



**Using games to support
students in the practice of
“Developing and Using Models.”**



*Hillary Lauren, Robert Wallon,
Barbara Hug*

University of Illinois at Urbana-Champaign



What is Project NEURON?

- At the University of Illinois
- Educators, scientists, and graduate students
- Curriculum development
 - Inquiry-based
 - Connect to standards
- Professional development
 - Summer institutes
 - Conferences



Project NEURON Curriculum Units

- **Do you see what I see?**
 - *Light, sight, and natural selection*
- **What can I learn from worms?**
 - *Regeneration, stem cells, and models*
- **What makes me tick...tock?**
 - *Circadian rhythms, genetics, and health*
- **What changes our minds?**
 - *Toxicants, exposure, and the environment*
 - *Foods, drugs, and the brain*
- **Why dread a bump on the head?**
 - *The neuroscience of traumatic brain injury (TBI)*
- **Food for thought: What fuels us?**
 - *Glucose, the endocrine system, and health*
- **What makes honey bees work together?**
 - *How genes and environment affect behavior*
- **How do small things make a big difference?**
 - *Microbes, ecology, and the tree of life*

Available at:
neuron.illinois.edu



Using games in the classroom

1. What is a **game**?
2. What was the last game you used in the classroom?
3. How did your students use it?
4. What were the learning outcomes or goals?



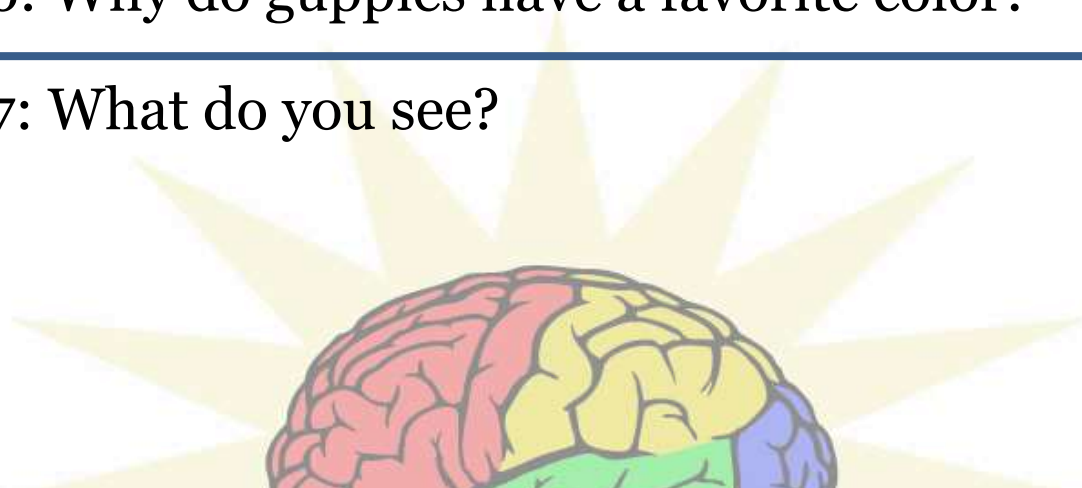
Using models in the classroom

1. What is a **model**?
2. What was the last model you used in the classroom?
3. How did your students use it?
4. What were the learning outcomes or goals?



Do you see what I see?

- Lesson 1: What do I see?
- Lesson 2: How does biology affect perception?
- Lesson 3: How does the environment affect perception?
- Lesson 4: What are light and color?
- Lesson 5: Do fish have a favorite color?
- Lesson 6: Why do guppies have a favorite color?
- Lesson 7: What do you see?




The Guppy Game!

