



# A Teacher's Guide to If We Could Talk to the Animals... Grades 3-6

**Description** How do animals convey messages without speaking? Explore some of the secrets of animal communication, such as body language, scent, color or sound.

**Outcomes** Students will recognize that animals communicate in various ways – through sound, body language, scent, and coloring. Students will be able to make connections between animal communication and human communication.

## Suggested Activities Before Your Outreach:

### Vocabulary

communication  
scent marking  
display

body language  
mimicry  
vocalization

- Have students brainstorm a list of all the different ways people communicate with each other. Divide this list into categories: How many of those methods involve sound? How many involve smells? How many involve body motion? How many involve colors?
- Compare these categories with the ways that dogs or cats communicate. Which categories do these animals rely on the most?
- Create hypotheses about the dominant method of communication of different animal groups (mammals, reptiles, insects, amphibians, birds). How do these relate to the animals' senses?

## Suggested Activities After Your Outreach:

### Classroom Activities:

- Discuss the lesson with your students. What new ideas or information did they learn? Was anything confusing? What did they like best?
- Discuss the results of your hypotheses. Were you right? Does each animal group have a dominant means of communication? (Do you need to do more research?)
- Play Animal Communication Charades! Try using sounds (without words), body language and color to communicate different messages that animals often send (examples: "Watch out!" "I'm hungry" "I'm scared" "I'm curious" "I like you").
- Distribute the handout on "Bird Songs" and discuss the "Stop and Think" questions that follow, and see attached "[Animal Communication Activity: Hear and Seek](#)" for an activity based on the vocalizations of parrots in the wild.
- Observe local birds. Take students outside, if possible, to listen to and watch birds in the area. Listen for distinct songs and calls. There are a few great websites to get an idea of some of the calls of the birds in your area. Notes about these sites can be found in the "Additional Resources for Educators" section. Repeat the activity; this time, however, listen for native insects. (This may work as a homework extension activity. Nighttime may be the best time to listen for insect songs.)

### **Homework Assignments:**

- Have students read the attached handout “Good Vibrations: Thornbug Communication” and answer the “Stop and Think” questions.
- Try the Crazy Critter Communication Crossword (attached) and reinforce vocabulary concepts.

### **Interdisciplinary Activities:**

- See attached “Animal Communication Activity: Communication Computation” for a math exercise involving animal communication.
- See the attached “Animal Communication Activity: Mimicry” and create a class “Book of Mimics.”

### **Writing Prompts:**

- Invent an animal. How will this new animal communicate? Will it use warning colors or mimicry? Will it vocalize or leave scent markings to recognize others of its species? What sort of body language will communicate fear, interest, and calm? Describe how the animal will communicate with member of the same species and how it will communicate with members of different species.
- You’re in the jungle. You come across a (animal of the student’s choosing). At first, you don’t think it sees you, but then it signals to a whole group behind it by...

### **Class Project Ideas:**

- Join “Project Pigeon Watch”  
Observe pigeons in your area to help scientists learn about their behavior—from communication to courtship behavior, and more! For details, visit:  
<http://ehrweb.aaas.org/ehr/parents/Pigeons!.html>
- Have each student choose an animal (perhaps one that was part of the lesson) to research individually to discover its main method(s) of communication. Why does this method of communication suit this animal, taking into account in its specific niche and habitat? Have each student present his or her findings to the group.
- Join “Classroom Feeder Watch”  
Team up with ornithologists at Cornell University and learn more about the behavior and communication style of the birds in your own backyard! For details, visit:  
<http://www.birds.cornell.edu/cfw/home.html>

### **Resources for Students**

- This site describes the way the animals in the movie “The Wild Thornberries” really communicate: <http://www.nationalgeographic.com/ngkids/0212>
- Koko’s Kitten by Dr. Francine Patterson
- Take the animal communication challenge and read more about animals and the ways they survive in their environment: <http://www.nhptv.org/natureworks/nwep3.htm>
- Honey Bees by Deborah Heiligman
- Peterson First Guide to Birds of North America (Peterson First Guides)  
by Roger Tory Peterson
- Eyewitness: Life - David Burnie (Eyewitness Books)
- The Kid’s Guide to Research – Deborah Heiligman

