

Exploring Animal communication and language among Animals

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ABSTRACT

The classical definition of animal communication is that "...an action or cue given by one organism [the sender] is perceived by another organism [the receiver] and alters the probability pattern of behavior in that organism in a manner adaptable to either the sender or the receiver". Animals communicate with one another through images, emotions and physical sensations. Researchers claim that animals do not have a true language like humans, but they do communicate through sounds and gestures. Animals have a number of in-born qualities they use to express themselves, but these aren't like the formed words we see in the human language. This paper explores the way animals communicate and language used by animals.

Introduction

A signal is the vehicle by which one animal provides information to another animal that it can then incorporate into its decision making. Animal communication is the process by which one animal provides information to another animal. In addition to sound, colour pattern, posture, movement, electrical discharge, touch, or the release of an odorant, signals may be provided in many different ways. Every animal face daily decision about how to behave. These choices may be as simple as a sea anemone deciding when to expand its tentacles or as complex as a male lion deciding whether to approach a reluctant mate.¹

The decision, which may be reflexive or conscious, is influenced by evolutionary biases based on alternative outcomes of choice, recent experiences about likely conditions, and sensory information. Those animals that have access to complete information can always make the right choice. Communication is therefore an important source of additional information that is incorporated into the decision-making process when life is not so accommodating and inputs often fail to provide complete information.²

Cactus wrens (*Campylorhynchus brunneicapillus*) sing to communicate with other species members. Signals are actions or anatomical structures that provide information to another animal as their primary function. Nevertheless, not all actions by one animal that provide information to another animal qualify as signals.

The noise created by a foraging mouse and used by an owl to locate and kill the mouse is a good example. Mice need food, and the noises they create while eating (e.g., through movement and chewing) are a consequence of their feeding activity. Therefore, these sounds are not signals. A wren's song, on the other hand, is not an accidental sound. The birds sing to communicate with one another only.

When an animal sends a signal, it is called a sender. The animal receiving the signal is called a receiver. The receiver analyzes the signal information and makes decisions based on it. In this case, a receiver brings to it biases and thresholds passed down from successful prior generations when faced with the decision of fighting or fleeing from an opponent. The receiver can use this information to avoid harm, find food, shelter, and mates, as well as shape their evaluation of the situation based on previous experiences in their own life. It would be useful to assess the size of the opponent if it regularly loses to larger animals. By using vision or other means, this can be accomplished. For example, the opponent may broadcast a low-frequency sound signal at the receiver. It indicates the opponent is large by the fact that low-frequency sounds can only be produced by large animals. The receiver integrates its perception of the sound frequency with its prior experience and inherited avoidance of harmful situations and therefore decides to flee.³

¹ "Sandra L. Vehrencamp and Jack W. Bradbury. 2022. animal communication. Encyclopedia Britannica."

² "Sandra L. Vehrencamp and Jack W. Bradbury. 2022. animal communication. Encyclopedia Britannica."

³ "Sandra L. Vehrencamp and Jack W. Bradbury. 2022. animal communication. Encyclopedia Britannica."



Fig 1. Animal Communication

In this example, the receiver can only interpret the signal if it understands that low-frequency sounds are associated with large body sizes. Known as a code, alternative signals (e.g., sounds of different frequencies) are associated with alternative circumstances (e.g., the size of opponents). Codes can be regarded as probabilities that a sender will emit a given signal in any given circumstance. In a perfect code, only one signal will be used in a given context, and only one context will evoke that signal. In addition to not having to be perfect, real codes must be good enough that a receiver relying on other sources of information and attending to signals makes better decisions.

A wide variety of mechanisms are used by animals to acquire signal codes. Some codes are inherited genetically. Insect males, for example, produce a limited range of sound frequencies, which females are more sensitive to than males. Some species determine their senders' sounds or body odors through random genetic processes, and receivers have to learn which signals belong to which individuals. Many songbirds have genetic limits on the range of sounds they can sing, but can learn one or more local variants within those limits during their youth. The sender and receiver of certain species, for example parrots or humans, must learn the appropriate vocal coding, and they can keep learning alternative coding systems throughout their lives.⁴

Types of Communications

2.1 Pheromones

A pheromone is a secreted chemical signal used to trigger a response in another individual of the same species. It is especially common among social insects, such as ants and bees, to use pheromones to attract the opposite sex, raise alarms, mark a food trail, or trigger other complex behavior.⁵

⁴ “Sandra L. Vehrencamp and Jack W. Bradbury. 2022. animal communication. Encyclopedia Britannica.”

