BEHAVIOR

The term behaviour refers to all the activities and responses of an organism as a result of changes in different environmental stimuli. And the study of behavior is generally known as ethnology.

Behavioral ecology refers to the investigation of ultimate causes of behaviors, the evolutionary basis for behaviors as mechanisms that enhance reproductive success.
Proximate cause; is the immediate explanation for an organism's behavior. The interactions of an organism with the environment or the particular environmental stimuli that triggers a behavioral response in an organism.
Ultimate cause: The evolutionary cause of behavior.

Development of behavior

i) Animal Genes:
Every animal has genetic information locked up in it for coding for certain behaviors. Therefore it is the potentiality of behavior that is inherited. These code anatomical and biochemical characteristics of any animal. They also lead to the formation of structures and organs involved in behaviour development

ii) Environment:

- A set of genes has to interact with a certain range of environments during the development of an animal in order to produce the expected behavior
- The interaction with the environment provides the process of growth and development
- Environmental selection favors individuals with certain genes but removes others.
- If surviving individuals in a population are adapted to the environment, their genes will be retained. If not, the individuals die out and their genes are removed.
- Behavior has therefore evolved under influence of natural selection.
- Each species is adopted to meet different conditions
- Differences in behavior between closely related species must have a survival value e.g. some animals are social others are not; some are monogamous others are not.
- The process by which animals alter their behavior through learning or hormonal mediated changes in order to cope with inevitable changes in the environment is referred to as **adaptability of behavior**.

TYPES OF BEHAVIOUR
Behaviour is broadly divided into categories.
1. Instinctive (innate) behaviour.
2. Learned behaviour.

INSTINCTIVE (INNATE) BEHAVIOUR
Is an inborn pattern of response or activity to one or more environmental stimuli. It has the following features (X-tics).
-It is inherited and highly specific and inflexible.
- It is an inborn pattern of behaviour and cannot be altered.
- Some instinct (innate) behaviour can be modified to some degree in response to past experience. -It is similar among all the members of the same species (species characteristic behaviour) except for slight differences between males and females of the same species.
- It is unintelligent and often accompanied by no appreciation of the purpose it serves.
- It is highly complex and consists of a chain of actions; the completion of each stage in chain acts as the stimulus for the commencement of the next stage,
- Instinctive behaviors have much value in adapting the organism to its environment. Examples of the instinct (innate) behaviour include simple reflexes (reflex action) orientation, migration, and territorial behaviour, nest building, mating, courtship and parental care.

Types of instinctive behaviour
This is divided into;
1. Simple reflex (simple action)
2.Complex instinctive behaviors.

I. REFLEX ACTION:
A reflex action is a simple act of behaviour in which some kind of stimulus evokes a specific automatic and short lived response. Reflexes are the simplest innate behaviour. Most reflexes are coordinated in the spinal cord and are known as the spinal reflexes e.g the knee Jerk. Withdrawal of hand from hot objects. Reflexes controlled through the brains are called

cranial reflexes e.g. blinking of the eye. The escape response of the earth worm is an example reflex action in lower animals

- ✓ ***Orientation:***

It is a simple behaviour pattern of lower organisms in response to specific environmental stimuli. Orientation response is important in the natural environment in that it enables organisms to move towards desirable stimuli and away from harmful one. i.e. Flagellates are guided towards light; animals towards food; parasites towards their hosts; and spermatozoa towards the females eggs.

Examples of orientation response include; - Kinesis. -Taxis.

- ✓ ***Kinesis:***

Is a response or behavioral pattern exhibited by a lower organism in response to unpleasant nondirectional stimulus. The direction of the response is not dependent on the direction of the stimulus but its intensity. This kind of behaviour is seen in wood lice if wood lice are placed in a "Choicechamber" half of which has a humid atmosphere and the other half a drier atmosphere the animals move much faster in the dry half than the humid half on the humid side. NOTE in kinesis the animal does not move towards or away from the stimulus but instead it simply moves faster and changes direction when subjected to un-pleasant stimulus.

- ✓ ***Taxis:***

Is the movement of the whole organism in response to directional stimuli. In this case the organism orientates itself with respect to the source of the stimulus if an organism moves towards the stimulus it is positively tactic. While moving away is a negative taxis examples of taxis include. Swimming of euglena, and other green flagellates towards light (phototaxis) and movement of spermatozoa towards chemical substances secreted by eggs (chemotaxis).

II. COMPLEX INSTINCTIVE BEHAVIOURS

✓ ***Migration:***

Is the movement of the whole population of species of organisms from one region to another and their return to the habitat of origin at some other time. Examples of migratory behaviour are seen in salmon fish which migrates to the fresh water streams to breed and returns to the sea for normal life. The young ones on attaining maturity also migrate to the sea. Many species migrate between the North Pole in Europe and the South Pole in South Africa or South America to escape unfavorable winter seasons.