### **Additional Resources for Educators**

- The first and most comprehensive site for bird songs (as well as one for insects that's great!) is [www.naturesounds.com](http://www.naturesounds.com). There is a North American Birds section that should be quite helpful. A word of warning- there are quite a few calls on this site so it's best to know which birds specifically you need. Check out a good field guide ahead of time, and this site is wonderful.
- Another site that could be utilized with the bird watching activities is <http://www.birds.cornell.edu/programs/AllAboutBirds/BirdGuide/>. This site is even more accessible, but again a field guide is a great help when navigating the site to find the bird calls you really want.
- Animal Talk: Breaking the Codes of Animal Language by Tim Friend
- The Animal Communication Project provides information on communication among organisms, from arthropods to apes: <http://acp.eugraph.com/index.html>
- Guide to a Well-Behaved Parrot (2<sup>nd</sup> edition) by Mattie Sue Athan. This book has a great section on parrot body language and the meanings behind some of the behaviors that parrots perform. It explains how parrots communicate with each other and with their human owners.
- Janice Van Cleave's Animals: Mind-Boggling Experiments You Can Turn into Science Fair Projects- by Janice VanCleave (general animal resource)
- How Nature Works (How It Works) by David Burnie (general animal resource)
- A Dictionary of Nature: 2,000 Key Words Arranged Thematically by David Burnie (general animal resource)

### **AAAS's Project 2061 Benchmarks**

*5. The Living Environment: Diversity of Life*

*5. The Living Environment: The Evolution of Life*

### **Pennsylvania Academic Standards in Environment and Ecology**

4.7.4

### **Pennsylvania Academic Standards in Science and Technology**

3.3.4

### **New Jersey Standards**

5.10.A.1

## Hear and Seek

### Background Information:

Parrots, unlike the songbirds in our backyards, do not always have a song to sing. Their communication is better described as clucks, squawks, clicks, and shrieks. With some species, those little tidbits of communication seem like they rival ambulance sirens in volume! Why do some parrots communicate so loudly? The answer lies in the wild in South America and Australia. Certain species of parrot (such as macaws and amazons) live in large flocks. Those large flocks are not made up of only one species of parrot. Instead, several species will fly and forage together. This may be a result of so many species occupying such a relatively small area; they follow the crowd to find good feeding grounds and nesting sites. But, if you're a macaw, you need to let the other macaws know where the good food is, find a mate, and send an alarm to the other macaws if there is any danger. You need to be heard above the vocalizations of all of the other birds flying around with you in your multispecies flock- you need to be loud! Parrots that would live in multispecies flocks in the wild have developed a much louder call than similar species of parrot that live in single species flocks, such as the African grey parrot. So, even a captive bred Blue and Gold Macaw will most likely produce much louder vocalizations than a captive African Grey!

### Now Try This:

As an experiment, make the class members of a multispecies flock! Each species will have a different "vocalization." Each student will carry a photofilm cannister filled with a different substance (rice, pennies, plastic beads, etc.) Try to have 3-4 very different sounds or species. First, have the class practice simply finding the other members of their species in the noise of the whole flock. Then, discuss the difficulties they encountered. Talk about possible strategies to make the connections easier. Try the experiment again. Talk about multispecies flocks of parrots in South America and Australia. If time (and patience) allows, let each species come up with a different rhythm to communicate danger and a different rhythm to communicate a good food source. See if the different species can get the message!



## Bird Songs

What is a bird "saying" when it sings?

(from Newton's Apple - <http://www.ktca.org/newtons>)

You're walking in a park when suddenly a bird bursts into song. At a spot where a pile of leaves are flying, you see it—a large, robinlike bird with orange flanks and a white belly. It's a rufous-sided towhee. It's singing a song that sounds like "drink-your-tea-ee-ee-ee-ee." The bird spots you and changes its tune to "dreet, dreet, tow-hee, chee-wink." Is the bird talking to you? What is it saying? Why does a towhee sing this song instead of a robin's song? Why do songbirds sing at all?