⁵ “Animal communication. Khan Academy. Retrieved from <https://www.khanacademy.org/science/ap-biology/ecology-ap/responses-to-the-environment/a/animal-communication>”

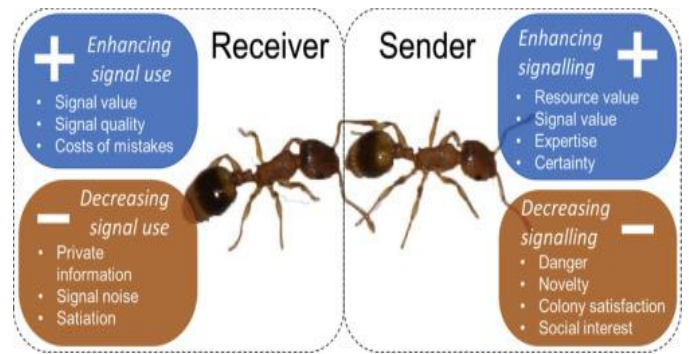


Fig 2. Pheromone Communication

In the diagram below, ants are shown directing others to food sources using pheromone trails. In order to attract more ants, ants will deposit pheromone on both the outgoing and return legs of their trips when a food source is rich. When the food source is about to run out, ants will stop adding pheromone on the way back, fading the trail out. Different ants may respond differently to the same pheromone signals cubed to communicate their social status, or role, in the colony. When an ant is squashed, it releases pheromones that warn nearby ants of danger—and may cause them to swarm and sting. Pheromones are also used by dogs to communicate. They sniff one another to collect this information, and they release many of these chemicals in their urine as well. When a dog pees on a bush or post, it leaves a marker of its identity that other dogs can read and can use to claim territory nearby.⁶

2.2 Auditory Signals

- A bird's ability to communicate through sounds is especially important, as it transmits warnings, attracts mates, defends its territory, and coordinates group behavior. Birds also produce birdsong, a long and melodious vocalization that is similar across species.
- Vervet monkeys even have different calls to indicate different predators when they sense a predator nearby.

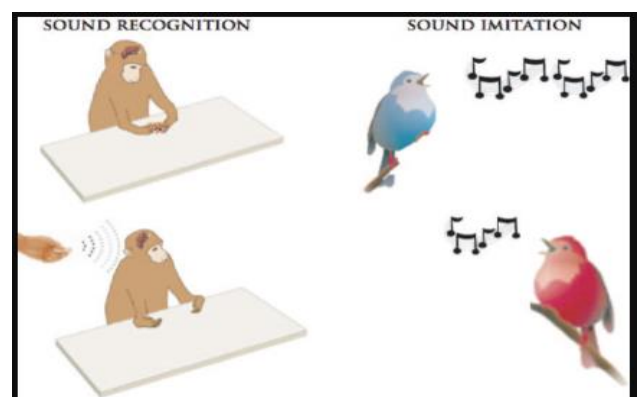


Fig 2. Auditory signals

⁶ “Animal communication. Khan Academy. Retrieved from <https://www.khanacademy.org/science/ap-biology/ecology-ap/responses-to-the-environment/a/animal-communication>”

- There are some frog species that can be heard up to a mile away when bullfrogs croak.
- Calls are used by gibbons to mark their territories and keep competitors at bay. A pair of gibbons, and even their offspring, may make the calls together.
- The water, like air, can carry sound waves, which is why marine animals can communicate using sound. Dolphins, for example, produce a variety of sounds—including whistles, chirps, and clicks—and arrange them in complex patterns. The idea of this being a language is intriguing, but highly controversial.⁷

2.3 Visual signals

A visual communication involves signals that are visible, such as gestures, facial expressions, body postures, and colors. For instance, chimpanzees communicate a threat by raising their arms, slapping the ground, or staring directly at another chimpanzee when threatened.