Migration in animals is said to be triggered by some stimulus in the environment such as changes in the day length, decreased temperature: food scarcity etc.

Advantages of migration

1. Provide better chances of finding better food supplies.
2. Provides better chances of finding good breeding grounds such breeding grounds with enough food and without predators.
3. Allow the organism to avoid unfavorable environmental conditions.

The migrating animals find their route by anyone of the following means.

- They follow prominent natural features like mountains ranges and water features.
- They orientate themselves in relation to the position of the sun.
- They have an in-born ability to sense direction e.g. homing ability ofthe pigeon.

- ✓ ***Territorial behaviour (territoriality):***

A territory is an area of the habitat which is occupied by an individual or group and defended from others of the same species. Most territories are defended for breeding purpose by use of passive means like;

- Urinating around it.
- Defecating around it.
- Use of other forms of signals like posture, odour etc.
- Use of specific sound.

Importance of territorial behaviour to survival of organisms:

1. Provides defence of an area in which organisms live against other organisms of the same species.

2. The mating pair of organisms of the same species and their offspring's are well soaked to receive the available resources e.g. food, space etc. Available resources are protected and shared amongst the population.
3. The species project and achieve maximum utilization of the habitat.
4. Actual fighting between organisms which would be detrimental to the species is quite rare and replaced by mere threats.
5. Intraspecific competition is reduced.
6. Population growth is controlled.
7. They limit mating to only fit individuals and hence increase the overall fitness of the population.
8. They help to prevent epidemics since contact between very many animals is reduced.
9. They permit improved defense of nest and the young.

Disadvantages of keeping territories:

- They limit the population density that can be learned in an area.
- They may encourage in -breeding where it is possible among the organisms. This is carried along the disadvantages of reduced biological fitness.
- The sounds produced and some postures exhibited by animals in defence of their territory may easily expose them to their predators.
- Animals are over restricted within an area; this may encourage spread of diseases.
- The weak individuals are denied chances of breeding and cannot propagate some either could be good genes, since only fit individuals are allowed to mate.

✓ ***Reproductive behaviour:***

This is complex form of innate behaviour involving both pre-copulatory and post natal (birth) behaviours. The examples include;

- Courtship.
- Parental care.

✓ ***Courtship behaviour:***

Is a form of innate behaviour between male and female organisms which occurs before mating which eventually leads them to mate (copulate).

Importance of courtship behaviour to organisms

- It stimulates organism to sexual activity.
- It synchronizes gonad development; enabling gametes to form at the same time to ensure ferti1ization occurs when mating takes place.
- It strengthens the bond between mating pairs.
- It leads to rise in levels of reproductive hormones.
- It synchronizes time to produce offspring in right seasons.
- It induces mating of individuals who accept each other.
- It permits both parents to show same parental care to young.
- It suppresses other tendencies like the avoidance of body contact escape behaviour and eventual mate cannibalism e.g. in spiders.

✓ ***Parental care:***

Are the activities a parent animal does to ensure the survival and development of its young. Parental care is mostly developed in the higher animals; the birds and mammals.

In birds it involves activities like feeding, warming, watering, nesting etc of the young.

In mammals it involves training the young on how to recognize food and escape from danger.

In man, the highest form of parental care is exhibited. It involves cultural transmission and language, Parental care is instinctive and does not decrease as the animals mature just as reproduction. The activities associated with the parental care are of evolutionary significance for they ensure the survival of the species.

Advantages of parental care to organisms:

- It strengthens the love bond between the parents and their offspring's.
- It protects the young offspring's from predators.
- It promotes the survival of the young offspring's until they reach maturity. This ensures continuity of the species.

- During parental care, the young animals learn from their parents some behavioral patterns of the species Such as search for food. Feeding and recognition and escape from predators.
- The instinctive (innate) behaviors (species characteristics behavior) depend on stimuli and motivation.

✓ **Aggression/Agonistic behavior.**

This is a group of behavioral activities including rituals, physical attacks on the organism but not associated with predation. It is behaviour which is associated with conflict or fighting or contests involving two individuals. It involves both threatening and submissive behaviors which determine which competitor gains access to some resource such as food, nesting sites and mates. Fights rarely end in death but may result in serious injury. They are highly ritualized and resemble tournaments. This is because killing or seriously injuring the loser would be disadvantageous because the loser may **not** necessarily be less healthy or weaker but may not be mature. Serious fights occur in animals which have weapons that can inflict motor injury but most of the time the loser is capable of quick flight. Fighting immediately stops when the loser turns away or surrenders thus assuming a submissive posture.