For the answers, you need to look at both heredity and experience. The songs a bird sings are usually distinctive to its species. Scientists believe a bird is born with a "neurological model" of what its song should sound like. The baby bird learns that song by matching the sounds it hears from its father and male neighbors. Scientists call this theory the auditory template hypothesis. In this theory, song learning begins at about ten days after hatching and continues for about 40 days. Baby birds then practice their songs through the fall and winter. By spring, birds have developed a "crystallized" song.

To communicate, birds combine songs and other vocalizations with certain behaviors and outward appearances. Males tend to sing more than females, and they sing more in the spring. Songs help proclaim territory, attract mates, and maintain a pair bond.

Some birds like gulls and parrots have no songs. Instead they use complex calls to defend territory and attract mates. Oilbirds and cave swiflets use vocalizations to maneuver in the dark, a process called echolocation. The ruffed grouse and mourning dove make sounds with their wings and woodpeckers with their beaks.

Most songbirds have several songs and calls. Birds in the Mimid family (the mockingbird, catbird, and brown thrasher) have very large repertoires. Scientists believe that repertoires increase with age and may indicate to females the health and experience of the male.

A songbird uses its syrinx, a vocal organ in its throat, to create a song. A bird's songs can vary in pitch, tone length, number of notes, and special sounds. The two halves of the syrinx can produce songs simultaneously so a bird may sing harmonies with itself, resulting in extremely rich and complex melodies. No human voice can equal this feat.

Stop and Think:

1. What different kinds of sounds do humans make? Why do humans sing and make music?
2. Why could the same word or gesture mean something different in different countries?



## Good Vibrations: Thornbug Communication

*It is a lovely morning. You're hanging out a stem with a hundred or so of your brothers and sisters. The sap today is delicious, and you can't think of a better way to spend your time than to sit on this stem and eat. All of a sudden, a wasp enters the picture. Even though you're still a baby, you know this wasp could mean trouble for you and your siblings. Mom is sitting nearby, but she doesn't see the dangerous bug hovering right above you. What do you do?*

If you were a thornbug, the answer would be obvious- you'd shake and shimmy! Thornbugs are very small insects (only about 1.3 centimeters long) that are common in some parts of Costa Rica. Adult thornbugs are lime green with a red spine down their spiked backs. Large groups of very young thornbugs spend their days eating sap from trees and trying not to get eaten themselves! The mother thornbug will spend the first month of her children's lives guarding them and making sure they don't wander off and get eaten. Sometimes, Mama Thornbug doesn't see predators before her offspring do!

If a young thornbug sees a hungry wasp nearby, it will begin to shake its body-sending vibrations through the stem. It's the thornbug's way of saying, "Hey, Ma! Get over here! We're in danger!" The other thornbugs near that first baby will begin to vibrate the stem with their bodies in time with the first message. Soon, the whole mess of young thornbugs will send vibrations through the stem. By then, hopefully, the mother thornbug will feel those urgent vibrations throughout her body. Then, she'll get the message and step closer to defend her babies.

This type of communication is called "substrate vibration." What that fancy name means is that an animal will send vibrations through whatever surface it happens to be sitting on or in (substrate) in order to communicate. Other animals including the chameleon and blind mole rat may also use substrate vibration to communicate. The animals that use substrate vibration use those vibrations very much like we use our vocal chords. We send vibrations through the air with our vocal chords to the eardrums of other people. These animals don't use vocal chords, but send vibrations using other parts of the body that repeatedly strike the area around them. These messages are sent through the substrate (not the air) and are picked up, not by eardrums, but by the whole body of the other animals.

*Your mother has gone to defend you. She waves her hind legs and hovers over the wasp. You wait. Has your mother defeated the dreaded wasp? Will you have to find a way to defend yourself from now on? Will you need to leave your brothers and sisters and head out on your own? All of a sudden, you feel it. The strong, steady movement in the stem below you. Your mother is letting you know the coast is clear. You go back to sipping away at the best sap you've ever tasted.*

Stop and think:

1. Compare the communication methods of human babies and thornbug babies. How are they alike and different?
2. Name two ways that animals can communicate other than substrate vibration.
3. What might be some disadvantages to using substrate vibration? Do you think there is danger in other animals picking up on the vibrations?

