

Zoo 403 Final

Animal Behavior

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FINAL TERM **LESSONS 40-72**

20% Mid term syllabus will be included.

Animal Behavior

40-Behavioral Rhythms

Behavioral Rhythms

Biological Clocks

Animals respond rhythmically to cyclic fluctuations in environment e.g.

- Changes in seasons
- Daily light and dark periods

Rhythmic behaviors are controlled by biological clocks

Behavioral Rhythms

Biological Clocks

- Biological clocks regulate daily and seasonal cyclic activities
- Clocks have a molecular genetic basis
- Genes for time sense have been identified in many animals (human beings too)

Behavioral Rhythms

Biological Clocks

Biological clocks may be:

- Circadian clocks
- Circannual clocks
- Lunar clocks

These clocks are influenced by:

- Dark and light periods
- Lunar cycles

Behavioral Rhythms

Circadian Clock and Circadian Rhythms

- Most important biological clock in all animals
- Regulates and coordinates daily behavioral activities
- Its output is a circadian rhythm
- Exhibited as a daily cycle of rest and activity

Behavioral Rhythms

Circadian Clock and Circadian Rhythms

- Clock is synchronized with light and dark cycles of the environment
- Can also maintain rhythmic activity under constant environment conditions (e.g. during hibernation)

Behavioral Rhythms

Circannual Rhythms

- Biological rhythms linked to yearly cycle of seasons
- Span events repeating on 12 month basis
- Correspond to tilt of earth's spin axis resulting in seasonal changes
- Circannual behaviors:
 - Hibernation
 - Migration
 - Reproduction

Behavioral Rhythms

Lunar Cycles and Tidal Rhythms

- Controlled by phases of the moon
- Gravitation pull of moon determines timing of tidal rhythms in marine environments

Behavioral Rhythms

Lunar Cycles and Tidal Rhythms

- Reproductive behaviors of many marine animals are linked to the timing of new or full moon
- This behavior links reproduction to the times of greatest tidal movement

Behavioral Rhythms

Lunar Cycles and Tidal Rhythms

- Tides disperse larvae to deeper waters
- Deeper waters are relatively safer environment to complete early development

END

Animal Behavior

41-Maintenance of Internal Biological Clocks

Maintenance of Internal Biological Clocks

What are biological clocks?

- Biological clocks are organisms' natural timing devices, regulating the cycle of circadian rhythms.
- They're composed of specific proteins that interact with cells throughout the body.

Maintenance of Internal Biological Clocks

What are biological clocks?

- Nearly every tissue and organ contains biological clocks.
- Researchers have identified similar genes in people, fruit flies, mice, plants, fungi, and several other organisms that make the clocks' molecular components.

Maintenance of Internal Biological Clocks

Biological Clocks

- In humans (and other mammals), a circadian clock is located in the suprachiasmatic nuclei (SCN).
- The SCN is in the hypothalamus. It is a tiny cluster of about 10 thousand nerve cells.

Behavioral Rhythms

Biological Clocks

- The internal mechanism by which such a rhythmic phenomenon occurs and is maintained even in the absence of the apparent environmental stimulus is termed a **biological clock**.
- This biological clock maintain the rhythmic cycle in all animals e.g., mammals and birds.

Maintenance of Internal Biological Clocks

Biological Clocks

- When an animal that functions according to such a clock is rapidly translocated to a geographic point where the environmental cycle is no longer synchronous with the animal's cycle, the clock continues for a time to function synchronously with the original environmental cycle.

Maintenance of Internal Biological Clocks

Mechanism and maintenance

- This group of cells in the hypothalamus respond to light and dark signals.
- When our eyes perceive light, our retinas send a signal to our SCN.
- The SCN sets off a chain reaction of hormone production and suppression that affects body temperature, appetite, sleep drive, and more.

Maintenance of Internal Biological Clocks

Mechanism and maintenance

- Each morning, as sunlight creeps in, our body temperature begins to rise and cortisol is released, increasing our alertness and causing us to wake up.

Maintenance of Internal Biological Clocks

Mechanism and maintenance

- In the evening, as it becomes dark outside, melatonin levels rise and body temperature lowers.
- Melatonin stays elevated throughout the night, promoting sleep.

Maintenance of Internal Biological Clocks

Mechanism and maintenance

- As long as our eyes perceive light, the SCN responds by suppressing melatonin production.
- This explains why evening exposure to light, such as that from indoor light or electronic devices that emit blue light, such as a computer or television, make it harder to fall asleep.

END

Animal Behavior

42-Animal Navigation and Migration

Animal Navigation and Migration

Migration

- A regular, long-distance change in location
- Involves navigation over long distances
- Travelling through unfamiliar territories and environments—not previously encountered

Animal Navigation and Migration

Stimuli for Migration

Environmental and seasonal stimuli:

- Seasonal droughts
- Harsh weather conditions
- Hot summers
- Cold winters

Animal Navigation and Migration

Migratory Animals

Migratory behavior
observed in a wide variety
of:

- Birds
- Fishes
- Butterflies
- Grey whales
- Many other animals

Animal Navigation and Migration

Migratory and Navigational Cues

- Navigational abilities rely on several sensory cues (signals)
- Guide in orientation and path finding
- Some types of cues are not perceivable by human beings

Animal Navigation and Migration

Migratory and Navigational Cues

- Sun compass
- Celestial cues
- Earth's magnetic field
- Visual cues
- Auditory cues
- Olfactory cues

Animal Navigation and Migration

Sun Compass

- Tracking position relative to the sun
- Sun's relative position changes during the day
- Animals adjust for these changes through circadian clock
- An internal mechanism that maintains a 24-hour activity rhythm or cycle

Animal Navigation and Migration

Celestial Cues

- Nocturnal navigators
- North Star in the night sky—has a constant position
- Navigators use this cue

Animal Navigation and Migration

Earth's Magnetic Field

- Long-distance migrants have magnetic sense
- Navigate by sensing position relative to earth's magnetic field
- e.g. birds and fishes

Animal Navigation and Migration

Visual, Auditory and Olfactory Cues

To find way to their destination, many birds use:

- Particular landmarks
- Plane of polarized light
- Odors
- Sounds

END

Animal Behavior

43. Competition for Resources

Competition for Resources

How do organisms compete for resources?

- **Competition** is the struggle among organisms to survive in a habitat with limited resources (species searching for the same kinds of food).
- Competition happens when organisms in an ecosystem have similar needs.

Competition for Resources

How do organisms compete for resources?

- Organisms with different needs can live and survive together in a habitat with little competition.
- Competition increases when the amount of available resources is low.
- Members of the same species compete for available resources.
- All organisms compete for resources (not just animals).

Competition for Resources

Competition occurs

- Within species (intraspecific competition)
 - ✓ Can limit population size
 - ✓ Can affect patterns of spatial dispersion

Competition for Resources

Competition occurs

- Between species (interspecific competition)
 - ✓ Can limit population size
 - ✓ Can affect patterns of spatial dispersion
 - ✓ Can influence patterns of diversity
 - ✓ Can act as a selective force on traits

Competition for Resources

What do organism compete for ?

- Organisms compete for the resources they need to survive
 - ✓ Air
 - ✓ Water
 - ✓ Food
 - ✓ space

Competition for Resources

What do organism compete for ?

- Animals and plants that have specific life history requirements, like cavity-nesting birds, or animals with obligate feeding behaviors, have a more difficult time competing.
- These resources can be limiting factors for where organisms are distributed, and competition for them can be fierce.

Animal Behavior

44. Habitat Selection

Habitat Selection

Habitat

- A habitat is a place where an organism makes its home.
- A habitat meets all the environmental conditions an organism needs to survive.
- For an animal, that means everything it needs to find and gather food, select a mate, and successfully reproduce.

Habitat Selection

Habitat selection

- To live in a habitat an animal must first have **access to the habitat**.
- Once the animal has access to the habitat it must be able to tolerate the conditions of the habitat and find the resources that it needs to survive in that habitat.

Habitat Selection

Habitat selection

- Animals must **be able to tolerate** at least two kinds of factors in the habitat. These factors are abiotic factors and biotic factors.
 - ✓ Abiotic factors are non-biological factors such as temperature, humidity, salinity and pH to name a few.
 - ✓ Biotic factors are biological factors such as competition, predation, and disease.

Habitat Selection

Habitat selection

- Then the animal has **to find the resources** that it needs to survive.
- These resources include: shelter, food, protection, mates, space for breeding, feeding, resting, roosting, courtship, grooming, sleeping etc.

Habitat Selection

Habitat selection

- Animals have **to compete for resources** too. Two species or more occur in a single habitat, in which they strive for survival, shelter, food; space etc. there may be considerable competition, predation, diseases, allelopathic agents (antibiosis/ poisoning) in the existing habitat.
- Every available space cannot play a role of habitat for all species at a time due to certain antagonistic factors. Therefore the animals select the habitat which fulfils its niche and keeps it away from other antagonistic factors.