Examples

- In wolves, the throat which is the most vulnerable part is exposed to the opponent. This inhibits further attack.
- In birds, some species turn the back of the head to the opponent and the rival stops fighting.
- In cichlid fish, the fish lie side by side and beat each other by tails. It they cannot decide who has won, they face each other pull and push by the jaws until the loser folds the dorsal fin.
- Deers match side by side eye each other on the corner of the head, face each other and clash the antlers (horns). If one exposes the posterior view, the rival waits until they face each other again and fight.

Aggression/Fighting serves an important function:

- Spacing out individuals and promoting distribution of a species. Spacing out is achieved by natural hostility
- In ground breeders e.g. gulls, spacing out is a means of defense against predators because a great concentration of prey in case eggs or chicks would attract the predators. Hence territorial fighting keeps individual groups far apart.
- Competition for mates by fighting selects fitter individuals for propagation of the species.

The evolutionally process whereby the displays become modified to form social signals is called ***ritualization***. **Ritualization** is the use of displays/symbolic activities so that no serious harm is done to either combatant.

4) Dominance Hierarchies/Peck Order

A dominance hierarchy is a social ranking of each member in a social group. **It refers to social rankings of each member within a social group according to status.**

It can also be defined as 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. Such a hierarchy is common amongst species of fish, birds like hens and mammals like baboons, wolves, etc.

If several hens unfamiliar to one another are put together, they respond by pecking each other. Eventually the group establishes a clear peck order hence a linear dominance hierarchy. In such a group, one individual is the tyrant and dominates and controls behaviour of all others by threats.

The next is subordinate only to the tyrant but subdues the rest. The third is subordinate only to the above two and dominates the rest and so on, down the line to the lowest. In such cases, learning often reduces the amount of fighting because each individual learns which of its companions is stronger and thus must be avoided or which members are weaker and can therefore be intimidated.

Such a continuous order of hierarchy is referred to as ***peck order or dominant hierarchy*** and it reduces the amount of actual fighting. Male individuals who do not learn their place and avoid their superiors are always at disadvantage because they receive more fights.

E.g. Wolves live in packs and within the pack a dominance hierarchy exists among females. The top female controls mating of others. When food is abundant, the top female mates and allows other females to do so. When food is scarce, she allows less mating hence making more food available for her own young.

Establishment of Dominance Hierarchies

Dominance hierarchies are often established through ritualized displays or mild fighting, rather than all-out battle. The loser in a battle for dominance typically moves away from a choice habitat or a disputed mate. Among primates, dominance conflicts frequently involve no more than the display of enlarged canines, sometimes through yawning. Bears, also, will roar or wave their open mouths at social inferiors. Behaviors like these do not require fighting, but do result in the prominent exhibition of potentially formidable fighting weapons. In other cases, as in elephant seals, there actually can be prolonged, often bloody fighting. However, once the hierarchy is established, subsequent fighting is less frequent. In many cases, there is a strong correlation between dominance and large size.

Dominance hierarchies have to be reestablished when certain individuals feel prepared to move up within the hierarchy, or when new individuals are introduced into an area. During such time a series of challenges may occur.

This can be a stressful period for all individuals involved.

Advantages of social hierarchies.

- Facilitate the sharing of resources to occur such that fit ones survive
- Increase genetic vigor in the group by ensuring the strongest and genetically fit individuals have higher reproductive advantage
- Decrease the amount of individual aggression associated with feeding, mate selection and breeding site selection
- Avoids injuries to stronger animal that may occur if fighting would be necessary to establish a hierarchy.

Disadvantages of social hierarchies

- Encourage inbreeding which may lead to expression of undesirable characteristics.
- Increase chances of starvation of weaker individuals since stronger ones feed first leaving the weaker ones to feed on left overs.
- Increased reproductive disadvantage in subordinates since mating is restricted to tyrants
- higher levels of stress hormones in high ranking individuals lead to high metabolic rates that demand large amounts of food that may result to quick starvation of the whole group in case of food shortage.

TYPES OFSTIMULI

There are 3 types of stimuli:

- Motivational stimuli.
- Releasing stimuli (releasers)
- Terminating stimuli.

I. Motivational stimuli:

Are those which determines the animal's state of responsiveness e.g. temperature, light, smell.

II. Releasing stimuli (releasers):

Are features the environment (Specific stimuli) which causes/elicit particular responses when the animals encounters them.

III. Terminating stimuli:

Are those features of the environment (stimuli) which bring an act of behaviour to an end.