## Fooled You!: Mimicry

(Conant 1958)



**Eastern Coral Snake  
(venomous)**

**Scarlet King Snake  
(non-venomous)**

Snakes have different arrangements of colors, patterns, or shapes on their bodies. For some snakes, the color scheme sends a warning: "Dangerous--stay away from me." Other nonvenomous snakes mimic the appearance of the venomous snakes by using the similar markings to scare away predators. For example, the venomous coral snake and the nonvenomous scarlet king snake have similar color patterns on their bodies. They each have bands of black, red, and yellow. For the coral snake, this communicates "Don't mess with me- I'm venomous!" to any potential predators. The king snake also has bands of black, red, and yellow, but the bands are arranged in a different order. Hopefully, predators will be too afraid of the coral snake to get close enough to figure out that the snake they are hunting is the nonvenomous king snake. Find an identification book on snakes. List the differences in coloration between venomous and nonvenomous snakes in your state. Are any of these snakes considered mimics? Why?

For an extension activity:

People have found it useful to create rhymes to help differentiate between venomous and nonvenomous snakes with red, black, and yellow bands.

One version of the rhyme is as follows:

If red touches black, friend of Jack. (If red bands touch black bands, the snake is nonvenomous.)

If red touches yellow, could kill a fellow. (If red bands touch yellow bands, the snake is venomous.)

Research natural mimics (insects, animals, plants). Try to figure out how being a mimic has helped your particular species. What about the "non-mimic" that helps to protect the mimic? (Remember: an animal/insect mimic does not have to mimic another animal/insect. A butterfly cocoon that looks like a leaf is also a mimic. Get creative!) Create your own rhyme to differentiate between the two species. Illustrate your rhyme. Present your findings and your new rhyme to the class. Create a class "Book of Mimics."

## Animal Communication Activity: Communication Computation

When you use this resource in your classroom, you may want to adjust the math problems to the skill level of your particular students. A blank template on which *you* can fill in appropriate “hints” as well as a usable example with addition and subtraction has been provided. The desired answers are below. Enjoy!

### Answer Key:

*Animals communicate in so many amazing ways. Solve the math problems below to find out some of the really neat ways animals at the Academy of Natural Sciences communicate.*

1. When threatened, large boa constrictors can hiss so loudly that their hiss can be heard up to 100 ft. away. This lets any predators know that they shouldn't mess with this snake.
2. When scared, turkey vultures can project their vomit up to 6 ft. What an extreme way to let your predators know that you're scared!
3. When it wakes up from a night's sleep, a Moluccan cockatoo can scream at 135 decibels! (A 747 Jumbo Jet produces 140 decibels!) This is the cockatoo's very loud way of telling the other members of its flock that it made it through the night safe and sound.
4. About 32 days after a female red-tailed hawk lays her eggs, the eggs hatch. The baby red-tails then can be heard making a “klee-uk” sound. That is the hatchlings' way of asking mom for some food. Hey, Ma, feed me!
5. Dr. Irene Pepperberg's African Grey parrot, Alex, knows about 100 words! Alex not only can say all of those words, but can also answer Dr. Pepperberg's questions about size, shape, and color.
6. When frightened, opossums can “play dead” for less than a minute all the way up to 6 hours. This hopefully communicates to a predator- “Look! I'm already dead! Don't you want to go find some other food that is alive?”
7. Even though bearded dragons can stand temperatures of 120 degrees, young male bearded dragons can find themselves in some pretty hot water! When an adult male bearded dragon wants to start a fight with a younger one, sometimes the kid will wave its arms around to show that it doesn't want to fight. Chill out!
8. A skunk's black and white coloring communicates to other animals (including humans!) that they have a defense that smells really bad. And, boy, are they right! The human nose can smell the spray of a skunk 2,640 feet away.

