

Animal communication

Unit 1, Class 2, Part 1

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Today's plan



The plan

- Who was absent in the last class?
- Review the last class
- How do animals communicate and why?



From the previous class

1. How does your communication approach change across Kathmandu and your home town?
2. Has an animal ever communicated anything to you? What kind of things and how?



Animal communication systems



Why study animal communication?

1. Intrinsically interesting
2. Understand human communication and language evolution
3. Understand cognition
 - forms of cognition across species
4. Communicate with animals and improve pets' lives



Types of animal communication

Which species is involved?

- Intraspecies
within same species e.g., *waggle dance* of honeybees
- Interspecies
between different species e.g., *rattle* of a rattle snake



Animal communication signals

1. Visual
2. Auditory
3. Chemical
4. Tactile
5. Electrial



Visual signals

- signals that can be seen
- include gestures, facial expressions, body postures, and coloration.
- generally active during the day



Figure 1: The “fear grin” on chimpanzee’s face showing he is willing to submit to a dominant male.



Auditory signals

- can be adapted to a wide variety of environmental conditions and behavioral situations
- can vary substantially in amplitude, duration, and frequency structure
- particularly important in birds
 - warnings and keep to flock together (birdcalls: simple vocalisation)
 - attract mates, signal territory (birdsongs: complex vocalisation)
- Passerine birds emit pure-tone alarm calls (difficult to localise) as well as more complex broadband mate attraction songs (allow conspecifics to find the sender) (Marler, 1955)
- Microchiropteran bats emit high-frequency sounds to detect and localize prey (from Gillam, 2011)



Chemical signals

- Often through glands, to trigger specific responses in organisms of the same species (think *pheromones*)
- Slower to travel than visual and auditory signals due to diffusion
- Effective over long distances
 - lingers for extended longer in the environment
- usually detected through smell

Ever seen a dog sniff another dog?

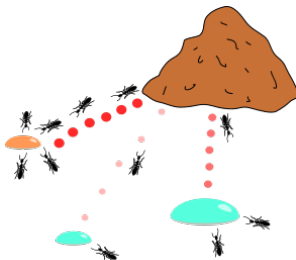


Figure 2: The pheromone trails laid down by ants to direct others to the source of food.



Tactile signals

- Physical contact between the sender and the receiver
- Transmitted over short distance even in darkness
- Builds and maintains relationships among social animals
- Signals the source of food
- Survival of young organisms



Figure 3: Social grooming in Japanese macaque monkeys



Electrical signals

- Electrogenesis: Send out high voltage shocks to incapacitate preys
- Electoreception: Detect weak electrical fields (or its distortion) generated by preys
- Electrolocation of conspecifics in murky water (sharks)
- Coordinate and synchronize the release of eggs and sperms
- Bumblebees: fast wings alter static electricity of flowers for about 100s to communicate other bees about the exhausted pollens (from McGrath, 2024)



Animal communication: Functions

1. Social bonds
2. Courtship and mating
3. Conflict resolution and territorial defense
4. Relocation and identification of young offsprings
5. Convey information about the environment and food to conspecifics



Social bonds

Maintain relationships, cohesion in groups, and cooperation.

- Primates grooming each other
 - Strengthens social bonds and reduces stress, e.g., chimpanzees and baboons
- Dolphin signature whistles
 - Unique whistles to maintain contact with specific individuals, like close friends or family
- Elephant rumbling
 - Elephants coordinate movements and maintain group cohesion through low-frequency vocalizations even when far apart



Courtship and mating

Attract mates, assess compatibility, and initiate reproduction

- Birdsong in songbirds (e.g., nightingales, canaries)
 - Males sing to advertise their fitness and territory to females
- Peacock tail displays
 - Visual signals communicate genetic quality to potential mates
- Firefly light flashes
 - Specific flash patterns to attract females



Conflict resolution and territorial defense

Avoid physical confrontations, warn rivals, and protect resources

- Dog growling or baring teeth
 - Intent or dominance to avoid fighting
- Howler monkey calls
 - Claim and defend territory without direct confrontation
- Red deer roaring contests
 - During rut, males roar to assess rival strength before engaging in antler fights



Relocation and identification of young offspring

Ensure care, prevent misidentification, and maintain parent-offspring bonds

- Penguin vocal recognition
 - Unique calls of emperor penguins to find their chicks in massive colonies
- Seal mothers sniffing pups
 - Olfactory cues help mothers identify and care for their own young
- Elephants using low rumbles
 - Calves recognize their mother's rumble among many herd members



Convey information about the environment and food to conspecifics

Share info about danger, food sources, or navigation

- Bee waggle dance
 - Direction and distance of nectar sources
- Meerkat alarm calls
 - Different calls for aerial vs. ground predators to direct group response
- Ravens calling to others
 - Informing kin or social allies about a carcass or food cache



Human Language and Linguistics

In the next part of this lecture, we'll discuss about human communication, particularly about human language and linguistics. We'll also see how human language and animal communication differ and how they are similar.



References I

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