In feeding behaviour, the smell of the food act as a motivational stimulus since they raise the animals' state of responsiveness while the sight of the food may act as a releasing stimulus, unleashing feeding behaviour and a full stomach may act as a terminating stimulus bringing feeding behaviour to an end.

In general, a releaser is any feature of the environment which can be shown to evoke a behaviourial response in courtship; the releasers may be features of an individual such as colour. shape or particular markings.

To respond to a specific stimulus, there must be a mechanism in the receptors or brain which filters out the relevant features of the stimuli from the irrelevant ones. This is referred to as stimulus filtering mechanisms.

Functions of the releasers:

- They serve as signals initiating appropriate behaviour and coordinating interactions between different individuals. This avoids open conflicts. e.g. in territorial behaviour the aggression involves a threat display by the aggressor, which intimidates a rival encroaching upon the animals' territory or its male; the rival accepts defeat and departs or it may show appeasement display. e.g. in dogs. ,
- In sexual reproduction releasers are important in changing an animal's normally aggressive behaviour to sexual behaviour. e.g. in spider the male waves its pedipalps to the aggressive female; this changes the female's behaviour from predatory to sexual.

- It is also important to bring one act of behaviour to an end and sometimes the same stimulus may start another act of behaviour. Example in blood sucking bugs, the muscular abdominal pump stops operation, and sucking ceases when the pressure of blood in the abdomen reaches certain critical level. In mammals, full stomach causes mechanical stretch which brings feeding to an end.

MOTIVATION:

Is the term used to describe the internal state which must precede a specified act of behaviour. It results from the animal's internal physiological state such as levels of different hormones in the body. This is in turn determined by motivational stimuli such as temperature and light. E.g. in certain birds sexual behaviour in spring is brought, about by increasing day-length (Photoperiodism) i.e. the eyes receive the light stimulus, which is transmitted to the brain; reaches the pituitary gland which secretes gonadotrophic hormones, the gonads are also activated to produce sex hormones, including reproductive

behaviour. Courtship and mating in the stickle back only takes place in the spring when the female's sex urge reaches its height as a result of various environmental and physiological condition.

Pheromones*:*
A pheromone is a chemical substance produced by one animal which influences the behaviour of another organism. The best known pheromones are the secretions of mammals.

The importance of pheromones to different animals include:
- In mammals they are important in marking out territories.
- Used in attraction of mates e.g. unmated female cockroaches secrete a chemical substance from the surface of their body which stimulates males to court them.
- They are also responsible for bringing the different sexes together in insects, marine worms etc.
- In social animals like bees, they play an important part in directing the development and behaviour of different castes in the colony. E.g. Pheromones produced by the queen bees called queen substance prevent workers from building queen cells in which a new queen would be received.
- Pheromones also serve as releasers or build up motivation towards a particular type of behaviour.

The role of hormones on the behaviour:
Hormones are involved in the building up of motivation and therefore it influences behaviour in the following ways.

- Hormones affect the growth of nervous connections in the brain.
- It may alter the sensitivity of peripheral receptors. Example In rats. the male hormone enhances sexual behaviour by raising the sensitivity of the penis.
- They may enhance or suppress the performance of effectors e.g. hormones may cause degeneration of a muscle; there by preventing a particular response.
- Hormones may directly affect nerve cells and synapses within the central nervous system. This may block inhibitory or open up excitatory pathways.

Note: The specific region of brain which is influenced by hormone, leading to a particular behavioural pattern in organisms is the hypothalamus.

DISPLACEMENT ACTIVITY

Displacement activity is where an animal which is in state of stress or frustration will perform behaviour which is out of context or irrelevant or performs a behaviour in a wrong situation to try and ease the anxiety developed. For example two birds that are fighting may suddenly begin to peck at the ground. In humans when in tense situation we perform displacement activities such as stroking the fore head, scratching an ear, or walking up and down, alter quarreling with a wife a man can resort to smoking cigarettes or drink alcohol.

There is another kind of displacement activity called the vacuum activity. This is when an animal is frustrated its motivation builds up but no sign stimulus is provided to release the appropriate behaviour as a result it performs in the wrong situation. For example a cock deprived of a mate will display courtship behaviour to another object such as a bucket. A bird goes through motions of building a nest even if there is no nest materials available,

Displacement activity serves a useful purpose of preventing open conflict. It is also revealed that much of the courtship behaviour evolved from the displacement activities arising from frustration.
This occurs when the male's sexual motivation builds up but cannot be released until the appropriate signal is given by the females, some of his sexual motivation is channeled into forms of behaviour which constitute courtship.

LEARNED BEHAVIOUR
Learned behaviour is behaviour which is acquired and modified in response to the past experience whereas learning is defined as an adaptive change in behaviour resulting from past experience.