*Animals communicate in so many amazing ways.*

*Solve the math problems below to find out some of the really neat ways animals at the Academy of Natural Sciences communicate.*

1. When threatened, large boa constrictors can hiss so loudly that their hiss can be heard up to \_\_\_\_\_ ft. away. This lets any predators know that they shouldn't mess with this snake. Hint: \_\_\_\_\_
2. When scared, turkey vultures can project their vomit up to \_\_\_\_\_ ft. What an extreme way to let your predators know that you're scared! Hint: \_\_\_\_\_
3. When it wakes up from a night's sleep, a Muluccan Cockatoo can scream at \_\_\_\_\_ decibels! (A 747 Jumbo Jet produces 140 decibels!) This is the cockatoo's very loud way of telling the other members of its flock that it made it through the night safe and sound. Hint: \_\_\_\_\_
4. About \_\_\_\_\_ days after a female red-tailed hawk lays her eggs, the eggs hatch. The baby red-tails then can be heard making a "klee-uk" sound. That is the hatchlings' way of asking mom for some food. Hey, Ma, feed me! Hint: \_\_\_\_\_
5. Dr. Irene Pepperberg's African Grey Parrot, Alex, knows about \_\_\_\_\_ words! Alex not only can say all of those words, but can also answer Dr. Pepperberg's questions about size, shape, and color. Hint: \_\_\_\_\_
6. When frightened, opossums can "play dead" for less than a minute all the way up to \_\_\_\_\_ hours. This hopefully communicates to a predator- "Look! I'm already dead! Don't you want to go find some other food that is alive?" Hint: \_\_\_\_\_
7. Even though Bearded Dragons can stand temperatures of \_\_\_\_\_ degrees, young male bearded dragons can find themselves in some pretty hot water! When an adult male bearded dragon wants to start a fight with a younger one, sometimes the kid will wave its arms around to show that it doesn't want to fight. Chill out! Hint: \_\_\_\_\_
8. A skunk's black and white coloring communicates to other animals (including humans!) that they are dangerous and have a defense that smells really bad. And, boy, are they right! The human nose can smell the spray of a skunk \_\_\_\_\_ feet away.  
Hint: \_\_\_\_\_

*Animals communicate in so many amazing ways.*

*Solve the math problems below to find out*

*some of the really neat ways animals at*

*the Academy of Natural Sciences communicate.*

1. When threatened, large boa constrictors can hiss so loudly that their hiss can be heard up to \_\_\_\_\_ ft. away. This lets any predators know that they shouldn't mess with this snake. Hint:  $5,500 / 55 =$  \_\_\_\_\_

2. When scared, turkey vultures can project their vomit up to \_\_\_\_\_ ft. What an extreme way to let your predators know that you're scared! Hint:  $\frac{1}{4}$  of 24 = \_\_\_\_\_

3. When it wakes up from a night's sleep, a Moluccan Cockatoo can scream at \_\_\_\_\_ decibels! (A 747 Jumbo Jet produces 140 decibels!) This is the cockatoo's very loud way of telling the other members of its flock that it made it through the night safe and sound. Hint:  $5 * 27 =$  \_\_\_\_\_

4. About \_\_\_\_\_ days after a female red-tailed hawk lays her eggs, the eggs hatch. The baby red-tails then can be heard making a "klee-uk" sound. That is the hatchlings' way of asking mom for some food. Hey, Ma, feed me! Hint:  $\frac{1}{2}$  of 64 = \_\_\_\_\_

5. Dr. Irene Pepperberg's African Grey Parrot, Alex, knows about \_\_\_\_\_ words! Alex not only can say all of those words, but can also answer Dr. Pepperberg's questions about size, shape, and color. Hint:  $8,500 / 85 =$  \_\_\_\_\_

6. When frightened, opossums can "play dead" for less than a minute all the way up to \_\_\_\_\_ hours. This hopefully communicates to a predator- "Look! I'm already dead! Don't you want to go find some other food that is alive?" Hint:  $54 / 9 =$  \_\_\_\_\_

7. Even though Bearded Dragons can stand temperatures of \_\_\_\_\_ degrees, young male bearded dragons can find themselves in some pretty hot water! When an adult male bearded dragon wants to start a fight with a younger one, sometimes the kid will wave its arms around to show that it doesn't want to fight. Chill out! Hint:  $6 * 20 =$  \_\_\_\_\_

8. A skunk's black and white coloring communicates to other animals (including humans!) that they have a defense that smells really bad. And, boy, are they right! The human nose can smell the spray of a skunk \_\_\_\_\_ feet away.