- Groups of 4
- Each person needs
 - Die
 - Guppy card
 - Scorecards
 - Quickrules



The Guppies

Fancy Guppy
Female



Chor Ham aheng


Sensory Bias Score

1 2 3 4 5 6

Survival Roll bias or under for +1 point

Reproduction Roll bias or over for +2 points

Fancy Guppy
Male



Landy Vella


Brightness Score

1 2 3 4 5 6

Survival Roll brightness or over for +1 point

Reproduction Roll brightness or under for +2 points

Wild Guppy
Female



Stragh Owens


Sensory Bias Score

1 2 3 4 5 6

Survival Roll bias or under for +1 point

Reproduction Roll bias or over for +2 points

Wild Guppy
Male



Stragh Owens

Brightness Score

1 2 3 4 5 6

Survival Roll brightness or over for +1 point

Reproduction Roll brightness or under for +2 points

The Habitats



part

The Practice Pond

Familiarize yourself with the basic game rules here.

Survival: Roll once as usual (win +1 point)

Reproduction: Roll once as usual (win +2 points)



Peter Kelly Studios

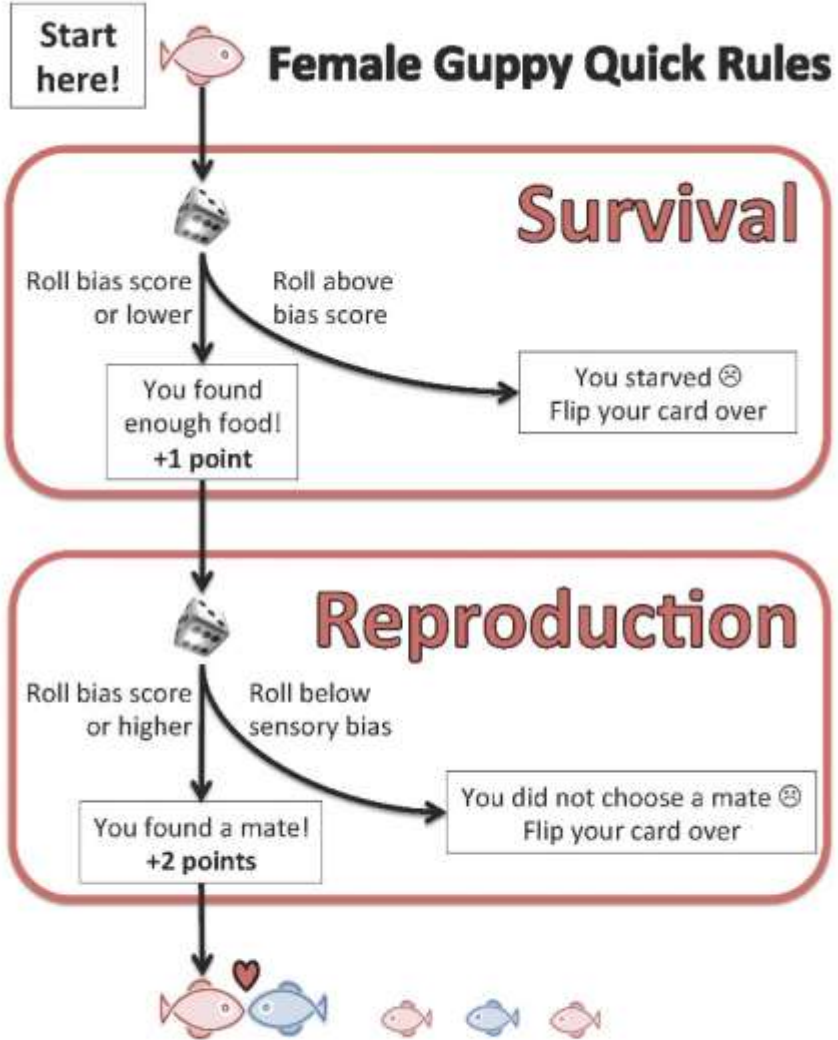
The Fish Tank

In this artificial environment, there are no predators and fish are fed daily, so survival is high.