Features x-tics of learned behaviour:
- They are not inherited but acquired during life time of an individual.
- Learned behaviour tends to vary from one individual to the other. Therefore not common among all members of the same species.

- They are adaptable i.e. the learned behaviour can be modified if the environment changes.
- Some learned behaviour are species specific and cannot be altered once established while others are very flexible.

TYPES OF LEARNING:

Learning may be classified into five categories.

- ✓ Habituation
- ✓ Associative learning
- ✓ Imprinting
- ✓ Exploratory learning
- ✓ Insight learning

1.Habituation:

This is where and animal gradually stops or ceases to response to repeated stimulation. It's the simplest form of learning behaviour. It is believed that habituation is caused by synaptic accommodation. An example of habituation is when a fan worm jerks back into their tubes when touched but when the tentacle is repeatedly stimulated the worm quickly stops reacting. This implies that habituation enables organism to ignore stimulus which is neither harmful nor beneficial.

2. Associative learning:

It's a type of behaviour where an animal learns to associate a particular response with reward of punishment. In associative learning the animal remembers its past experiences and modifies its behaviour accordingly. It's carried in the nervous system, below the level conscious part of the brain.

There are two basic forms of associative learning:

- The conditioned reflex.
- Operant conditioning (trial and error learning).

✓ ***The conditioned reflex:***

The conditioned reflex is shown by a classical experiment performed on dogs by Ivan Pavlov. In his experiment. Pavlov allowed dog, to hear the sound of a bell and observed that the dogs did not salivate at all.
He then presented the dogs with the taste of powdered meat and measured quantity of saliva produced. In another instance, he presented the powdered meat and immediately rang the bell. This was repeated many times.
He later rang the bell alone without presenting meat and he observed that the dogs salivated in response to it implying that the dogs had learned to associate the bell with food. He called the new stimulus (the bell) as conditioned stimulus and the response a conditioned reflex if however the bell is rang a lone without presenting of the food several times. It leads to reduction in the quantity of the saliva produced until the conditioned stimulus failed to produce any conditioned response.

Conditioned reflex is also important in the wild in that predators learn to associate unpalatable animals with certain markings or coloration and will thus avoid eating them. In this way maximum rewards are obtained and punishment is avoided.

Features of a conditioned reflex:

- It is the association of two stimuli presented together.
- It is a temporary condition.
- The response is involuntary.
- It declines without repetition.
- Removal of the cerebral cortex causes loss of the response.

3.Trial and error learning:

It is also a type or conditioning though it differs from Pavlov classical conditioned reflex ill the way that, it becomes established. It is called operant conditioning. Trial and error learning is confined to animals with well-developed brains. In trial and error experiments, it is common that the animal is provided with a "choice" it is punished if it makes the wrong choice and it is rewarded if it makes a right choice for example suppose that a hungry dog is allowed to roam about the room. But as soon as it jumps onto certain chair, we reward it with food, the dog is observed to immediately go to the chair as soon as it enters the room. In this case the dog has learned to associate a reward with its own behaviour but not with the stimuli.

In another experiment, a rat is placed at the entrance to a complicated maze which has an empty food box at the other end. In the first trial the rat makes numerous blind routes as it traverses the maze. The rat is rewarded with food when eventually it reaches the end. In subsequent trials it makes fewer and fewer mistakes and gets through the maze and reaches its end much quicker until eventually it makes no mistakes at all.

The ability of all animal to learn by trial and error is reflected in three things:

- The speed with which it ceases to make errors.
- The length of time it can remember without repeated trials.
- The complexity of the situation to which it responds.

