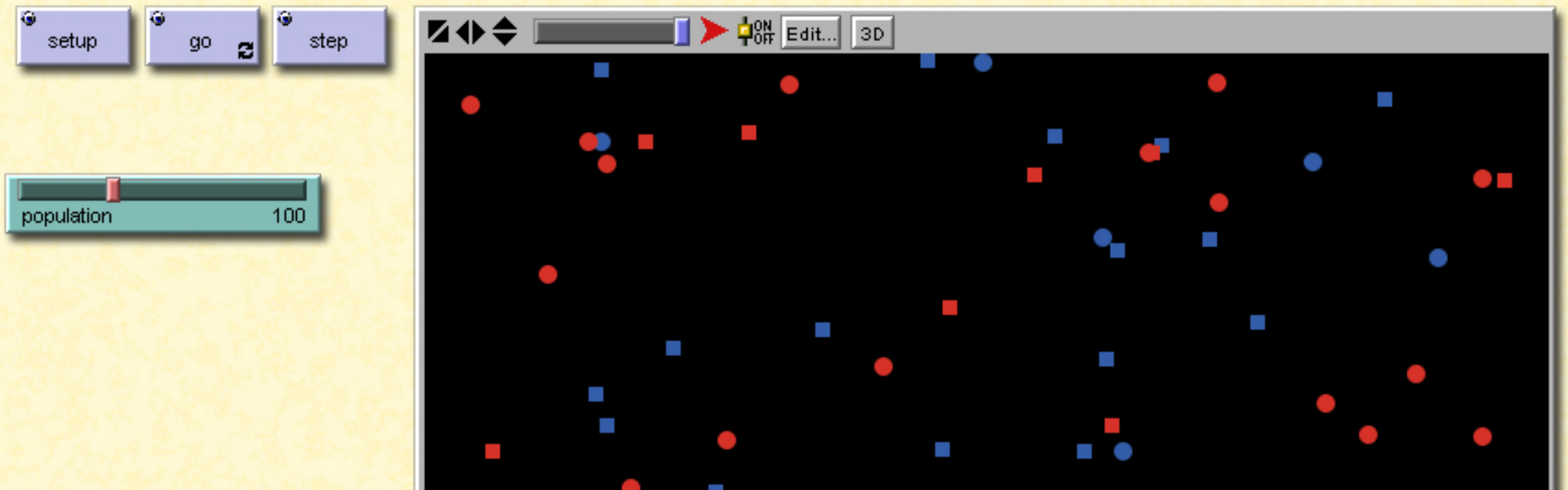
Creating the Hatfield and McCoy Model

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 Sytematic 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

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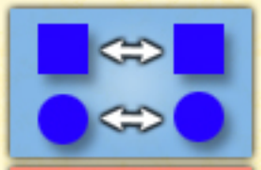
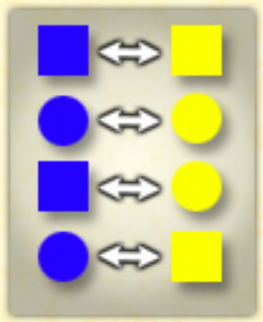
Agent Behavior: What Are the Effects of Interaction?



Both Alignments -1 (min 0)

Both Alignments +1 (max 9)



What to Do?
Average Alignments, Birth, Fight

Average Alignments

Birth (and Alignment Adjustment)

Fight! (Probability of Death)

Intergroup Marriage:
Birth and Average Alignments