Habitat Selection

Birds are ideal for studies of habitat selection as they are highly mobile, often migrating thousands of miles (and in the process passing over an enormous range of environments), and yet ordinarily forage, breed, and winter in very specific habitats. For Example

- ✓ The small migrant songbirds
- ✓ Male Henslow's Sparrows foraging
- ✓ Female Red-eyed Vireos seeking their food

Animal Behavior

45-Foraging Behavior

Foraging Behavior

Foraging Behavior

- All activities of an animal related to search, recognize and capture food items

Foraging Behavior

Foraging Choices for Animals

- What items should be included in the diet?
- What path should an animal take between patches?
- How should it locate new patches of food?
- If food is depleted in a patch, when should animal depart to seek another patch of food?

Foraging Behavior

Foraging Choices for Animals

- All animals require decisions among such choices—e.g.,
- Hummingbirds and bees, visiting clumps of flowers to obtain nectar
- Owls, foraging for small rodents in different habitats (fields and forests)

Foraging Behavior

Evolution of Foraging Behavior

- Nutrition is essential for an animal's survival and reproductive success
- Natural selection has operated to refine behaviors that enhance efficiency of feeding

Foraging Behavior

Foraging and Role of Genetic Components

- Variation in forager (*for*) gene in *Drosophila* dictates food search behavior in larvae
- Larvae carrying allele *for*^R (Rover) travel twice for feeding than with *for*^s (sitter)

Foraging Behavior

Foraging and Role of Genetic Components

- Enzyme encoded by forager locus is involved in signal transduction pathway
- It is more active in *for*^R than in *for*^S larvae
- Result: genetic components are behind foraging behaviors

END

Animal Behavior

46-Foraging Model: Risk and Reward Balance

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Foraging Model: Risk and Reward Balance

Gains and Costs of Foraging

- Gains and costs in finding and consuming food:
 - Energy gain from food
 - Energy expenditure in foraging
 - Risk of predation while foraging

Foraging Model: Risk and Reward Balance

Optimal Foraging Model

- Behavioral ecologists apply a model of cost-benefit analysis to study foraging strategies of animals
- Animal foraging behaviors reflect a compromise between competing selective pressures i.e.
 - Benefits of nutrition
 - Costs of obtaining food

Foraging Model: Risk and Reward Balance

Optimal Energy Expenditure

- Optimal Foraging Model analyzes:
 - Energy needed to search food
 - Energy needed to pursue and handle food
 - Energy required to digest food

Foraging Model: Risk and Reward Balance

Optimal Energy Expenditure

- For an animal, energy gain from a given food item must exceed energy costs
- According to optimal foraging model, natural selection favors a foraging behavior that:
 - Minimizes costs of foraging
 - Maximizes benefits

Foraging Model: Risk and Reward Balance

Balancing Risk and Reward

- Most potential cost to a forager is risk of predation
- Maximizing energy gain and minimizing energy costs have no importance if the forager becomes meal of a predator
- Animal's foraging behaviors reflect more safety from predation risk and not the hunger for more food gain

END

Animal Behavior

47. Specialists and Generalists

Specialists and Generalists

Species Diversity

- Species can be broadly divided into:
 - ✓ Generalist species
 - ✓ Specialist species

Specialists and Generalists

Generalist species

- Species that can live in many different types of environments, and have a varied diet are considered **generalists**.

Specialists and Generalists

Generalist species

- Generalists can eat a variety of foods
- Thrive in a range of habitats.
- They have broad niches.
- They can thrive in rapidly changing environmental conditions.

Specialists and Generalists

Examples of Generalist species

- **Raccoons** (*Procyon lotor*) are an example of a generalist species. They can live in a wide variety of environments, including forests, mountains, and large cities, which they do throughout North America. Raccoons are omnivores and can feast on everything from fruit and nuts to insects, frogs, eggs, and human trash.
- Other examples of generalist species include bobcats, coyotes, cockroaches, rats, mice, flies, white-tailed deer and humans, etc.

Specialists and Generalists

Specialist species

- **Specialist** species are animals that require very unique resources. Often, these species have a very limited diet, or need a specific habitat condition to survive.

Specialists and Generalists

Specialist species

- Specialist species evolved to fit a very specific niche.
- Environmental disruptions like effects from climate change or habitat loss have a strong effect on specialists.
- They cannot adapt to use other food sources or habitats as quickly as generalist species.
- The number of specialist species is declining due to human activities.

Specialists and Generalists

Examples of Specialist species

- **Tiger salamanders** can only reproduce in wetland habitats. They also require an abundance of insects and worms for their diet.
- **Koala** (*Phascolarctos cinereus*) are native to Australia. They feed only on the leaves of the eucalyptus tree. Therefore, their range is restricted to habitats that support eucalyptus trees.
- **Canada lynx** (*Lynx canadensis*) a carnivore only feed on snowshoe hare. It inhabit the forested and mountainous areas where their prey is present.

Specialists and Generalists

	Generalist	Specialist
DEFINITION	Generalist is a species that eats a variety of food and lives in a wide range of environmental conditions	Specialist is a species that has a limited diet and lives only in a narrow range of environmental conditions
ENVIRONMENTAL CONDITIONS	Thrives in a wide variety of environmental conditions	Thrives only in a narrow range of environmental conditions
DIET	Eats a variety of food	Has a limited diet
HABITAT	A range of habitats	Strict to a habitat
VARYING ENVIRONMENTAL CONDITIONS	Can adapt to varying environmental conditions	Unable to adapt to varying environmental conditions
EXAMPLE SPECIES	Raccoons, bobcats and coyotes, etc.	Koala, Canada lynx, Cactus and pandas
NUMBER OF GENERALIST SPECIES	Increases	Declines

Animal Behavior

48-Mating Behaviors and Systems

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Mating Behaviors and Systems

Mating Behavior

- Mating behaviors enhance reproductive success of a species
- Mating behaviors of animal species evolved through sexual selection—a form of natural selection

Mating Behaviors and Systems

Mate Choice

- Mating behavior involves mate choice
- Mate choice includes:
 - Seeking or attracting mates
 - Choosing among potential mates
 - Competing for mates

Mating Behaviors and Systems

Mating Systems

- Mating systems of different species vary
- They are of three types:
 - Monogamous mating system
 - Polygamous mating system
 - Promiscuous mating system

Mating Behaviors and Systems

Monogamous Mating Systems

- In a monogamous relationship:
 - One male mates with one female during a breeding season
 - Mates usually remain together for a longer period

Mating Behaviors and Systems

Monogamous Mating Systems

- Monogamy is rare in most animal groups
- It is typically found in groups exhibiting nesting behaviors and parental care
- It is most frequent in birds
- More than 90% birds are monogamous

Mating Behaviors and Systems

Monogamous Mating Systems

- In a few bird species, partners are chosen for life and often remain together throughout the year (e.g. swans and geese)
- In others, seasonal monogamy is more common

Mating Behaviors and Systems

Polygamous Mating Systems

- An individual of one sex mates with several of the other
- Polygamous relationships are of two types:
 - Polygynous Systems
 - Polyandrous Systems

Mating Behaviors and Systems

Polygynous Systems

- Involve an exclusive relationship of one male with two or more females
- Polygynous species are generally dimorphic
- Males are often showier and larger than females

Mating Behaviors and Systems

Polyandrous Systems

- One female has an exclusive relationship with two or more males
- Polyandrous species are also dimorphic
- Females are generally more ornamented and larger than males

Mating Behaviors and Systems

Promiscuous Mating System

- A member of one sex within the social group mates with any member of the opposite sex
- There are no strong pair bonds or lasting relationships

Mating Behaviors and Systems

Promiscuous Mating System

- In promiscuous species, males and females are often morphologically alike
- They may be difficult or impossible to distinguish based on external characteristics

END

Animal Behavior

49-Sexual Selection and Mate Choice

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Sexual Selection and Mate Choice

Sexual Selection

- Sexual selection among members of a species may be:
 - Intersexual selection
 - Intrasexual selection

Sexual Selection and Mate Choice

Intersexual Selection

- Involves mate choice
- Members of one sex choose mates with particular characteristics, e.g.
 - Appearance
 - Color
 - Courtship songs

Sexual Selection and Mate Choice

Intersexual Selection

- Intersexual selection has led to sexual dimorphism in secondary sexual characteristics, e.g.
 - Ornate plumage of birds
 - Antlers of deer
 - Manes of lions
- Selective characters correlate in general with the mate's health and vitality

Sexual Selection and Mate Choice

Intersexual Selection

- Purpose of mate choice is to choose a healthy partner likely to enhance reproductive success
- Mate choice patterns vary among species
- In some, females make choice for their mates
- In others, males make selections among the available pool of females

Sexual Selection and Mate Choice

Intrasexual Selection

- Involves competition for mates b/w members of same sex
- To access to members of opposite sex
- Usually occurs b/w males
- May involve male-to-male combat or fight
- Such individuals have developed weapons for competition (e.g. horns, antlers etc.)

