Predator and Prey

An open-ended, start-from-scratch, simulation-building activity in StarLogo Nova.

This activity is designed for users with some experience working with and extending StarLogo Nova projects who would like to learn how to build a new project from start to finish. Rather than present step-by-step instructions, it contains a series of small challenges paired with some commands that are useful for completing the challenges. The result of all of the work to complete the challenges is a fully functional, extensible predator/prey simulation.

Goals:

- Create a predator/prey model in StarLogo Nova
- Learn to start a project from scratch
- Explore new commands without fear of breaking something
- Learn essential concepts that apply to every StarLogo Nova simulation

Instructions

Read each challenge and examine any commands or features that are given to help complete the challenge. Then try to complete the challenge in any way you want to. Do not be afraid to explore and make mistakes! Use any commands or features you want to use, but if you are stuck make sure to look at what is supplied with the challenge. Feel free to ask your neighbors for help, but always make sure to make your own mistakes first.

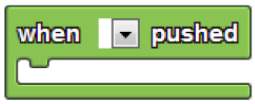
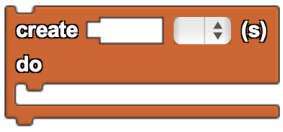
Challenge 1

Make a predator breed and a prey breed. Write a setup code to create agents of both breeds and scatter them.

Useful features/commands:

Edit Breeds: Opens the Breed Editor

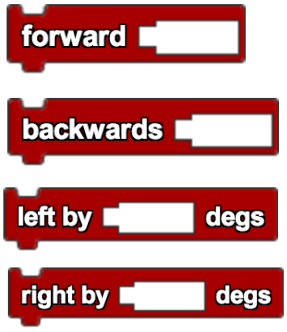
Remember: You do not need to use all of the blocks in this table.

Block	Drawer	What the agent does:
	Interface	Executes commands inside this block (once, from top to bottom) when the push button widget is pushed. Widgets can be created using the Edit Widgets feature.
	Agents	Deletes everyone including itself.
	Agents	Creates the specified number of agents of the chosen breed. Each newly created agent immediately follows the directions the block makes them "do".
	Agents	Sets its location to a random position in SpaceLand.
	Agents	Sets all the agents' locations to random positions in SpaceLand
	Traits	Sets its trait to some value. The trait is chosen from the drop down menu and includes color, shape, size, etc.

Challenge 2

Make the agents (both predators and prey) move around the terrain.

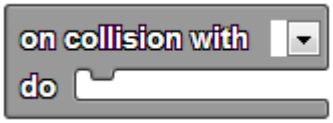
Useful features/commands:

Block	Drawer	What the agent does:
	Interface	Executes commands (in a forever loop) when the toggle button widget is turned on. When the toggle button widget is turned off, the commands in this block don't run. Widgets can be created using the Edit Widgets feature.
	Movement	Agent moves according to the command. Programmer specifies number of steps for the forward and backwards blocks. Programmer specifies numbers of degrees for the left by and right by blocks.

Challenge 3

Program the predators to “eat” the prey.

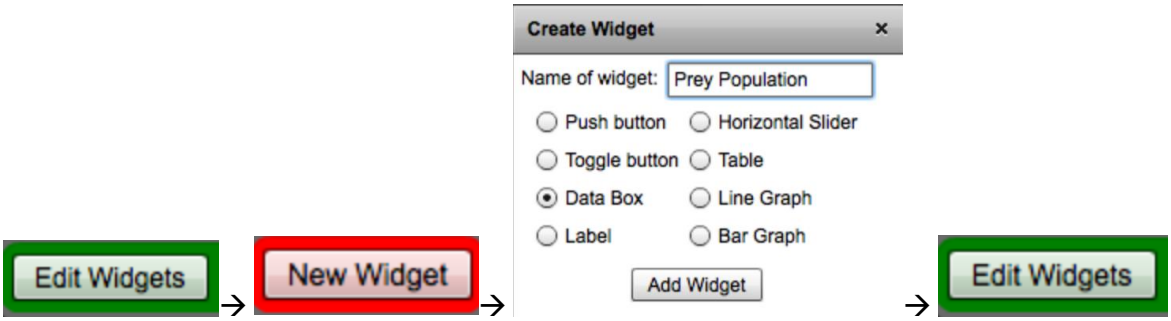
Useful features/commands:

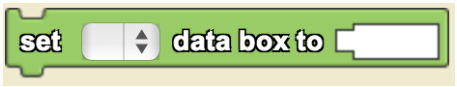
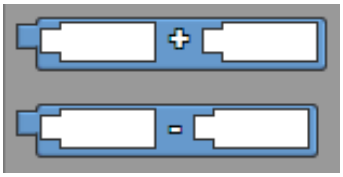
Block	Drawer	What the agent does:
	Detection	Tells the "owner" of the block what to do when it bumps into an agent of the chosen breed. The “owner” is an agent of the breed whose page is where this collision block is put.
	Detection	Refers to the agent currently colliding with the "owner" of the block. (Only works inside an on collision with block)
	Agents	Deletes itself.
	Agents	Deletes the specified agent (use "collidee", "nearest", or "my parent" blocks).

Challenge 4

Program two data box widgets to track the population numbers of the predator and prey agents.

Useful features/commands:



Block	Drawer	What the agent does:
	Interface	Assigns a value to a data box.
	Interface	Returns the value of the data box
	Math	Returns the value of the computed expression.

Is the overall simulation behavior a good approximation of how things work in the real world? How could this simulation be improved? Spend some time thinking about and discussing ways to make this simulation more realistic. In particular, how are the population sizes being made to change? Does either population grow? If so, how? If not, why not?

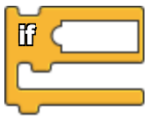
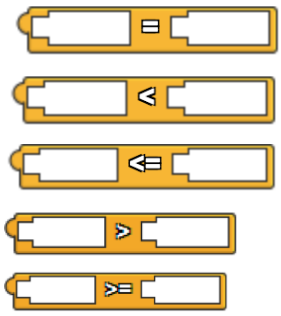
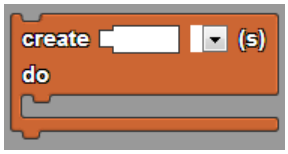
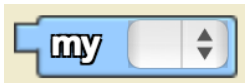
Challenge 5

Program your breeds to reproduce according to rules that mimic the real world. Come up with some of your own ideas, but here are some examples to get you started:

- If a predator eats some number of prey, the predator reproduces.
- If the number of predators reaches a certain number, the predators begin to die.
- A certain percentage of predators and prey can reproduce. (use random)
- Define a new trait – "Energy" – that you can use to set certain values for each agent in setup, and program it to automatically decrease over time and increase when the agent eats food (for example, if the predator eats prey). The agent can only reproduce if it has enough energy.

Useful features/ commands:

Breed editor can also define new traits: 

Block	Drawer	What the agent does:
	Logic	Test for something. If true, then the agent follows the commands in the hook.
	Logic	Equal to Less Than Greater Than Less Than/Equal to Greater/Equal to Compare two quantities. Returns either true or false.
	Agents	Creates the specified number of agents of the chosen breed. Each newly created agent immediately follows the directions the block makes them "do".
	Traits	Sets its trait to some value. The trait is chosen from the drop down menu and includes color, shape, size, etc.
	Traits	Returns the value of an agent's trait.