Hint:  $1320 * 2 =$  \_\_\_\_\_

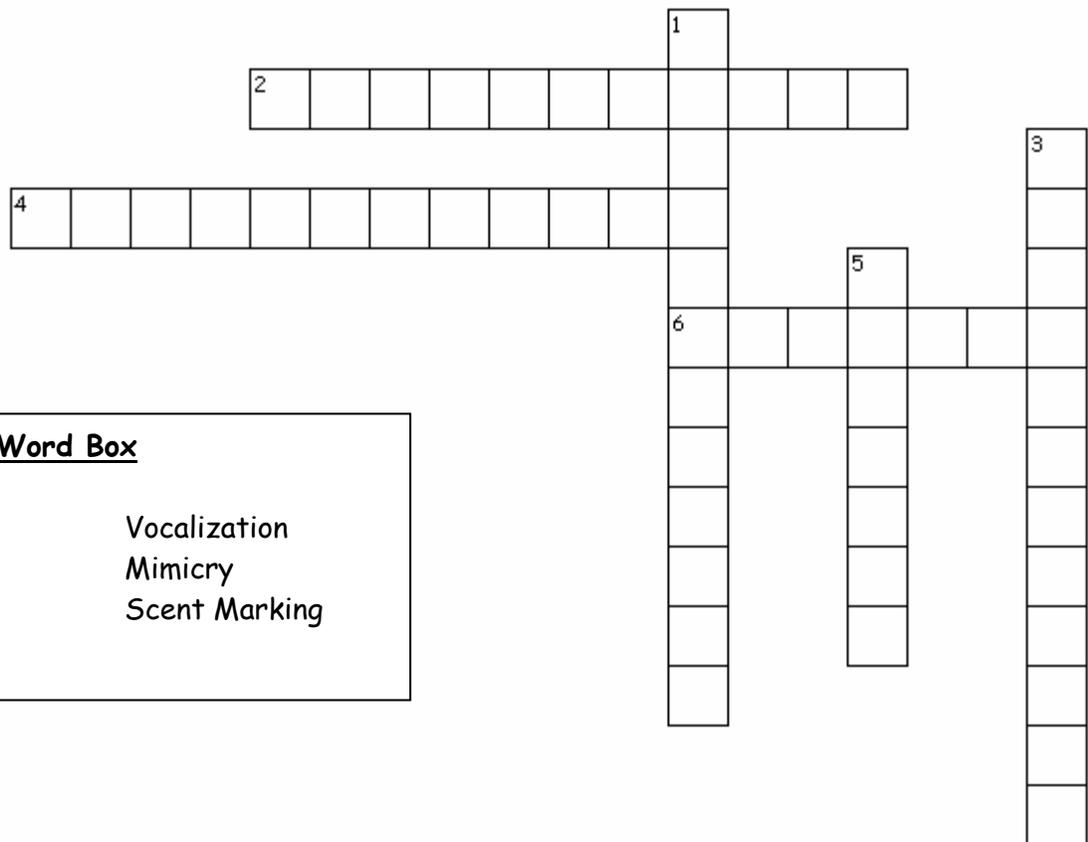
# Crazy Critter Communication

## Across

- An animal can \_\_\_\_\_ through body language, scent, coloration, and sound.
- A Great Horned Owl that makes a "hoot" sound is using a \_\_\_\_\_ to communicate.
- A non-venomous milksnake will use the fact that it looks like a highly venomous coral snake to confuse predators into thinking it is dangerous. This type of communication is called \_\_\_\_\_.

## Down

- When an animal leaves a smell behind as a way to communicate with other animals, it is called \_\_\_\_\_.
- Animals can communicate through facial expressions and posture. When they do this, it is said that they are using \_\_\_\_\_ to communicate.
- A peacock's feathers spread in a special \_\_\_\_\_ in order to attract a female peahen.



### Word Box

Communicate	Vocalization
Body Language	Mimicry
Display	Scent Marking