Sexual Selection and Mate Choice

Intrasexual Selection

- Two main types of competition among males over females:
 - Scramble
 - Contest competition
- Scramble: race to get to female first and grab her
- Male body size and vigor contribute to success

Sexual Selection and Mate Choice

Intrasexual Selection

- Contest is a more typical form of competition
- Male with best fighting technique, largest body size or largest weapons will win the female

END

Animal Behavior

50. Dominance Hierarchies

Dominance Hierarchies

Dominance Hierarchy

- A form of animal social structure in which a linear or nearly linear ranking exists, with each animal dominant over those below it and submissive to those above it in the hierarchy.
- Dominance hierarchies are best known in social mammals, such as baboons and wolves, and in birds, notably chickens.

Dominance Hierarchies

Dominance Hierarchy

- Dominance hierarchies are a common among organisms.
- Some individuals will behave more dominantly toward others, these interactions result in a rank or status order.
- In some species, social ranks do not change (e.g. in insects such as bees), but most social mammals like humans and other primates have adaptable roles, where one individual can move through many social ranks over a lifetime.

Dominance Hierarchies

Dominance Hierarchy

- The study of animal sociality is called **sociobiology**, which E. O. Wilson (1975) defines as “the extension of population biology and evolutionary theory to social organization”.
- Dominance hierarchies impact the survival and reproduction of individuals by regulating access to food, mates, and shelter.
- As such, the stability of a dominance hierarchy can affect whether a population prospers or collapses.

Dominance Hierarchies

Dominance Hierarchy

- Dominance hierarchy is relatively stable from day to day.
- Direct conflict is rare; an animal usually steps aside when confronted by one of higher rank.

Dominance Hierarchies

Dominance Hierarchy

- Temporary shifts occur; for instance, a female baboon mated to a high-ranking male assumes a high rank for the duration of the pair bond.
- An individual weakened by injury, disease, or senility usually moves downward in rank.

End

Animal Behavior

51. Examples of Dominance Hierarchies

Examples of Dominance Hierarchies

Dominance Hierarchies

- Dominance hierarchies involve a ranking of individuals in a group (a “pecking order”).
- Alpha, beta rankings exist.
- The alpha organisms control the behavior of others.

Examples of Dominance Hierarchies

Examples:

1. Dominance Hierarchy in Monkeys

- The troop always has a dominant male (**alpha male**).
- The **crowning** of alpha male occurs with threats and attack.
- The **threat posture** is seen in a typical male is an open mouth with teeth exposed, ears are held against head.

Examples of Dominance Hierarchies

Dominance Hierarchy in Monkeys

- The head and body is held stiff.
- The attack includes biting and manual biting.
- There will not be much injury caused to other.

Examples of Dominance Hierarchies

Dominance Hierarchy in Monkeys

- Staring is also a part of competition.
- The male stares at another male with head held forward and brow protruded.
- The loser walks away.

Examples of Dominance Hierarchies



Dominant male



Subordinate male

Dominance Hierarchy in Monkeys

- The dominant male moves around majestically with its tail raised in the form of S letter.
- The subordinate male assumes a crouching or subdued position.

Examples of Dominance Hierarchies

Examples:

2. Dominance Hierarchy in wolf packs

- Dominance is highly organized in these species
- These animals hunt in groups and are keenly aware of their own status in relation to the other individuals present within the group.

Examples of Dominance Hierarchies

Examples:

- Dominant wolves are referred to as **alphas**.
- There are commonly both alpha males and females.
- The alpha status assures a wolf the highest priority in getting every resource e.g. food.
- These factors determine the survival of a particular individual and their ability to pass on their genes.

Examples of Dominance Hierarchies

Examples:

3. Dominance Hierarchy in Lion prides

- In lion prides, an alpha male or sometimes multiple alpha males (that are closely genetically related) hold dominant positions in the pride.



Examples of Dominance Hierarchies

Dominance Hierarchy in Lion prides

- An animal in the alpha position spends much of his time in scent marking the territory and patrolling its boundaries in order to prevent rival males from infringing upon the territory.
- The alpha male will have priority over the choice of food and mating, thereby enhancing his overall fitness.

Examples of Dominance Hierarchies

Dominance Hierarchy in Lion prides

- Female lions also vary in dominance status.
- Dominance can be determined in part by age and hunting prowess.
- The alpha status regularly changes over when an animal becomes sick, older, or simply when a stronger animal moves in and successfully challenges the leader.

End

Animal Behavior

52-Agonistic Behaviors

Agonistic Behaviors

Agonistic Behaviors

- Behaviors involving confrontation, aggression, threat displays, attacks and fights between animals
- Displayed by individuals of many animal species
- Reason: limited resources e.g. food, shelter and mates

Agonistic Behaviors

Agonistic Behavior

- These behaviors are usually used only to intimidate the enemies
- They are rarely lethal
- These seemingly antisocial behaviors are important in maintaining:
 - Social order
 - Territories
 - Dominance hierarchies

Agonistic Behaviors

Two Types of Agonistic Behaviors

- Territorial Behaviors
- Dominance hierarchies

Territorial Behaviors

- Include territorial ownership and defense
- A territory is a fixed area in which an animal spends most of its time and defends it from intruders of the same species

Agonistic Behaviors

Territorial Behaviors

- Found in most social animal populations e.g.
 - Insects
 - Crustaceans
 - Fishes
 - Amphibians
 - Lizards
 - Birds
 - Mammals, including humans

Agonistic Behaviors

Purposes of Territorial Behaviors

- Occupying a defined territory for breeding (as by many male birds and mammals)
- Male actively defends his area against other males
- He attracts a female in his territory and performs courtship and mating without interference

Agonistic Behaviors

Purposes of Territorial Behaviors

- Occupying a territory with abundant food supply
- Occupying a territory that provides shelter to the animal from predators and unfavorable climate

Agonistic Behaviors

Dominance Hierarchies

- “Organization of groups in such a way that some members of the group have greater access to resources (food, mates) than others”

Agonistic Behaviors

Dominance Hierarchies

- Some animals in a group are considered at top of the order
- They have first choice of resources
- Members present near the bottom do not get sufficient resources
- Such hierarchies exist in many vertebrate groups

END

Animal Behavior

53. Examples of Agonistic Behaviors

Agonistic Behaviors

Agonistic Behaviors

- Any social behaviour related to fighting.
- It includes threats, displays, retreats, placation, and conciliation.

Examples of Agonistic Behaviors

Examples

1. Western gorilla (*Gorilla gorilla*)



- Male displays a wide range of both vocal and gestural communications when threatened by an opponent.
- A silverback (alpha male) will start hooting, throwing, chest pounding, leg kicks, and sideways running when approached by another male.
- This is done to intimidate the opponent and show physical abilities without actually making any physical contact.

Examples of Agonistic Behaviors

Examples

2. Sheep



- Often viewed as non-aggressive, gregarious animals but they do show agonistic behaviour.
- Aggressive behaviour include shoving with shoulders, running together and butting.
- Play butting occurs in young lambs and more damaging aggression in ewes and rams.

Examples of Agonistic Behaviors

Examples

- Most fighting is during breeding season.
- Threat postures include: striking the ground, tooth grinding, lateral body presentation, sniffing, mounting and chasing.
- Aberrant aggression: Some ewes show aberrant aggression towards their lambs or alien lambs.
- Wool picking with teeth is common in confined sheep.

Examples of Agonistic Behaviors

3. Chickens



- Chickens show threats associated with fighting, leaping and wing-flapping.
- The major aggressive act is pecking.
- Submissive behaviours are described as retreat.
- Aberrant behaviour can be found among confined chickens.
- Cannibalism could be influenced by diet and management procedures.

Examples of Agonistic Behaviors

4. Cattle

- Pre-fight behaviours – Active or passive avoidance leads to fight.
- Close contact, head lowered, ready to fight and butting or active fighting.
- Butting could be regarded as a non-retaliated blow with the head, while fighting involves reciprocal butts, circling and pushing.

Examples of Agonistic Behaviors

- The end of the fight begins with one animal showing submissive behaviour.
- Aberrant agonistic behaviour include naval sucking, fence and pen chewing (aggression towards inanimate objects) and ear sucking.

Examples of Agonistic Behaviors

5. Black mamba (*Dendroaspis polylepis*)



- Agonistic fighting for black mambas involves a wrestling match.
- Opponents attempt to pin each other's head repeatedly to the ground.
- Fights normally last a few minutes but can extend to over an hour.
- The purpose of fighting is to secure mating rights to receptive females nearby during the breeding season.