Survival: Do NOT roll (+1 point automatically)
Reproduction: Roll once as usual (win +2 points)



How to play



Score Card

Circle one: **Wild** or **Fancy**

Circle one: **Male** or **Female**

Tally your survival and reproduction points for each season, and sum all your tallies for each habitat's total score

Habitat	Season 1	Season 2	Season 3	Total
Example	0			4
Practice				
Tank				
Murky				
Clear				
Amazon				
Brook				

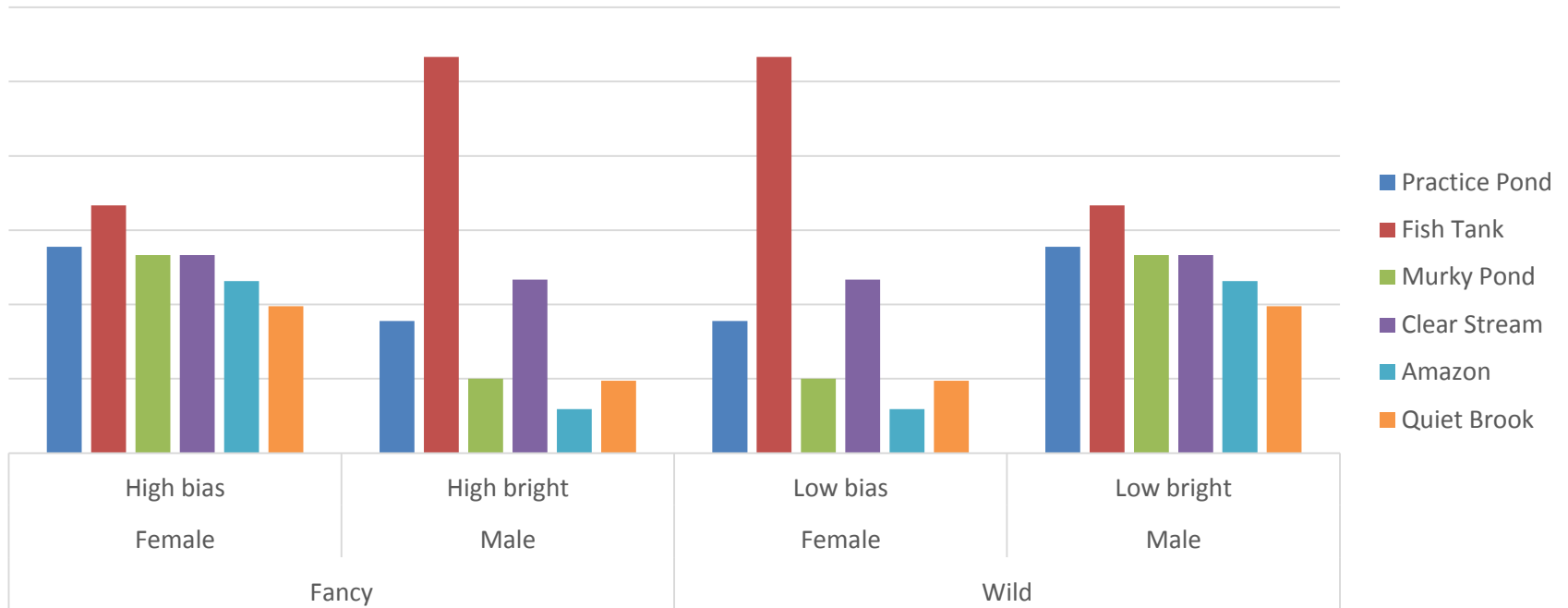
Play time!

- 15 Minutes
- Habitats:
 - Practice Pond
 - Fish Tank
 - Murky Pond
 - Clear Stream



Class Data

Relative Success



Probability data from “Guppy Data” Excel document. This is available on the Workshop Session’s page on the website. Lesson 6 of the “Do you see what I see?” Unit will be revised to incorporate this resource as well.

Meta-Discussion

- What is realistic in the game and what is not?
- How do you think the outcomes would change if we modified _____?
- In the real world, how could we collect similar data?



