



Agent-Based Modelling in NetLogo

David Hales

www.davidhales.com/abm-netlogo

Resources

- The Open ABM website contains various resources including tutorials and an expanding models library: <https://www.openabm.org/>
- Open access Journal of Artificial Societies and Social Simulation with many ABM related papers: <http://jasss.soc.surrey.ac.uk/>

Wolf Sheep Predation Model

- Simple predator / prey ecological model
- Sheep eat grass and wolves eat sheep
- Both reproduce a fixed rates
- Explores coupled dynamics of population sizes
- Developed for the purposes of education of high school students
- Allowing them to explore and experiment rather than learn differential equations

[File > Models Library > Biology > Wolf Sheep Predation](#)

NetLogo — Wolf Sheep Predation

Interface Info Code

Edit Delete Add abc Button normal speed view updates on ticks Settings...

setup go On Off show-energy?

Grass settings

On Off grass? grass-regrowth-time 30

Sheep settings

initial-number-sheep 100

sheep-gain-from-food 4

sheep-reproduce 4 %

Wolf settings

initial-number-wolves 50

wolf-gain-from-food 20

wolf-reproduce 5 %

sheep	wolves	grass / 4
185	81	215

populations

pop. 364 0

time 0 1910

sheep wolves grass / 4

ticks: 1868 3D

Command Center

observer>

Clear

Notable code

- Introduces the “breed” command:
 - Breed [wolves wolf]
 - Breed [sheep, a-sheep]
 - Defines new turtle subtypes (breeds)
- You can use breeds with commands used for turtles:
 - e.g. create-sheep 10, count sheep etc.

Code in detail – see exercise sheet

Task 1

- Modify code adding a breed of called “humans”:
 - humans behave like wolves but catch wolves rather than sheep.
 - add three sliders to the Interface to set the parameters for humans
 - add a line to the plot for the total number of humans
 - add a monitor to show the the total number of humans.
 - note that there is a shape called “person”.
- Can you find some parameters that keep all three turtle breeds alive for a long time?

Task 2

- Modify the behaviour of humans:
 - They feed on sheep not wolves but only eat a sheep with a probability set by a slider
 - If wolves and humans find themselves sharing a patch they fight but do not eat each other
 - If there are more wolves in the patch than humans the wolves win and the humans die otherwise the humans win and the wolves die
 - See what happens when you run it