Examples of Agonistic Behaviors



6. Frill-necked lizard

- It uses its frill as a way to display size and aggression.
- In comparison to its body size, frill can flare out to make the lizards head look several times bigger.
- It displays bright orange and red scales.
- Males fight and display frills often during the mating seasons.
- Male display includes repeated partial erections of frill, head bobbing, tail lashing, and waving of forelimbs.

End

Animal Behavior

54. Social Organization

Social Organization

Social Organization

- A **society** is a group of individuals belonging to the same species and organized in a cooperative manner.
- The members of a social organization are:
 - ✓ interdependent
 - ✓ variously specialized in function and
 - ✓ survival depends on co operation in the group.

Social Organization

Social Organization

- A social organization is a large group of members who:
 - intercommunicate extensively
 - exhibit division of labour
 - bear some relatively permanent social relationship to one another
- Such organization exists in both invertebrates and vertebrates.

Social Organization

Examples

- Among vertebrates, arthropods such as ants, bees and termites have well organized colonies.
- A well established social organization is seen in primates such as monkeys, baboons, langurs etc.

Social Organization

Origin of Social Organization

- The social organization could have been originated due to the following reasons:
 1. The offspring chose to stay with their parents for protection, obtain food, learning, communication, survival, etc.
 2. When two adults choose to stay together. It can be for survival, sharing of work, mating, protection from predators, social behaviours like altruism and kin selection

Social Organization

Size and composition of a social organization

We can understand the organization size and composition with the help of an example of Bonnet Monkey.

- The Bonnet monkey, *Macaqua radiata* is the most common macaque of south India.
- It can be easily recognized by a cap of brown hair that appears like a baby's bonnet (cap).

Social Organization

Size and composition of a social organization

- There is sexual dimorphism and males are larger than female with distinct canines.
- They live in groups called **troops** and live in forests, villages and also in cities.
- A troop consist of 30 individuals with both males and females of different age groups.

Social Organization

It includes:

- a. **Infants:** They have chocolate colour hair
- b. **Juveniles:** between 1-2 years with brown hair
- c. **Seniors:** between 2-3 years with brown hair
- d. **Sub adults:** 3-5 years old males and 2-3 years old females
- e. **Adults.** 4 years old males and 3 years old females. Have brown hair on the back and white hair on belly. The older individuals have yellowish grey hair.

End

Animal Behavior

55. Benefits of Social Organization

Benefits of Social Organization

Benefits of Social Organization

There are many benefits of living in social organization.

Few of them are discussed here:

1. One obvious benefit for social aggregations is **defense, both passive and active, from predators.**

Examples:

- Musk-oxen that form a passive defensive circle when threatened by a wolf pack are much less vulnerable than an individual facing the wolves alone.

Benefits of Social Organization

Examples:

- A breeding colony of gulls, alerted by the alarm calls of a few, attack predators *in group*; this collective attack is certain to discourage a predator more effectively than individual attacks.
- Members of prairie dogs, although divided into social units called **coteries**, cooperate by warning each other with a special bark when danger threatens. Thus they get benefit from each other.

Benefits of Social Organization

Benefits of Social Organization

2. Sociality offers **several benefits to animals reproduction**. It facilitates encounters between males and females, which, for solitary animals, may consume much time and energy. Sociality also helps synchronize reproductive behavior through the mutual stimulation that individuals have on one another.

Examples:

- Large colonies of gulls produce more young per nest than do small colonies. Furthermore, parental care that social animals provide their offspring increases survival of the brood.

Benefits of Social Organization

Benefits of Social Organization

3. There is **improved protection of limited recourses** against other groups of the same species and related species. Members help each other in protecting territory, food material and mates against other groups. Social living provides opportunities for individuals to give aid and to share food with young other than their own. Such interactions within a social network have produced some intricate cooperative behavior among parents, their young, and their kin.

Benefits of Social Organization

Benefits of Social Organization

4. There are increased chance of foraging success. In other words more individuals finding food is better than one.

Examples:

All the lions in the pride cooperate with each other in foraging and protection, though there is still serious competition among the males. Male lions work together to defend the other lions in the pride. Female lions work together to hunt.

Benefits of Social Organization

Benefits of Social Organization

3. There is reduction in predation pressure by improved detection and repulsion of enemies.
4. There is more care of offspring through communal feeding and protection.

Examples:

An infant yellow baboon (*Papio cyanocephalus*) “jockey rides” its mother. Later, as the infant is weaned, the mother-infant bond weakens and the infant will be refused rides.

Benefits of Social Organization

Benefits of Social Organization

5. Of the many other advantages of social organization, cooperation in hunting for food; huddling for mutual protection from severe weather; opportunities for division of labor, which is especially well developed in the social insects with their caste systems; and the potential for learning and transmitting useful information through the society.

End

Animal Behavior

56. Disadvantages of Social Organization

Disadvantages of Social Organization

Disadvantages of Social Organization

There are some disadvantages of living in social organization.

Few of them are discussed here:

1. There is increased competition within the group for food, mate, nest sites, nest material and other limited recourses.
2. Increased risk of infection due to outbreak of disease or epidemic.
3. Increased risk of exploitation of parents.
4. Increased inbreeding will weaken the progeny.

Benefits of Social Organization

- **Increased Sickness and Disease**

Animals that live in close proximity to one another face higher risks of infection than do individual animals.

Diseases and parasites can be passed between animals living too closely together, and this can dramatically decrease a group's numbers.

Some animals might die as a direct result of the sickness itself, but latent effects of infection can come in several forms, such as decreased mobility, making it difficult to escape from predators, as well as decreased vision and sense of smell, making it harder to find food.

Benefits of Social Organization

- **Increased Competition for Food**

The bigger the animal group, the more competitive the hunt for food becomes.

Predators who hunt in large packs or prides tend to expend more energy than needed in capturing prey, as the element of surprise is not so easy to come by.

Predators often scavenge as a result, and many go hungry. Sizable assemblies of animals put pressure on food resources, and unequal distribution of food among animals can lead to increased aggression, starvation, and death.

Benefits of Social Organization

- **Increased Competition for Mates**

In group, where there are more males than females; direct, aggressive competition to find a mate can become the norm.

Ritualized fighting and displays of violence and aggression can ensue before and even after finding a mate. The ultimate battle here is not necessarily for survival in the strictest sense but in the passing on of genes and reproductive success.

End

Animal Behavior

57. Social Organization in Insects

Social Organization in Insects

Social Organization

- All species show some degree of social organization; many species nest in a system of tunnels, in the soil, under a dome, hill or excavated earth, sand, or debris.
- Colonies range in size from a few dozen to half a million or more individuals. Typically they include three castes: winged, fertile females, or queens; wingless, infertile females, or workers; and winged males.

Social Organization in Insects

Social Organization

- The familiar examples of social organization in insects are:
 - ants, bees, and wasps (order hymenoptera),
 - termites (order isoptera),
 - Silkworms

Many of these species live in colonies with thousands or even millions of individuals.

Social Organization in Insects

Ants

- The most highly developed social insects.
- Each colony contains at least one queen. Ants defend their nest by biting and stinging.
- Ants secrete pheromones detected by other ants through antennae. This process called **chemoreception**; the primary communication vehicle that facilitates mate attraction, kin and non-kin recognition.
- Ants send tactile signals by touching and stroking each other's bodies with their antennae and forelegs.

Social Organization in Insects

Ants

- Majority of ants form underground nests called **formic aria**. It consists of numerous chambers connected by galleries. The Chambers are used as granaries for storing seeds for rearing progeny.
- Ants fall into four main castes:
 - **QUEEN:** Fertile females with reproductive system. They are larger than all other castes. Two pairs of membranous wings and mandibles are present. Their sole duty is to lay eggs. They may have life span of 15 or even 30 years. The ant colony has several queens.

Social Organization in Insects

Ants

- **KINGS:** Fertile males with well reproductive system, smaller than the queens and soldiers but larger than workers. They have two pairs of wings and mandibles are reduced. They serve to fertilize the queens.
- **WORKERS:** These are sterile females with reduced, non functional reproductive system. They are smaller than all other castes. Their mandibles are well developed but eyes are small. They repair nest ,collect and store food.

Social Organization in Insects

Ants

- **SOLDIERS:** They are modified workers. They are smaller than queen in size. They are wingless with large heads and powerful mandibles. They defend the colony from the enemies. They also crush seeds and fruits.

Social Organization in Insects

Termites

- They are social insects but less advanced than ant colonies.
- The termite colony has three classes of individuals and each class includes both sexes.
- Termites digest wood and paper. Some species of termites build nests up to 6 meters in height.

Social Organization in Insects

Termites

- Termites use pheromones for communication.
- They use pheromones for trail, alarm, aggregation and mating.
- Trail pheromones is produced by termites when they are trying to get other member of the colony to follow then to a particular area perhaps a new food source for the colony.
Termites dislike daylight. Some species lives in nests called **termitaria**.