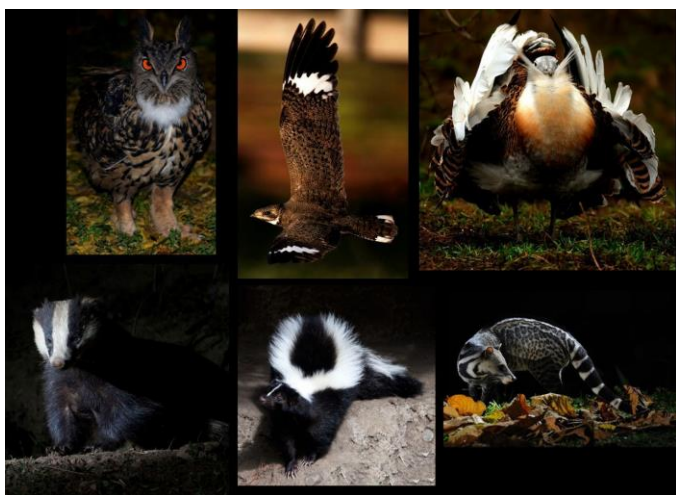


Fig 3. Visual Signals

In mating rituals, gestures and postures are commonly used, and they may convey other signals, such as bright colors. Some species use facial expressions to convey information. The fear grin, shown on the young chimpanzee below, signals submission in some species. To indicate their acceptance of a dominant male in their troop, young chimpanzees use this expression when approaching him.

In some monkey species, colored skin around the reproductive organs becomes brightly colored when the female is in fertile phases of her reproductive cycle. Color changes also serve as visual signals. In this case, suitors can approach the female due to the change in color. Coloration may also serve as a visual signal, rather than a change in color.⁸

⁷ “Animal communication. Khan Academy. Retrieved from <https://www.khanacademy.org/science/ap-biology/ecology-ap/responses-to-the-environment/a/animal-communication>”

⁸ “Zimmer, Marc. *Bioluminescence: Nature and Science at Work* (Twenty-First Century Books, 2016).”

Animals use a variety of visual signals to communicate information. For example, bright colored badges or antlers may indicate the sender's species, sex, and age. In some social animals, badges may indicate the sender's rank. In many species, bright colors indicate the animal is poisonous—the bright colors signal potential predators that attacking the sender will lead to harm to them.⁹

An example is the elaborate bowerlike nest the male of the bowerbird builds solely to attract a mate, which is intended to serve as a communication tool. Others create display arenas or build structures to communicate with each other. It is also possible to see rabbit dung heaps and bear scars on tree trunks as signs of territory marking.

Behavioral displays can be seen through postures and dances. Take, for instance, the case of the worker honeybee, which conveys its discovery of a new food source to the other bees through its vibrant wing vibrations and its so-called dance. In many animal species, males compete for mates via flamboyant courtship rituals; cranes are known to have such a display where they strut and bow. Moreover, during mating season many birds like peacocks flaunt their spectacularly colorful plumage as a visual signal to attract potential partners.¹⁰

Several animals use special display postures to show dominance or send a threat signal to potential predators. A dog pack's alpha, for instance, will sometimes show its teeth in order to assert its authority. Deer and rabbits are just two types of animals that use the freeze reflex to signal danger. When facing a dangerous situation, they freeze, or stop moving, until the threat passes.

2.4 Touch signals - tactile signals

A tactile signal can only be sent when two organisms are right next to each other. It is quite common for insects to use tactile signals. Honeybee foragers, for example, will perform a series of intricate motions called waggle dances to indicate where food is located. The other bees interpret this dance primarily by touch since it is performed in darkness inside the nest. In many primate species, members of a group will groom each other in order to remove parasites and maintain hygiene. For instance, newborn puppies instinctively knead at their mothers' mammary glands, releasing the hormone oxytocin and causing milk to be produced.¹¹

⁹ “Zimmer, Marc. *Bioluminescence: Nature and Science at Work* (Twenty-First Century Books, 2016).”

¹⁰ “Zimmer, Marc. *Bioluminescence: Nature and Science at Work* (Twenty-First Century Books, 2016).”

¹¹ “Animal communication. Khan Academy. Retrieved from <https://www.khanacademy.org/science/ap-biology/ecology-ap/responses-to-the-environment/a/animal-communication>”

Purpose of Communication

Animals communicate using many different types of signals, and they also use these signals in many different contexts. Here are some common functions of animal communication.

- Many animals have elaborate communication behaviors around mating, which may involve attracting a mate or competing with other potential suitors for access to the female.
- Communication behaviors are important in establishing dominance or defending territory in many species.
- Communication is key in coordinating the activities of social species, such as food acquisition and defense, and in maintaining group cohesion.
- Communication coordinates parent and offspring behaviors to ensure the survival of offspring among species that provide parental care.

Conclusion

Animals communicate using signals that can be visual, auditory, chemical or tactile. If you wish to connect with an animal, try sending a beam of love and patience towards them. Ask their permission to communicate with no resistance and wait for their response. Whilst human language may not be something animals understand exactly, they still converse with one another via vocal sounds like whales singing, wolves howling, birds chirping and frogs croaking. Animals also communicate in nonverbal ways much like humans do.