- Models include diagrams, physical replicas, mathematical representations, analogies, and computer simulations.
- Bring certain features into focus while obscuring others.
- Contain approximations and assumptions that limit the range of validity and predictive power.
- Used to
 - represent a system (or parts of a system) under study
 - aid in the development of questions and explanations
 - generate data that can be used to make predictions
 - communicate ideas to others
- Students can evaluate and refine models in iterative cycle.
 - Comparing their predictions with the real world.
 - Adjust models to gain insights into the phenomenon being modeled.
- Models are based upon evidence.
 - When new evidence is uncovered that the models can't explain, models are modified.

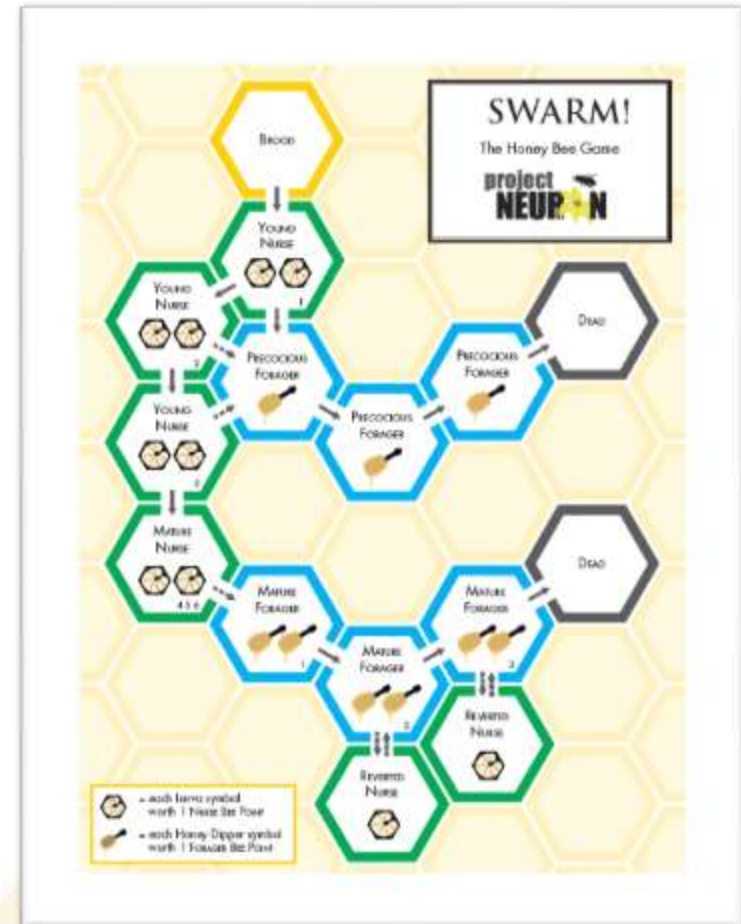
Biomagnification Game

- Students role-play as anchovies and tuna in aquatic food chain
- Goals: Eat and don't die!
- Models the biomagnification of toxicants within ecosystem