A graph showing the result of maize learning by arat

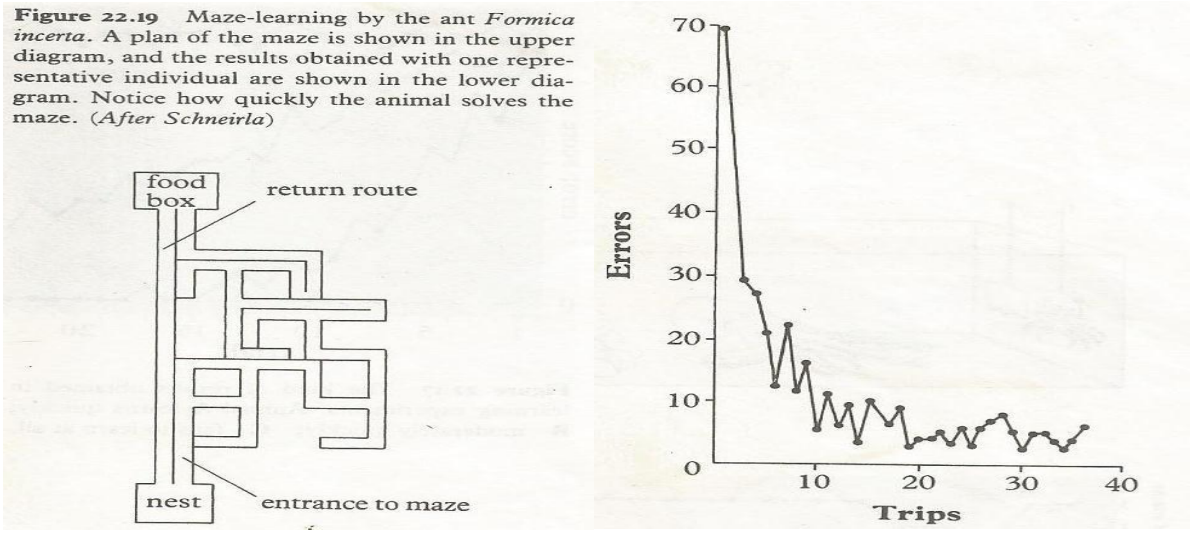


Figure 22.19 Maze-learning by the ant *Formica incerta*. A plan of the maze is shown in the upper diagram, and the results obtained with one representative individual are shown in the lower diagram. Notice how quickly the animal solves the maze. (*After Schneirla*)

Graphs showing the results obtained in different learning experiments:

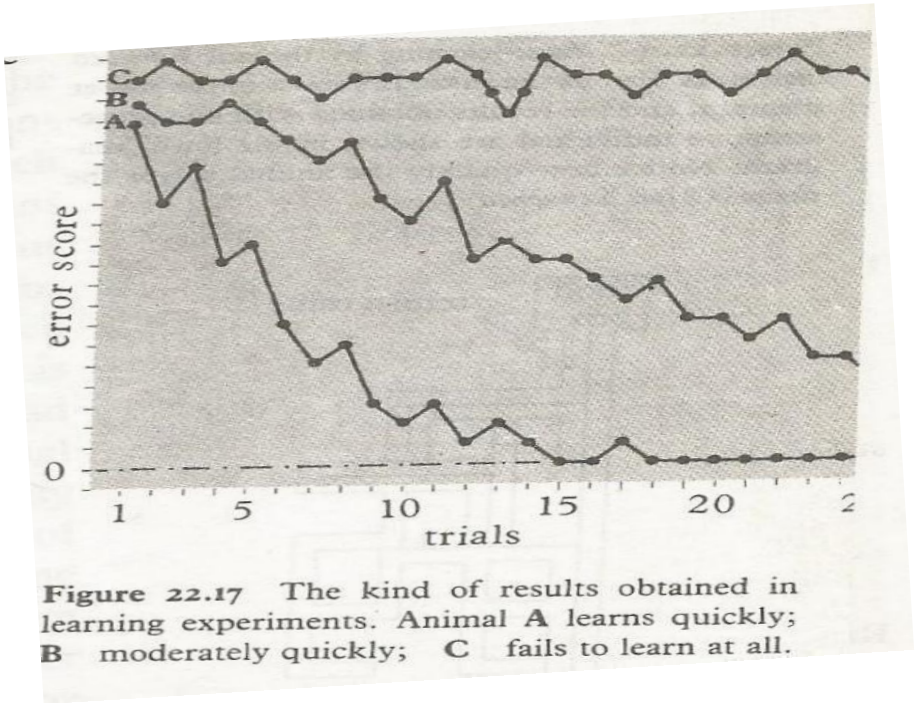


Figure 22.17 The kind of results obtained in learning experiments. Animal **A** learns quickly; **B** moderately quickly; **C** fails to learn at all.

Features of trial and error learning:

- The associative stimulus follows the action and the two are not necessarily simultaneously.
- Repetition improves the response.
- The action is involuntary.
- It is temporary but the association is less easily removed than in conditioned reflex.
- Removal of the cerebral cortex does not cause loss of response.

Note: (Read and make notes on the neutral and a biochemical theory of learning Functional App. P9 361)

4.Exploratory learning (latent learning):

This arises when animal stores informations while exploring its environment and uses it at some later time. Exploratory behaviour is important in the lives of many animals for it enables them to find their way about their environment. Example a rat placed in a maze with no reward as a stimulus will later complete the maze, when a reward is present more rapidly than a rat which has never been in the maze.