Social Organization in Insects

Termites

Termites are categorized as:

- Fertile castes
- Sterile castes

Social Organization in Insects

Termites

- **Fertile castes** also known as sexual castes. It is of 3 types:
 - **LARGE WINGED FORMS:** These are king and queen. The sole duty of queen is to lay eggs.
 - **SHORT WINGED FORM:** These are supplementary kings and queens. The wings are short, pad like and vestigial.
 - **WINGLESS FORM:** Wings are absent. The ocelli are absent.

Social Organization in Insects

Termites

- **Sterile Castes:** These are wingless, eyeless and colorless. The sex organs are rudimentary. It is of 3 types:
 - **WORKERS:** They are dimorphic. They are trimorphic in some cases. They construct, repair the nest collect and distribute food.
 - **SOLDIERS:** They are larger than the workers. The soldiers defend the colony by killing the intruders with their mandibles.
 - **NASUTES:** The nasutes also called the proboscideans. They possess large head prolonged into rostrum.

Social Organization in Insects

Honey bee

- They live in hives which is often constructed in a hollow tree. The individuals forming a colony are of 3 castes:
 - **QUEEN:** The queen is fertile female. She is unable to form hive. Her duty is to lay eggs.
 - **DRONES:** The drones are males. They do not work in hives.
 - **WORKERS:** They are sterile females. Young workers stay in the hives and called the house bees.

Scout bees fly from the colony in search of pollen and nectar. It successful in finding good supplies of food “dances” on the honeycomb.

Social Organization in Insects

Yellow wasp

- Also known as **Polistes**. The wasp has 3 castes: **queens, drones and workers**.
 - Single **queen** prepares a nest in spring. The queen lay eggs and the egg hatch into apodous larvae .
 - The **workers** have a powerful sting and are a source of great annoyance to men.
 - Drones are produced from unfertilized eggs. They fertilize the young queens.

In winters the young queens hibernate and the nest perishes .The queens start new colonies next spring. The adult wasp feed on insects ,fruit juices and nectar.

End

Animal Behavior

58. Social Organization in Birds

Social Organization in Birds

Social Organization

The term social organization includes:

- **Physical structure:** the size of the group and its composition in respect to age, sex and degrees of relatedness of group members.
- **Social structure:** all of the relationships among individuals in the group and their consequences for spatial distribution and behavioural interactions.
- **Group cohesion:** the duration of association of the members of the group and the frequency of fission in which one or more members leave the group.

Social Organization in Birds

Social Organization in Chicken

- There is also a social organization in chicken called the **pecking order**. It is a system by which birds arrange their social standing in the flock.
- The higher ranked birds will get the best food, water and roosts while the lower placed birds will get the leftovers.
- This method of organization places each member of the flock on a '**hierarchy ladder**'. At the top of the ladder will be the **head rooster** (or hen if no rooster is present).

Social Organization in Birds

- It is a flexible structure and within the flock there are usually three different types of social order going on:
 - Rooster to Rooster
 - Hens to Hens
 - Roosters to Hens
- A **rooster** may go up the ladder if he mounts a successful campaign against the leader. He becomes the new chicken-in-charge! And the defeated roosters go down the ladder, as do weak or sickly birds.

Social Organization in Birds

- Hens have their own order. The matriarchs of the flock will be up to the top of the ladder, with less dominant birds at the bottom.
- In this system the older, stronger and savier hens will be at the top.
- **Young pullets** just coming to point of lay, will try to 'move up' the social ladder quickly.
- If a hen tries to challenge; she will earn glares, pecks and feather pulling from the higher 'ranked' hens.

Social Organization in Birds

- The serious games of the pecking order start when chicks are around six weeks of age.
- Chicks will start rushing at each other, bumping chests and flaring feathers. These are all methods used to intimidate flock mates at any stage of life. By the time they leave the brooder, they will have their own pecking order sorted out.

Social Organization in Birds

Social Organization in Starling

- Starlings normally fly in loose flocks, but when under attack by a peregrine falcon, they fly as close together as possible.

Social Organization in Birds

Social Organization in Pied Flycatcher

- A male pied flycatcher defends a territory against other males. The female chooses a male on the basis of the quality of his territory and the suitability of the nest site it contains. Males that had a low density of birch trees in their territories and nest sites high up in the trees with thick trunks giving safety to the nest were the ones that obtained mates first.

Social Organization in Birds

Nesting and Parental Care in Birds

- 95% of bird species are socially **monogamous** i.e., a male and female bird will pair for at least the length of the breeding season or, in some cases, for several years or until the death of one mate.
- Monogamy allows for care of the fledglings by both parents.

Social Organization in Birds

Nesting and Parental Care

- Some birds are polygamous; they have many mates in a breeding season.
- Birds eggs are usually incubated by the parents. Most birds have an extended period of parental care after hatching. The length and nature of parental care varies widely amongst different orders and species.

End

Animal Behavior

59. Social Organization in Mammals

Social Organization in Mammals

Social Organization in Mammals

Social organization can also be observed in variety of mammalian species.

Examples:

Black Tailed Prairie dog

1. Highly social, social units are called **Coteris**.
2. Coterie is composed of one adult male, several females and young ones.
3. Without dominant hierarchy.
4. Everything inside the premises of coterie are shared by all members.

Social Organization in Mammals

- 5. Hostility with neighbors always exist.
- 6. Two syllable call used to claim the territorial ownership.
- 7. They become familiar to each other and start recognizing a member of same territory.
- 8. In a coterie, dog watch out for danger, produce alarm calls.

Social Organization in Mammals

Examples:

Meerkats

1. Active and social animals
2. Live in groups that include 2-30 individuals, although the average pack size is around 10-15 individuals. Groups are called **mobs**.
3. Each mob may consist of up to three families living together. Each family group consists of a breeding pair and their offspring.

Social Organization in Mammals

4. Each mob comprise on nearly equal numbers of either sex.
5. Members take turns at jobs such as looking after pups and keeping a lookout for predators.
6. Meerkats are a cooperatively breeding species — typically the dominant '**breeders**' in a mob produce offspring, and the nonbreeding, subordinate '**helpers**' provide altruistic care for the pups.
7. Meerkats have a clear dominance hierarchy with older individuals having a higher social status.

Social Organization in Mammals

Examples:

Elephants

1. Several levels of social system can be observed in elephants: **Family, kin and Bachelor's herd.**
2. Mostly 10-20 members are there.
3. Family consists of grandmothers, daughters, sons, grandsons and grand daughters.

Social Organization in Mammals

4. Females bond socially for nearly 50 years.
5. Kinship involves several family groups living in same vicinity, occasion and mingle peaceably. They are not together except during the migration times.
6. At their maturity, bulls leave their family and join Bachelor herds, all male herd. It is dominated by ritual dominance , and dominant male gets a female in estrus.

Social Organization in Mammals

Examples:

Primate societies

Variety of social organization exists in primates.

The group could comprise of one male and a group of females called **harem**, a multi male group or a large **troupe**.

1. Solitary ones are the **lemurs, loris and tarsiers**.

They are arboreal, nocturnal and feeding on insects. They make contacts during the breeding season.

Social Organization in Mammals

2. **White handed gibbons** are monogamous species. A pair lives with their offspring. The offspring move away after they become sexually mature. They are territorial.
3. The **gelada baboons** show variation in social organization depending on the availability of food. There are single male herds. There are herds with “single” male and a “harem” of females.

Social Organization in Mammals

4. The **mountain gorilla** lives in small groups, headed by a single male and includes other males as well. They are not territorial.
5. Some of the smallest primate societies are seen in the gibbon and orangutan. **Orangutan** is an exceptionally solitary animal while the **gibbons** live as small family units, the father, mother and their offspring. Some of the largest groups are to be found in the terrestrial primates-baboon troops range up to 90.

End

Social Organization in Mammals

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Animal Behavior

60. Territoriality and Defense

Territoriality and Defense

Territoriality

- A **territory** is an area defended against other members of the same species. It provides food, water supplies, nesting areas and refuges from danger.
- Territoriality uses a great deal of an individual's energy. In addition, an individual might die defending a territory, thus miss a reproductive opportunity.

Territoriality and Defense

Examples of Territorial Behaviour

- Spraying behavior is a way for an individual to mark its territory.
- The red breast of the robin (visual)
- Bird songs or the calls of gibbons (auditory)
- Through the deposit of scent marks (olfactory)
- Bears, dogs, cats, lemurs, etc. use scent-marking to signal the boundaries of their territories.

Territoriality and Defense

Territories are usually used for:

1. Feeding
2. Mating
3. Rearing of young
4. Combination of all activities

Territoriality and Defense

Types of Territories

- **Mating Territory:** places of mating for the partner.
- **Breeding Territory:** The breeding territory is relatively small. It usually contains only a nesting or mating site.
- **Feeding Territory:** It tends to be larger than the breeding territory because it must contain sufficient food to support the owner of the territory and any mate or offspring that may also be residing there.
- **Multi- purpose Territory:** This type of territory is generally the largest as it includes aspects of both breeding and feeding territories.

