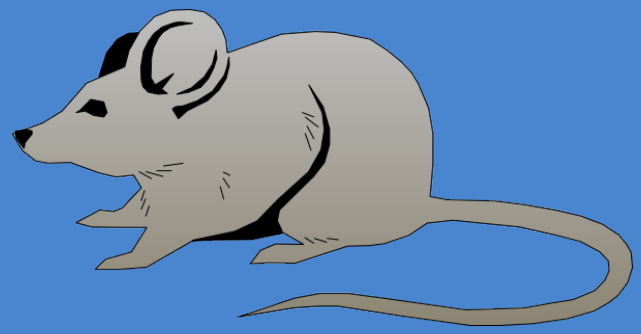

Behavioral Evolution Rodent Model: Bat Rats™

Charly Resendiz (charly.resendiz@northwestern.edu)

The Goal

- To demonstrate that selective breeding can influence path finding strategies

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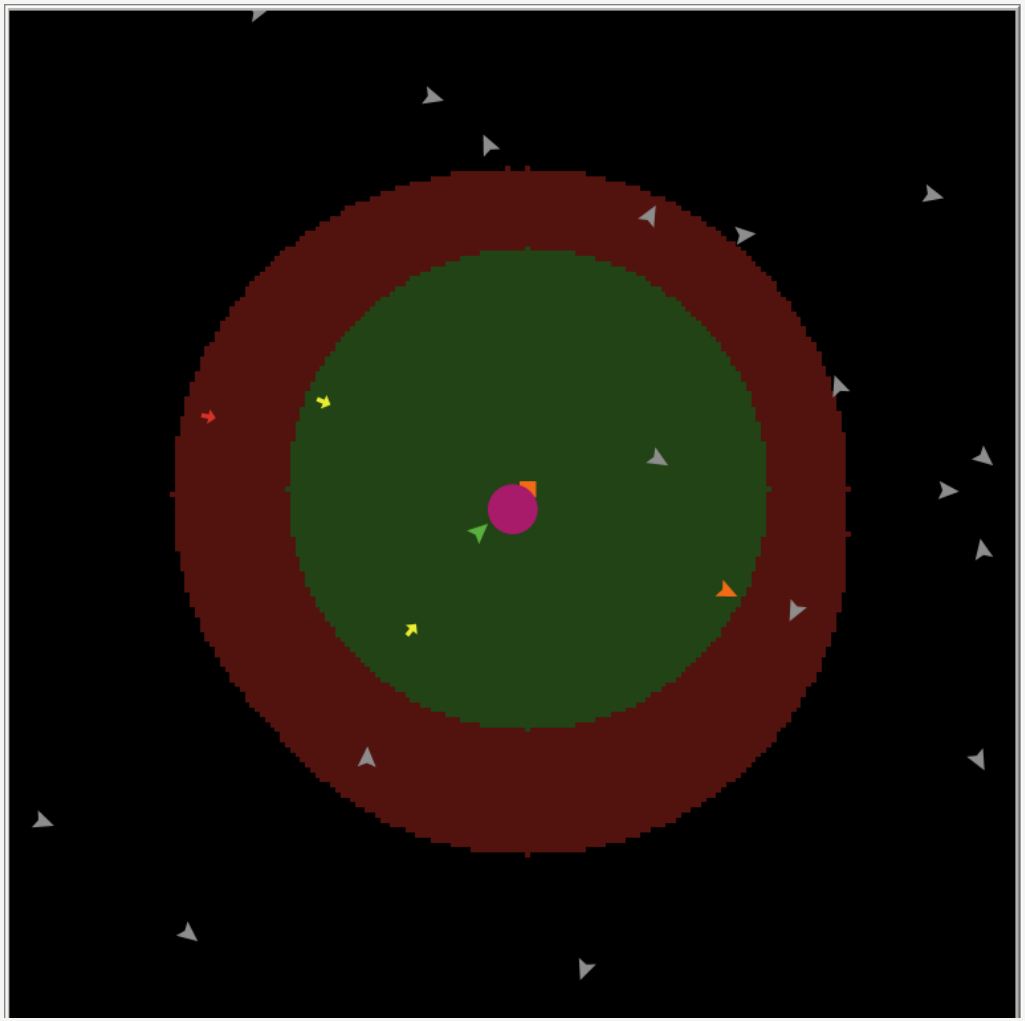
- To show multiple phases to evolution, especially with behaviour
- The model does not simulate a naturally occuring phenomenon
  - Rats, but with the ability to read signs

Behavioral Evolution Model



Background : Behavioral Genetics

A field of scientific research that uses genetic methods to investigate the nature and origins of individual differences in behavior. This is commonly seen with :

- Selective Breeding

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  - Stealth

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  - Stealth
  - Construction
  - Navigation