Exploratory learning in rats

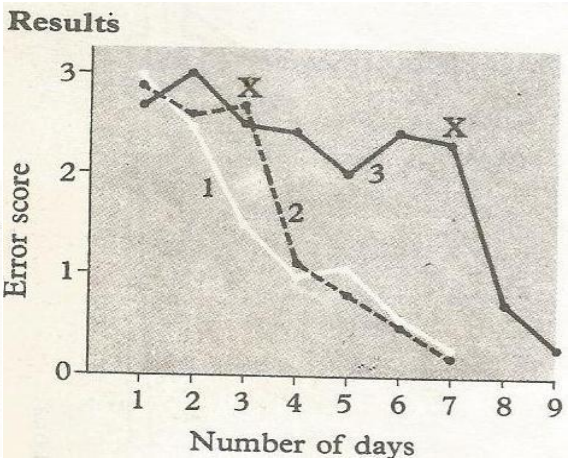
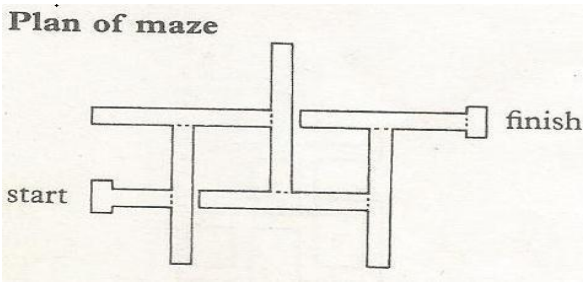


Figure 22.20 Exploratory learning in rats. Group 1 were given a reward (food) at the end of each run. Groups 2 and 3 were given no reward until the third and seventh days respectively (the points marked **X** in the graph), after which they were rewarded each time. Notice the slow learning prior to **X**, and the very rapid reduction in errors immediately after **X**. This is attributable to previous exploratory learning. (*After Blodgett*)



5.Imprinting:

This is when young animals tend to follow their parents. Unlike other forms of learning improving behaviour is fixed and not adapted. For example the young geese follow that first thing they see after they are born generally, the first objects they see is their mother but they can follow any other objects.

Imprinting is important in many ways which include;

- It permits the newly born young ones to be under full parental protection for their survival.
- It is used in training of animals for circus.
- It is applicable in psychiatry.

6.Insight learning:

It is the immediate comprehension (understanding) and the response to a new situation without trial and error. It involves mental reasoning. Intelligence. Insight learning is the highest form of learning. For example chimpanzees will acquire bananas fixed to the roof or their cage by piling up boxes upon which they can climb to reach them. In the same way sticks may be joined together to form a long pole which is used to obtain bananas which is out of reach outside the cage.

Insight learning is important to organisms in the following ways;

- It enables organisms to sense danger easily and escape from it.
- They develop abilities to use tools.
- They improve ability to solve problems not encountered before.
- Organisms become highly adaptable to the environment.
- It leads to the development of the ability to get solutions to problems instantly.

Note

Fixed action patterns

These are behavioral patterns that are resistant to change and may not even be altered by the learning process. They are controlled by very few neurons in the central nervous system and are performed perfectly in an identical fashion.

For example, Yawning in primates and the two nesting habits in the parrot family Agapormis i.e. tucking of building material under the wing and carrying it in the bill. When few of such species were interbred the highbreeds failed to build nests. Those which succeeded did it after a very long time and carried the "nesting material in the beak.

SOCIAL BEHAVIOUR

Is where groups of organisms of the same species live together and is completely dependent on one another for their survival. The organisms adapt their behaviour towards the interest of the group but not of an individual.

In social behaviour, there is the establishment of a social hierarchy (pecking order). This is where each individual has its own fixed status and role within the group. Example in honey bee colony, there is a caste system which consists of a queen which is the single fertile female, the remaining females are the workers which are all sterile. All the males are called drones and are fertile.

Honey-bees demonstrate complex social cooperation particularly in times of foraging for food. The worker bees returning from foraging mission reveal the location of food sources to other workers using communicate the direction of the food source from the hive and its distance away.

These are two forms of the dance;

- A round dance performed if the food source is within l00m of the hive. But does not show the direction.
- A waggle dance is performed if the food source is greater than 100m.

