

“SEEING” FUNCTION

In order for human technologies to emulate what works in nature, we need to learn to see how nature functions. For example, how the structure of a gecko’s feet allow it to climb walls without using glue, or how termite mounds regulate temperature without external energy. Function is the essence which biomimics seek to emulate from the natural world; however, looking for function is not how students are typically taught to observe nature.

Biomimicry is learning from and then adapting nature’s best ideas to solve human challenges, in order to create a healthier more sustainable planet.

In this activity, students learn to “see” function in natural objects—ironically, by encountering, describing, and considering natural objects while blindfolded. This activity is a fundamental introductory exercise that can be used with almost any age group.

Background Information

Biomimicry is an approach to technological innovation that draws its ideas from nature. Energy efficient buildings inspired by the passive cooling in termite mounds and non-toxic adhesives inspired by geckos are examples of biomimicry. Seeing function in the natural world is a fundamental shift which enables biomimetic innovation to occur. It allows students to begin to learn *from* nature, rather than *about* nature. Rather than only learning what the scientific name of a certain conifer species is, or in what climate and soil conditions it grows, a student should be encouraged to observe details about the tree’s form (e.g., the spiral of the bracts on the tree’s cones), and to inquire why this form exists, i.e., to question how the tree’s form enables it to have certain functional capacities (e.g., more opportunities for pollen deposition).

Goals

- Students will begin to understand the difference between learning about nature and learning from nature.
- Students will learn what biological function is, and why it is so important to discern.
- Students will learn how to explore an organism’s form and function with entirely fresh “eyes.”

Objectives

- Students recognize that organisms are the way they are (in terms of anatomy, physiology, behavior, etc.) to achieve many functions.
- Students learn how to explore an organism’s form and function in an entirely new way, and to suspend what they “know” about the organism in order to see it with fresh eyes.

Materials

- A set of natural objects.

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Activity

DURATION: 10—45 minutes

PROCEDURE

1. Have the students form pairs, and give each pair one blindfold and one worksheet (if using). Have one student put on the blindfold. Explain that the blindfolded student will explore a natural object with all of his/her senses except sight — feel the object, smell it, etc. While exploring the natural object, the blindfolded student should give adjectives about the object (e.g., “it’s very soft at the tips,” etc.).
2. Give each pair a natural object, or, have them go outside where they can encounter natural objects.
3. Have the unblindfolded student hand the natural object to his/her partner or, if outside, lead his/her partner to a natural object. Of course, instruct seeing partners to keep blindfolded partners safe at all times.
4. Have the blindfolded student use all of their senses (other than sight) to explore the object, and provide adjectives about what they are sensing. If using worksheets, have the unblindfolded student write these adjectives down. Do this with several natural objects.
5. If using worksheets, read the adjectives one-by-one back to the blindfolded student, and ask them to speculate on the function of the attribute. You can try this with the blindfold still on or take it off.
6. Switch the blindfold to the second student and repeat, using new natural objects.
7. As an option, you can add a third column to the worksheet called “Application,” and have the blindfolded student return to the first row and brainstorm how each identified attribute and function might be applied to solving a human technological challenge.

CONCLUSION AND DISCUSSION

This exercise is a foundational one for exploring the concept of function in biomimicry. It can be used with almost any age group.

EXTENSION

Link to other activities on “seeing” function.

Add a column on the worksheet titles: “Application.” Have students brainstorm what application the functional adaptations might have for human technologies.

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Vocabulary

Adjective: An adjective describes a noun. For example, “salty” to describe the ocean.

Function: In biology, functions describe what a characteristic or process does or how it performs, within the context of natural selection and the imperative to survive and reproduce. Discussions of function seek to explain why an object or process occurs in an organism or system and is closely related to the term “adaptation,” which is a functional characteristic of an organism. More generally, function refers to the purpose or operational result of any mechanism, so that we can speak of parallel functions that exist in both the natural and human-built worlds. For example, adhesion both in geckos and in human-made products like medical bandages.



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A student leads a blindfolded partner in an exploration of their surroundings.

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Worksheet

Natural Object	Adjectives	Functions
<i>Sea Urchin</i>	<i>spiny</i>	<i>defend against predators</i>