

# Honeybee Foraging Preferences

*("I'll take a nonfat half-caff grande honeysuckle with extra nectar and a shot of pollen.")*

**Introduction:**

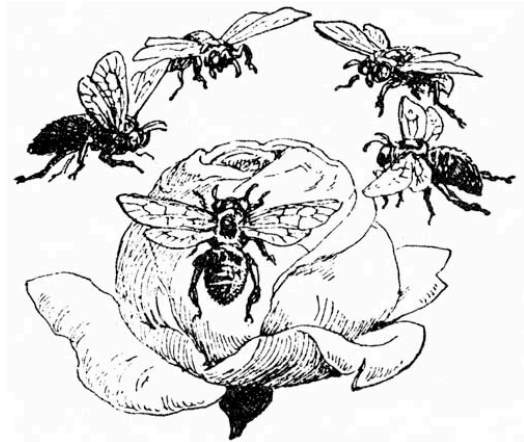
Honeybees perceive a very wide range of colors, but do not see all colors equally well. Honeybees can be very sensitive to symmetry, and have strong preferences for certain types of symmetry. They can also easily differentiate between solid and broken patterns as well. In this lab, your goal will be to use data you collect on honeybee behavior to make inferences about what colors, shapes, and types of symmetry bees prefer.

**Terminology:**

Transforming Data: \_\_\_\_\_  
 \_\_\_\_\_  
 Biological Model: \_\_\_\_\_  
 \_\_\_\_\_

**Job Assignments:**

Recorder: \_\_\_\_\_  
 Roller: \_\_\_\_\_  
 Caller: \_\_\_\_\_



**Materials:**

- Six color samples \_\_\_\_\_
- Six shape samples \_\_\_\_\_
- One Die \_\_\_\_\_







**Resources:**

You will be rolling the dice to simulate a bee visiting flowers.

Each face of the die corresponds to a color or shape. Refer to the following chart as a guide:

<u>Die Face:</u>	<u>Experiment 1: Color</u>	<u>Experiment 2: Shape</u>
	Yellow	Square
	Blue	Circle
	Green	Triangle
	Red	Four-Pointed Star
	Purple	Six-Pointed Star
	White	No Shape (blob)

After you have collected your data, you will *transform* it using the rules of the following *model*:

<u>If you roll . . .</u>	<u>Experiment 1: Color</u>	<u>Experiment 2: Shape</u>
Two 	Yellow	Square
Three 	Blue	Circle
Six 	Green	Triangle
Five 	Red	Four-Pointed Star
One 	Purple	Six-Pointed Star
Seven 	White	No Shape (blob-o-licious)

**Methods:**

**Experiment 1:**

**Question:** *What colors do Honeybees prefer?*

1) Write a Hypothesis: Based on your current knowledge and previous experience with flowers and insects, what colors do you think honeybees prefer? Choose two colors you believe bees are **most** attracted to, and write a hypothesis *in complete sentences* that justifies your choices.

**Hypothesis:**

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2) Collect data:

Record each time a bee ‘lands’ at a color using hash marks. Remember to be efficient bees, and roll the dice as many times as you can during each time period!

Observation Time (min)	Yellow	Blue	Green	Red	Purple	White
3 minutes						
Total						

**EXPERIMENT 2:**

**Question:** *What Shapes do Honey Bees prefer?*

3) Write a Hypothesis: Based on your background with flowers and insects, write a hypothesis in complete sentences for shape preference.

**Hypothesis:**

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4) Collect data:

Record **Each** time a bee lands at shape. If the **SAME** Bee lands at a shape more than once, record each time it lands.

Observation Time (min)	Square	Circle	Triangle	Four-Pointed Star	Six-Pointed Star	Blob
3 minutes						
Total						

**Methods for Transforming The Data to Fit the Model:**

1) Use the second chart in the Resources section of your worksheet for the rules of the model. Using the information in that chart, fill in the following tables:

**Table 1: Color Preference**

<b>Color</b>	<b>Number of visits from dice</b>	<b>Number from Model</b>	<b><u>Number of visits</u> Number from model =</b>
<b>Yellow</b>			<b>Total visits</b>
<b>Blue</b>			<b>Total visits</b>
<b>Green</b>			<b>Total visits</b>
<b>Red</b>			<b>Total visits</b>
<b>Purple</b>			<b>Total visits</b>
<b>White</b>			<b>Total visits</b>

**Table 2: Shape Preference**

<b>Shape</b>	<b>Number of visits from dice</b>	<b>Number from Model</b>	<b><u>Number of visits</u> Number from model =</b>
<b>Square</b>			<b>Total visits</b>
<b>Circle</b>			<b>Total visits</b>
<b>Triangle</b>			<b>Total visits</b>
<b>Four-Pointed Star</b>			<b>Total visits</b>
<b>Six-Pointed Star</b>			<b>Total visits</b>
<b>Blob</b>			<b>Total visits</b>

**CHALLENGE! Apply Your Data!**

Using the knowledge you gained from the data collected during the previous two exercises, design a **three dimensional flower** to attract Honey Bees. Your flower can contain as many shapes and colors as you want, but BE CAREFUL! Your flower design MUST reflect what you learned from your data! Sketch your design in the space on this page and the next, then build your flower. Please include both TOP and SIDE views in your flower sketch!

**QUESTIONS:**

- 1) How does your flower compare to other groups flowers? What was different about the flowers that had more bees attracted to them?
  
- 2) Why did different groups get different results for color and shape preference? Was it due to bad data collection?
  
- 3) What is the purpose of the white paper and the non-shape blob? If bees were landing frequently on the white paper, what would that tell you about their preference for color?

**Conclusions:** From the data you collected, what can you infer about Honeybee preferences for shape, color, and symmetry? How did you make these conclusions?

**For more information, please contact Meg Eckles ([meg.eckles@gmail.com](mailto:meg.eckles@gmail.com)).**  
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