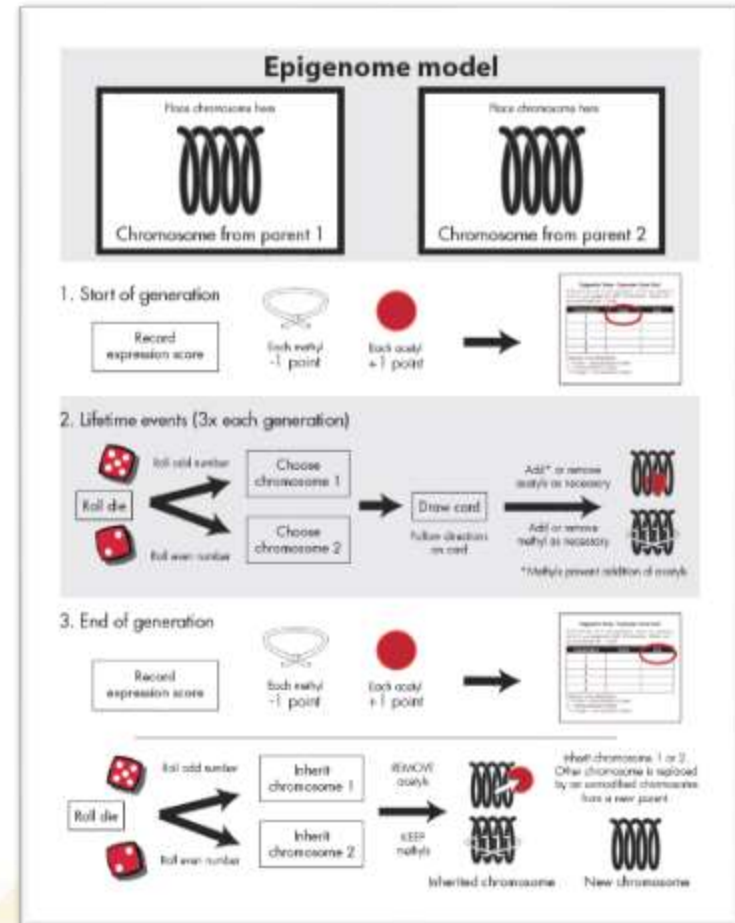
Swarm! Honey Bee Game

- Students role-play as many bees in a hive
- Goals: Make honey and take care of larvae
- Models balance of honey bee roles in colony, environmental challenges to colony



Epigenetics Game

- Students role-play as “themselves”
- Goals: Play through several generations
- Models modifications of environmental factors on genes



Acknowledgements

- NIH, SEPA
- University of Illinois

This project was supported by SEPA and the National Center for Research Resources and the Division of Program Coordination, Planning, and Strategic Initiatives of the National Institutes of Health through Grant Number R25OD011144. The contents of this presentation are solely the responsibility of Project NEURON and do not necessarily represent the official views of the funding agencies.



Thanks!

For additional information visit:
<http://neuron.illinois.edu>

E-mail:
neuron@illinois.edu

@ProjectNeuron #nsta15



ILLINOIS **Project NEURON** [Sign In/Create Account](#)

[Curriculum Units](#) [Professional Development](#) [Games and Media](#) [Additional Projects](#) [About](#)

Project NEURON

Novel Education for Understanding Research on Neuroscience

Find out more about our 2013 Summer Professional Development!

Project NEURON brings cutting-edge neuroscience to middle and high school students through classroom modules and activities based on research conducted at the University of Illinois at Urbana-Champaign. We bring together scientists, science educators, schoolteachers, and students to develop and disseminate materials that connect science with national and state science standards.

Our core project is the development of in-class curriculum units that emphasizing inquiry and active learning. These materials are tested by a dedicated group of high school teachers, to whom we provide support and professional development. We have adapted and expanded these materials into a variety of additional projects that include outreach for younger grades, informal education, and educational games and videos.

Please note that we are continuously improving this website and the materials hosted here. We work hard to create quality materials, but if you notice any inconsistencies, missing materials, etc., please let us know! We also love to hear suggested improvements or adaptations from teachers who have used our materials!

News and Events

Color Sorting Activity in The Science Teacher
Teacher
March 23, 2012
The March 2012 issue of The Science Teacher features the colored candy sorting activity in an article titled, "What color do you see?" (p. 60-65).

Color Sorting Game is Back Online
February 20, 2012
The Color Sorting Game is back up on the Project NEURON web site.

Project NEURON at 2013 Public Engagement Symposium
February 6, 2013
Keep an eye out for a poster at the 2013 Public Engagement Symposium that describes TPOD-Orkay.

Neuroscience Day

Neuroscience Day

March 19 @ Science Inn
S. SIOUX CITY, NE

March 20 @ South Dakota
MISSION, SD

9:00 - 2:00 with lunch provided



Hillary's blog about Science, Education, Games, and Design:
The Science Slug: <http://scienceslug.wordpress.com>