Territoriality and Defense

Salient Features of a Territory

1. Definite home and home range

Territorial behaviour varies widely. Most animals have a **definite home**. The area the animal covers regularly in search of food and mates is the **home range**. This area is not defended. The part of the home range defended against others of the same species is the territory. Aggressive behaviour is used to hold on territories.

Territoriality and Defense

2. Adaptive Features of Territoriality

Ensures enough space for each animal – if in short supply and needed for breeding, keeps population down.

By spreading out reduces the spread of disease and parasites. Also harder for predators to find them.

Most successful males hold best territories and so ensure best genes are passed on to offspring. Once territories are established the resources have been divided. The losers will spread out and look for food elsewhere rather than go on fighting.

Territoriality and Defense

3. Food and security

Territories ensure enough food for the animals and their families. Territories ensure a safe, protected nest or home for the young or at least a place to breed in the case of communal breeding grounds. Animal now has an area with which it can become familiar, can learn where food, water and protection from predators is located. Territorial behaviour is set. Defenders and intruders know their roles.

Territoriality and Defense

4. Marking and Defending Territories

- **Vocalizations** – e.g. birds singing on boundaries of their areas at dawn and dusk
- **Scent** – e.g. marking with urine (dogs and cats) or faeces
- **Scent glands** – special glands produce chemo markers. e.g. on rump, between horns (deer), wrists (lemur), behind ears (cats)
- **Physical gesturing** – crabs wave claws at edge of territory

Territoriality and Defense

Advantages of territory

Territorial behavior forms an important part of social behavior.

- ✓ Territory provides a base which the male can advertise himself to female, and attracted the female.
- ✓ Provides a protected place for courtship, mating and parental care to young.
- ✓ Provided safety where young can live freely and without any interference.

Territoriality and Defense

Defensive Behaviour

- Behavior showed by animals trying to avoid being harmed by another.
- This might involve:
 - ✓ **defensive aggression:** against a potential predator or against a member of its own species, from its own group or an outside group
 - ✓ **animal escape behavior** to avoid the source of harm
 - ✓ **Camouflage** or inactivity
 - ✓ highly conspicuous, as in the noise that a rattlesnake makes to indicate potential danger if provoked or attacked

Territoriality and Defense

Types of Defensive Behaviour

1. Chemical defense

Examples

- **Poison dart frog** has poison glands secreted all over its body.
- **Fire salamander** makes a nerve poison, which it is secreted by the glands on its back.
- **Bombardier beetle** spray boiling hot and chemically toxic bodily fluids towards predator.
- **Horned lizard**, when attacked; it pressures its own sinus cavities until the blood vessels in its eyes burst, then sprays its attacker with blood from its eyes.

Territoriality and Defense

Types of Defensive Behaviour

2. Camouflage

Examples

- Stick insect pretends to be a twig, in an attempt to avoid being seen by a bird or other predator.
- Polar bear blend into the white snow of the Arctic to avoid danger.
- Frogfish resembles a sponge and prey on the small fishes swimming nearby.
- Chameleon only change color when in imminent danger.

Territoriality and Defense

Types of Defensive Behaviour

3. Actual Weapons

Examples

- The simple defense system of turtles is its shell. Predators cannot penetrate it.
- Hedgehogs have spikes that are enough to deter predators.
- Pufferfishes have the ability to inflate themselves into a balloon shape by swallowing water. Their bodies are also covered with thorny spikes, which stand out on inflation, providing a formidable defense against attack.

Territoriality and Defense

Types of Defensive Behaviour

4. Mimicry

Examples

- The simple defense system of turtles is its shell. Predators cannot penetrate it.
- Scarlet king snake is non-poisonous and mimic of the extremely venomous coral snake.
- Locust borer not only looks like a bee or wasp, it sounds like one, too.

End

Animal Behavior

Social Behaviors

Social Behaviors

Social Behaviors in Animals

- A set of interactions among individuals of the same species
- A wide range of sociality occurs among animals

Social Behaviors

Asocial Animals

- Some animals rarely interact with one another e.g.
 - Mosquitoes
 - Polar bears

Social Behaviors

Social Animals

- Social animals live together in large groups or form tightly knit colonies, e.g.
 - Ants and termites
 - Bees and wasps
 - Many birds
 - Wildebeests
 - Wolves and Lions
 - Monkeys and gorillas
 - Humans

Social Behaviors

Characters of Social Behaviors

- Most social behaviors are based on
 - Cooperation
 - Competition
 - Conflict
 - Exchange
 - Coercion
 - Sacrifice
- Most social animals cooperate to accomplish some tasks

Social Behaviors

Characters of Social Behaviors

- Many social behaviors are adaptive
- They increase animal's fitness and reproductive success
- Animals in groups show joint aggregation against predators

Social Behaviors

Characters of Social Behaviors

- Many social behaviors are agonistic and based on competition
- Such behaviors are selfish and individuals benefit at the expense of others

Social Behaviors

Characters of Social Behaviors

- Most social adaptations benefitting one individual may indirectly harm others, e.g.
- Superior foraging ability of one individual may leave less food for others
- Some behaviors are altruistic or unselfish i.e. an animal favors other sacrificing its own benefit

END

Animal Behavior

**Social Behavior:
Living in Groups**

Social Behavior: Living in Groups

Animal Groups

- Animal populations are often organized into groups
- Groups may be:
 - Simple aggregation of individuals
 - Complex animal societies

Social Behavior: Living in Groups

Aggregation

- An aggregation is any form of gathering of animals or the process of coming together
- There is minimal interaction between members of an aggregation
- For example, several *Drosophila* flies living on a piece of rotting fruit

Social Behavior: Living in Groups

Animal Societies

- A stable group of individuals of a species
- It maintains a close-knit cooperative social relationship b/w individuals
- It has a complex social organization
- Its sphere extends beyond the level of mating and taking care of young

Social Behavior: Living in Groups

Advantages of Social Grouping

- Protection from predators
- Warning signals spread rapidly
- Increased feeding efficiency by cooperative hunting and food search
- Protection from harsh cold environment by social huddling
- Helpful in finding mates and rearing of young

Social Behavior: Living in Groups

Disadvantages of Social Groupings

- Competition for resources (food, mates) develops b/w members of a social group
- Diseases and parasites spread more rapidly
- Interference in reproductive behaviors and rearing of young
- Increased susceptibility to predation for large congregations of animals

END

Animal Behavior

63-Altruism

Altruism

Altruism

- It is a type of social behaviour
- A selfless behavior in which an individual endangers his own survival or sacrifices some of its own reproductive potential to benefit another individual.
- It is an innate trait with genetic basis
- Developed through the process of evolution in many animal species

Altruism

Altruism

- Particularly prevalent in species with complex social structures e.g. primates, some other mammals and insects
- There are wide individual variations in tendencies toward altruism

Altruism

Altruism

- Altruism is a different kind of social behavior
- It has been hard to explain within the framework of Darwinism and natural selection which emphasize on fitness
- It reduces the fitness of the altruist individual

Altruism

Altruism

- Two basic concepts comes under Altruism:
 - Inclusive fitness
 - Kin selection

Altruism

Altruism

- **Inclusive fitness** is defined as the affect an individual has on proliferating its own genes by reproducing and helping relatives raise offspring.
- **Kin selection** is the mechanism of inclusive fitness, where individuals help relatives raise young.

Altruism

Significance of Altruism

- In ethology, costs and benefits of a behavior are measured in terms of reproductive fitness, or expected number of offspring
- By behaving altruistically, an organism reduces the number of offspring it is likely to produce itself

Altruism

Significance of Altruism

- By sacrificing its own favors to save others, an altruist indirectly boosts the would-be number of offspring of species—that other members are likely to produce.

End

Animal Behavior

64. Examples of Altruism

Examples of Altruism

Altruism in squirrel

- A squirrel on seeing a predator gives alarm calls to alert unaware individuals to hide safely
- Squirrel that warns becomes conspicuous increasing risk of its own predation
- Similar altruist alarming calls are observed in crows and monkeys

Examples of Altruism

Altruism in social insects

- Social insects such as ants, wasps, bees and termites also shows altruism.
- In social insect colonies, sterile workers devote whole lives to:
 - Care for queen
 - Construct and protect the hive
 - Foraging for food
 - Tending the larvae
- This is maximally altruistic behavior.

Examples of Altruism

Altruism in stinging bees

- Worker bee stings intruders to help defend the hive—but result is death of stinging bee

Examples of Altruism

Altruism in Vampire bats

- Vampire bats regurgitate blood and donate it to other members of their group who have failed to feed that night, ensuring they do not starve

Examples of Altruism

Altruism in Emperor penguins

- Emperor penguins migrate miles in harsh conditions to bring back food for their young.

