

CS 346U: Exploring Complexity in Science and Technology

Week 1 Assignment

1. **Optional:** Watch videos for Unit 1 on <http://complexityexplorer.org>
2. **Reading:**
 - Textbook, Chapter 1
 - W. Weaver, Science and Complexity (download from Course Materials page: <http://www.complexityexplorer.org/online-courses/3/materials>.)
3. Download MultipleAnts.nlogo from the Course Materials page: <http://www.complexityexplorer.org/online-courses/3/materials>.
4. Modify MultipleAnts.nlogo to **get rid of** the command that labels ants with a number (representing the amount of food they have eaten)
5. Modify MultipleAnts.nlogo to make the ants change color depending on how much food they have eaten. That is, if they have eaten more than 2 food patches, they should turn blue, and if they have eaten more than 4 food patches they should turn yellow. Hint: Use a statement like
 - a. **if (food-eaten > 2) [set color blue]**
 - b. It's up to you to figure out where to put this, and then how to make them turn yellow if they've eaten more than 4 food patches.
6. Implement the following: The nine center patches form the ant nest. Ants wander around as in the MultipleAnts model, but when an ant finds a patch of food it collects it and returns to the nest before it wanders out again.
7. Implement the following, which is similar to the Ants model from the Netlogo Models Library: Same as the Intermediate Option, but when returning to the nest, the ant leaves a pheromone trail—that is, the patches that it traverses each gain a unit of pheromone. The pheromone evaporates over time—that is, at every time step each patch with pheromone has a probability of losing its pheromone. If a

wandering ant encounters a patch with pheromone, it follows the trail as long as it can sense pheromone.

Experiment with this model to see if adding the pheromone mechanism speeds up the ants' process of gathering all the food.

What to turn in: Nothing this week. We will be discussing the readings and doing the NetLogo assignments together in class.