Defining Collaborative Traits (Helpful or Foolish)

- Does not guarantee passing on an organism's genes

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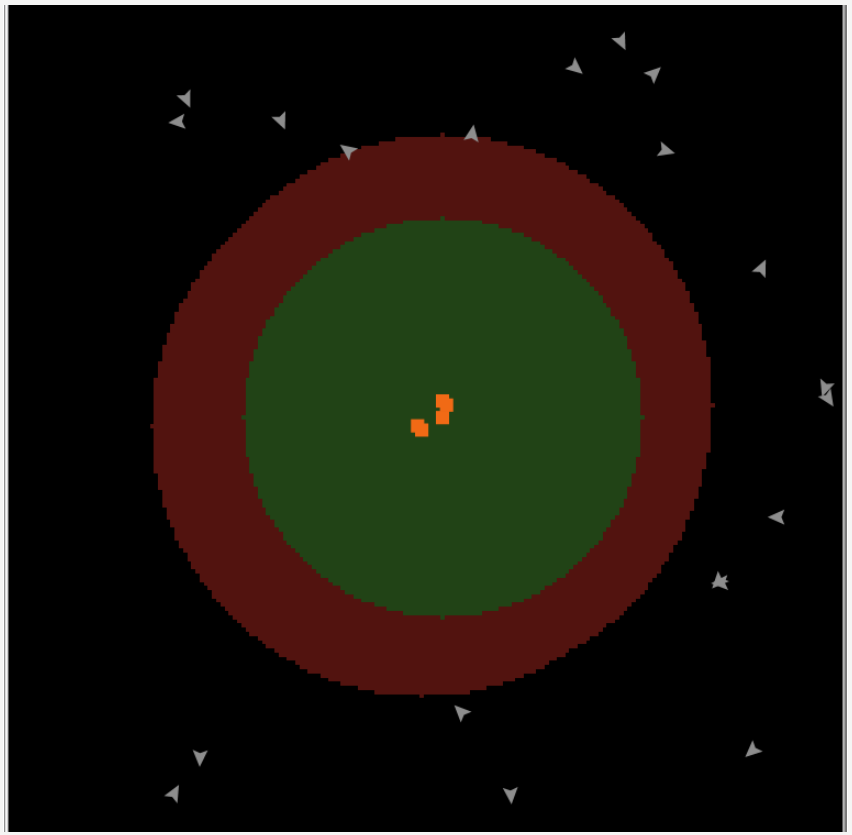
Defining Collaborative Traits (Helpful or Foolish)

- Does not guarantee passing on an organism's genes
- Behavior can help other organisms
- Straightforward actions

Overview

You begin with 15 rodents, outside a specified radius, with the food huddled in the center



Variables

- Likelihood to lie (units : %)

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Variables

- Likelihood to lie (units : %)
- Likelihood to drop a sign (units : %)
- Range of possible sign angle error (units : degrees)
- *Maximum Random Turning Angle* (MRTA) (unit : degrees)
- Energy (not configurable)
- Topology

Color Sheet

Mice Colors

- Grey (Searching)

Sign Colors

Color Sheet

Mice Colors

- Grey (Searching)
- Orange (Noticed Sign)

Sign Colors

Color Sheet

Mice Colors

- Grey (Searching)
- Orange (Noticed Sign)
- Green (Influenced by Sign)

Sign Colors

Color Sheet

Mice Colors

- Grey (Searching)
- Orange (Noticed Sign)
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- White (Ate)

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Color Sheet

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- White (Ate)

Sign Colors

- Yellow (Honest)

Color Sheet

Mice Colors

- Grey (Searching)
- Orange (Noticed Sign)
- Green (Influenced by Sign)
- White (Ate)

Sign Colors

- Yellow (Honest)
- Red (Intentionally Misleading)

Plots and Pens

- Pen (Visualize a rat's maximum random turning angle)

Plots and Pens

- Pen (Visualize a rat's maximum random turning angle)
- Range's Maximum Turning Angle

Plots and Pens

- Pen (Visualize a rat's maximum random turning angle)
- Range's Maximum Turning Angle
- Probability Range

Observations

Depending on the inital configurations, the rats pass on certain behaviors

- More willing to lie/cooperate

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Depending on the inital configurations, the rats pass on certain behaviors

- More willing to lie/cooperate
- More accurate signs or no signs at all
- Having higher or lower maximum turning angle

Demo

Possible Extensions

- Adding vision

Possible Extensions

- Adding vision
- Adding probability of following sign

Possible Extensions

- Adding vision
- Adding probability of following sign
- User-defined inital energy

Possible Extensions

- Adding vision
- Adding probability of following sign
- User-defined inital energy
- Pre-defined behaviors as an option