Examples of Altruism

Altruism in Vervet monkeys

- Vervet monkeys give alarm calls when predator approaches. Alarm calls attract attention of predator and others monkeys have more time to escape.

End

Animal Behavior

65-Kin Selection and Inclusive Fitness

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Kin Selection and Inclusive Fitness

Kin Selection

- An altruistic evolutionary strategy favoring reproductive success of an animal's close relatives—even at a cost of animal's own survival and reproduction

Kin Selection and Inclusive Fitness

Kin Selection

- Kin selection is an instance of inclusive fitness
- It combines the number of offspring produced by an individual itself and the number of offspring it can ensure by supporting other close relatives (siblings)

Kin Selection and Inclusive Fitness

Kin Selection

- Fitness of an individual is based on the genes it passes on as well as on those common genes that its relatives pass on
- Through kin selection, a gene carried by a particular individual passes on to the next generation through a related individual

Kin Selection and Inclusive Fitness

Kin Selection

- Kin selection explains how natural selection acting on relatives of an animal can affect the fitness of an individual
- For kin selection to be effective, individuals of a group must be able to identify their relatives
- So, it is found in animals with advanced social structures i.e. primates and social insects

Kin Selection and Inclusive Fitness

Kin Selection: Example

- Altruistic kin selection behavior is most evident in sacrifice of parents for their offspring
- Parents' sacrifice of their own reproductive potential actually increases their fitness because reproduction by their kins maximizes spread of their genes in population

Kin Selection and Inclusive Fitness

Inclusive Fitness

- Inclusive fitness is the measure of fitness of a group of members of a species—which may not be close relatives

Kin Selection and Inclusive Fitness

Inclusive Fitness

- An organism's inclusive fitness is determined by its personal fitness, plus its weighted effects on the fitness of every other individual in population
- Weights are determined by relationship coefficient (related genes)

Kin Selection and Inclusive Fitness

Inclusive Fitness

- It is favored by natural selection
- N.S. acts to maximize genetic and reproductive fitness of group (population)
- It does not think in terms of maximizing an individual's genes in the gene-pool

Kin Selection and Inclusive Fitness

Inclusive Fitness Behavior

- Individuals of a species helping others who are not their close relatives

END

Animal Behavior

66-Reciprocal Altruism

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Reciprocal Altruism

Reciprocal Altruism

- Animals occasionally behave altruistically toward unrelated individuals
- This is in expectation of return of favor in future—i.e. reciprocity
- A baboon may help an unrelated companion in a fight
- A wolf may offer food to another wolf—even they share no kinship

Reciprocal Altruism

Reciprocal Altruism

- Reciprocal altruism is limited to species with stable social groups (e.g. chimpanzees, humans)
- In such groups, individuals are likely to meet again and get chance to exchange aid

Reciprocal Altruism

Cheating

- Reciprocal altruism is also associated with negative consequences
- If favors are not returned to individual who had been helpful in past
- Such unreciprocated behavior is referred to as “cheating” by behavioral ecologists
- It occurs as cheating may benefit the cheater substantially

Reciprocal Altruism

Game Theory and Tit for Tat Strategy

- Game theory explains how reciprocal altruism dominates over cheating behavior
- It involves a behavioral strategy: tit for tat
- In this strategy, an individual treats other in the same way it was treated in their last encounter

Reciprocal Altruism

Game Theory and Tit for Tat Strategy

- Individuals adopting tit for tat behavior are always altruistic, or cooperative, on the first encounter with another
- They remain so as long as their altruism is reciprocated

Reciprocal Altruism

Game Theory and Tit for Tat Strategy

- When their cooperation is not reciprocated, individuals employ tit for tat—retaliate immediately
- Cooperative behavior returns as soon as other individual becomes cooperative

END

Animal Behavior

67-Examples of Reciprocal Altruism

Examples of Reciprocal Altruism

Reciprocal Altruism in Cleaner fish

- Cleaner fish and their clients include other large fishes.
- The host fish allows the cleaner fish free entrance and exit and does not eat the cleaner, even after the cleaning is done.

Examples of Reciprocal Altruism

- The host signals the cleaner it is about to depart the cleaner's locality, even when the cleaner is not in its body. The host sometimes chases off possible dangers to the cleaner.

Examples of Reciprocal Altruism

Reciprocal Altruism by Red-winged blackbird

- Red-winged blackbird males help defend neighbor's nests.
- There are many theories as to why males behave this way.
 1. Males only defend other nests which contain their extra-pair offspring.

Examples of Reciprocal Altruism

2. Another is the tit-for-tat strategy of reciprocal altruism.
3. A third theory is, males help only other closely related males.

The tit-for-tat strategy of reciprocal altruism is highly accepted by researchers.

Examples of Reciprocal Altruism

Reciprocal Altruism in Primates

- Grooming and coalitions in female vervet monkeys is an example.
- Human social behavior also shows the reciprocal altruism; explains human emotions and ethics etc.

Examples of Reciprocal Altruism

Reciprocal Altruism in Wolves

- Wolf also shows reciprocal altruism by helping out other wolves that are not even the members of their pack.

Examples of Reciprocal Altruism

Reciprocal Altruism in dolphins

- There are cases reported about the reciprocal altruism by dolphins.
 - The surfer, Todd Endris was surfing at Marina State Park off Monterey, California, when he was suddenly attacked by a great white shark.
 - The shark peeled the skin off his back and was biting on his right leg.
 - A pod of bottlenose dolphins swam over and formed a protective ring around Endris, providing him a chance to escape from the shark and to swim back to shore where help was available.

Examples of Reciprocal Altruism

Reciprocal Altruism in dolphins

- Moko, a bottlenose dolphin in New Zealand, helped two whales who were stranded on the beach by directing them to open sea.

End

Animal Behavior

68-Parental Care

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Parental Care

Parental Care

- Catering the needs of newborn and young offspring by parents
- More evolved in animals whose newborns and young cannot care for their selves
- This behavioral need has been an important factor in the evolution of mating systems

Parental Care

Parental Care in Birds

- Birds show maximum parental care
- Most newly hatched birds cannot care for themselves
- They require a large, continuous food supply

Parental Care

Parental Care in Birds

- Catering the needs of young is difficult for a single parent
- To enhance chances of viability of offspring, most birds form monogamous pairs
- Male stays with its mate and helps her till offspring are able to fulfill their own needs

Parental Care

Parental Care in Mammals

- Lactating female nourishes the young
- She provides most of the required care
- Males usually play no role in raising the young

Parental Care

Parental Care in Mammals

- In some species (e.g. lions) males provide protection to females and young
- In such species, a male or small group of males takes care of many females at once in a harem

Parental Care

Polygyny Prevails If No Parental Care Required

- Males in mammals and birds do not stay with their partner if young ones can feed and care for themselves after hatching
- Males of these species maximize their reproductive success by seeking other mates
- Polygyny is more common in such animals

Parental Care

Male Parental Care: Certainty of Paternity

- Mating behavior and parental care of males is associated with certainty of paternity
- Certainty of paternity is relatively low in most species (even within a monogamous relation)
- So, male parental care is found in very few species of birds and mammals

Parental Care

Male Parental Care: Certainty of Paternity

- Males engage in behaviors that increase their certainty of paternity—including:
- Guarding females
- Removing any sperm from female reproductive tract before copulation
- Introducing large quantities of sperm to displace sperms of other males

In such
species

END

Animal Behavior

69-Examples of Parental Care

Examples of Parental Care

Parental Care in fishes



Salmon and trout

- The simplest form of parental care is guarding or protection of eggs in egg-laying, or oviparous, species.
- For example female salmon and trout will excavate nests by digging simple depressions with their tails. The eggs that are laid in the nests are fertilized and then buried by the female.
- Brood fishes carry their eggs in their mouth to keep them safe from predators.

Examples of Parental Care



Green frog



Blacksmith frog

Parental Care in Amphibians

- Paternal care occurs in a number of species of anuran amphibians.
- Males of green frog defend their eggs by not allowing small sized intruders in their territories.
- Blacksmith frog digs small holes in the mud for deposition and development of the eggs.

Examples of Parental Care



Aquatic salamanders



Japanese giant salamander

Parental Care in amphibians

- Aquatic salamanders, females after laying eggs guard them by coiling body till the eggs hatch.
- In Japanese giant salamander, the males perform the same function.

Examples of Parental Care

Parental Care in reptiles

- Reptiles provide less parental care than other tetrapods. When it does occur, it is usually female-only or bi-parental care.
- A few lizards and snakes guard their eggs and pythons incubate their eggs for a while.
- The eggs of some female snakes remain inside the body until they hatch but also receive no parental care.

Examples of Parental Care

Parental Care in birds

- 96% of birds show parental care to their offspring.
- Bi-parental care is the most common form in birds, especially in **passerines**. The hatchling benefits from the mutual care at the cost of the parents' future reproductive success.
- In bi-parental care, the male provides food and the female is a caretaker. Examples include acorn woodpeckers and red-eyed vireos

Examples of Parental Care

Parental Care in birds



Snail kite

- **Snail kites** are example of mono- parental care in birds. The both members compete on who will desert the nest.
- In some species females never incubate offspring alone unless the male has been killed for example spotted sandpipers and red-necked phalaropes.
- In temminck's stint, little stint, mountain plover, and sanderling the females lays a clutch of eggs and the male incubates them.

Examples of Parental Care

Parental Care in Mammals

- There is maternal care in all species of mammals. 95% species exhibit female-only care. In the remaining 5% of species, there is bi-parental care.
- In **rodents**, parental care involve behaviors as warming, feeding, protecting, retrieving, and grooming young depending on the species.
- In domestic **dogs**, maternal behaviour shown by the dam mainly consists of contact, nursing, grooming/licking, play, punishment, thermoregulation, and motion.

Examples of Parental Care

Parental Care in Mammals

- Among **primate** species, male also involve in parental care. This care is often in the form of grooming, carrying, support in agonistic interactions, and protection against infanticide.
- Owl monkeys (*Aotus azarai*) and Titi monkeys (*Callicebus caligatus*) exhibit bi-parental care for their offspring.

Examples of Parental Care

Parental Care in Mammals

- Mother **bats** hold the pups in their tail pouches. Pups are only an inch long and suck milk from their mothers.
- In **cetaceans**, maternal care is long-lasting. Calves and juveniles stay close to their mothers' sides for a long time, even if they are able to feed themselves.
- **Belugas** remain near their mothers for three years, sometimes even longer.
- The rearing and socialization of **bottlenose dolphins** calves depend on the female, whether via direct maternal care or allomaternal parenting.

End

Animal Behavior

70-Social Learning

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Social Learning

Social Learning

- “Type of learning that involves observing and copying others behavior”
- Example: young chimpanzee learns to crack palm nuts by copying the behavior of elders

Social Learning

Social Learning and Culture

- Social learning forms the roots of culture
- Culture: “a system of information transfer through social learning or teaching that alters behavioral phenotypes of individuals in a population”

Social Learning

Social Learning and Culture

- Culture enhances the fitness of individuals much rapidly
- Culture based changes in phenotype occur on a much shorter time scale than changes resulting from natural selection

Social Learning

Social Learning Behaviors

- Social learning behaviors are prevalent in animal kingdom, specially vertebrates
- Types:
 - Copying behaviors
 - Fine-tuned social learning

Social Learning

Mate-Choice Copying Behavior

- A form of social learning behavior demonstrated in several fish, bird and mammal species
- Individuals in a population copy the mate choice of others
- In copying mate choice, an individual is attracted to a mate that is also attractive to most other individuals

Social Learning

Fine-Tuned Social Learning

- Fine-tuned learning with experience in humans is well known
- A human baby starts to learn expressive words and accents that modify and improve with age
- Studies on vervet monkeys have demonstrated fine-tuned learning in animals

Social Learning

Fine-Tuned Learning of Alarm Calls

- Vervet monkeys produce a complex set of alarm calls
- They give distinct alarm calls for predators like leopards, eagles or snakes
- Alarm call for leopard is a loud barking sound
- For an eagle a short double-syllabled cough
- For a snake, a “chutter”

Social Learning

Fine-Tuned Learning of Alarm Calls

- Upon hearing an alarm call, other vervets behave in an appropriate way:
- Run up a tree on hearing alarm call for leopard
- Look up on hearing alarm for an eagle
- Look down on hearing alarm for a snake

Social Learning

Fine-Tuned Learning of Alarm Calls

- Infant vervets give and understand alarm calls, but in a relatively indiscriminating way
- They give “eagle alarm” on seeing any bird
- With age, they fine-tune their calls by learning from other members of the group

END

Animal Behavior

71-Examples of Social Learning

Examples of Social Learning

Social Learning in birds

- A bird is able to learn by **observation and imitation** of others.
- Bird song is a good example of social learning. Bird song is affected by biological factors such as hormones and maturation, birds in different regions have different "dialects".

Examples of Social Learning

Social Learning in birds

- Birds learn **to solve complex problems** more readily than many mammals in laboratory experiments.
- Birds learn how to capture food.
- Blue Jays can learn to tell edible from inedible caterpillars by watching the reaction of other Blue Jays when they attempt to eat a caterpillar.

Examples of Social Learning

Social Learning in birds

- A number of birds are able **mimics**. For example a **parrot** can be taught to say different phrases of human language.
- A **Northern Mockingbird** can mimic as many as 30 other species of coexisting birds.
- The **Marsh Warbler** in mimics 99 European species and 133 African species that it coexists with on its wintering grounds.

Examples of Social Learning

Social Learning in birds

- A **Lyrebird** learned to imitate barn yard sounds including pig squeals, a chain rattling, a cross-cut saw, and a howling dog, along with most calls and songs of the local birds.
- A **Crested Lark** learned the whistled commands given to sheepdogs (“Run ahead”, “Fast”, “Halt” and “Come here”). When taped and played back to sheep dogs, these calls were obeyed by the dogs.

Examples of Social Learning

Social Learning in birds

- Some birds have devised ways to **use tools to feed**.
- The **Woodpecker Finch** of the Galapagos Islands uses a stick or cactus spine held in its bill to pry insects from crevices.
- **Egyptian Vultures** have learned to crack ostrich eggs using stones.

Examples of Social Learning

Social Learning in birds

- **Green Herons** are clever fishers, they use pieces of bread as fishing bait. A Green Heron will drop bread into still water and wait for fish to gather which it then captures by spearing with its bill.

Examples of Social Learning

Social Learning in Fishes

- Fish use social information in a variety of contexts, including: antipredator behavior, migration, foraging and mate choice.
- Fishes shows fright responses. When one member of a group is startled, the rest of the shoal respond to it. This reaction can be driven both by visual information and chemical alarm substance in fishes of the superorder Ostariophysi.

Examples of Social Learning

Social Learning in Fishes

- Naive fish learn to associate a new predator with the visual fright response of more experienced fish.

Examples of Social Learning

Social Learning in other animals

- Young chimpanzees learn to use tools to open nuts by observing the adults.
- Chimpanzees learn to solve stick and tunnel problems, ant species selection to eat and also able to learn sign language in experimental setups.

Examples of Social Learning

Social Learning in other animals

- Young rhesus monkey (*Macaca mulatta*), learns to fear snakes by observing their parents being afraid of them.
- Orangutan learns to dig with spade, lift lid of sewage tank, building nests, feeding habits, flaking stone tools and tool use during experimental studies.

Examples of Social Learning

Social Learning in other animals

- Adult **meerkats** (*Suricata suricatta*) teach its pups the essential prey-handling skills.
- Meerkats feed on dangerous prey (such as venomous scorpions) that inexperienced pups appear unable to safely catch and eat.

Examples of Social Learning

Social Learning in other animals

- Adults display teaching behavior to pup and modify their specific teaching behaviors based upon the age of the pup.
- Teaching behaviour is also seen in other species. Cheetah catches live prey animals and transport them back to cubs, allowing the cubs to learn and practice hunting skills.

End

Animal Behavior

72-Evolution and Human Culture

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Evolution and Human Culture

Genetic Basis of Human Culture

- Human culture and certain social behaviors are due to expression of genes
- Genes perpetuate by natural selection
- So, human culture is related to Darwinian evolutionary theory

Evolution and Human Culture

Genetic Basis of Human Culture

- An irrational interpretation of genetic and evolutionary basis of human behavior may be misleading
- It will justify the status quo in human society, rationalizing social injustices and animal behaviors of human

Evolution and Human Culture

Plasticity of Human Behavior

- Human behavior is not a rigid genetic model
- Just as anatomical features vary extensively, so do inherent behaviors
- Just like environment intervenes in phenotypic expression of physical traits—it affects the expression of behavioral traits

Evolution and Human Culture

Plasticity of Human Behavior

- Human behavior is probably more plastic than any other animal—as human have greater capacity for learning

Evolution and Human Culture

Control of Instinctive Behavior by Culture

- In human cultural history, humans have built up a diversity of structured societies
- Structured societies have laws, governments, institutions, cultural values and religions
- These institutions define what behavior is acceptable or what is not

Evolution and Human Culture

Control of Instinctive Behavior by Culture

- Many instinctive behaviors might enhance an individual's Darwinian fitness
- But they are considered unacceptable and prohibited by law

Evolution and Human Culture

Control of Instinctive Behavior by Culture

- These are the social and cultural institutions that define values
- Values make human behavior distinct and controlled than that of other animal societies

END