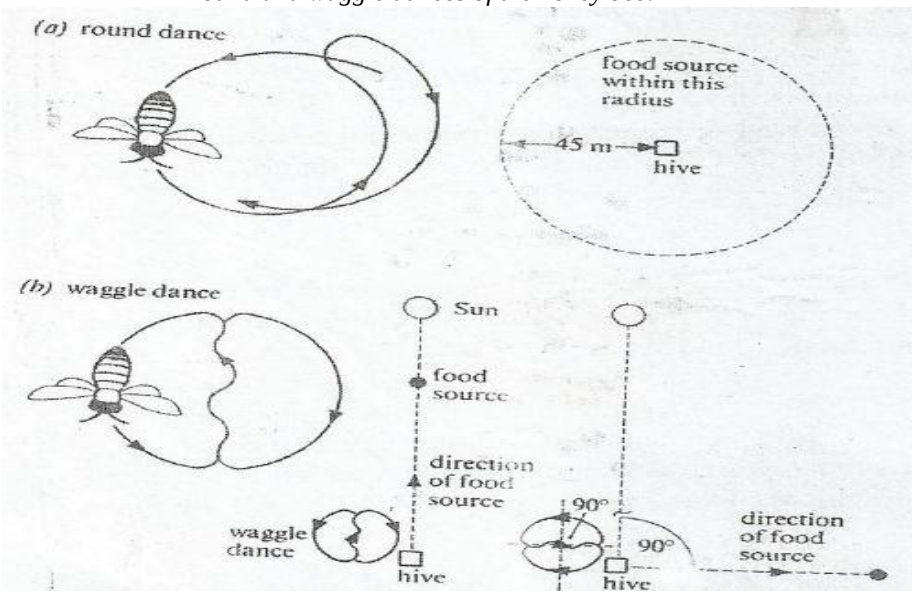
In both dances the speed at which it is performed is inversely proportional to the distance away from the hive that the food lays.

In the waggle dance the worker bee's moves in an eight figure pattern, waggling its abdomen as it does so. The waggle part of the dance occurs as it moves along the line between the two loops of the figure of eight. The number of waggles gives some indication of the quantity of food discovered the angle of the waggle relative to vertical angle of the sun gives the direction n of the food Source from the hive. However during a cloudy day. The bees are able to locate the position of the Sun using the plane of the polarized light penetrating the cloud. This is further assisted by the internal biological clocks existing in the bees permitting them to have the continually changing picture of sun's movement during the day.

The advantages of a social group include;

- Increases chances for locating food.
- Provides better protection against predators.

Round and waggle dances of the honey bee:



ALTRUISTIC BEHAVIOUR (ALTRUISM)

Is the behaviour or activities carried out by one organism so as to promote the survival of other organisms of the same species, sometimes at the expense of its own life. Examples include, parental care to their young ones, Examples

(i) Some animals give alarm calls which warn others of the approach of a predator e.g. ground squirrels. The alarm caller is most likely attacked because when it calls, the others run into the burrows with it going down last.

(ii) A female baboon protects and cares for its offspring for almost six years
(iii) Female birds protect their nestlings from unfavorable weather conditions such as rain
(iv) Female monkeys care for young ones of others.
(v).defence of the bee hive and the queen by the worker bees.
. This hehaviour ensures the continuity of the species in the population and the continuous transmission of their genes to the next generations.

Significance of altruism

- Ensures survival and protection of weak and young ones.
  - There is increased chance of survival of young ones.
  - It increases allele frequency of a particular organism.

RHYTHMICAL BEHAVIOURS

This is where animals carry out activities at regular intervals irrespective of the season or day length. They are described as time biology since they tend to indicate existence of biological clocks within the animals or organisms Rhythms that are controlled by biochemical and physiological changes within the organism are called endogenous rhythms. This involves nervous and endocrine system in animals. Rhythms that are controlled by external changes such day lengths (Photoperiodism) are called exogenous rhythms.

Annual rhythmical behaviours include:

- ✓ Breeding seasons.
- ✓ Biannual migrations.
- ✓ Annual hibernation.
- ✓ Daily (circadian) rhythm

Circadian rhythms: endogenously generated rhythms with a period close to 24 hours.
Diurnal rhythms: a circadian rhythm that is synchronized with the day/night cycle.
Ultradian rhythms: biological rhythms (e.g. feeding cycles) with a period much shorter (i.e. frequency much higher) than that of a circadian rhythm.
Infradian rhythms: biological rhythms with a cycle of more than 24 hours (e.g. the human menstrual cycle).

BEHAVIOUR DISSCUSSION QUESTIONS

1.(a)Give the meanings of each of the following forms of behavior.
(i) Habituation (ii) Imprinting iii) Instinctive behavior

(b) State the benefits of each of the above forms of behavior to animals.
(i) Habituation. ii) Imprinting. iii) Instinctive behavior.

2. (a) Explain the significance of the following forms of behavior
   i) Territorial behavior ii) Courtship behavior
   (b) Distinguish between **learned** and **instinctive** behavior.

3. (a) What is an **instinctive behavior**?
(b) State **two** factors that influence instinctive behavior

(c) Territorial behavior is common among many animal species. Give **four** advantages and **three** disadvantages of this behavior

4. (a) What is **displacement activity**?

(b) State the biological importance of each of the forms of behavior.

(i) Territorial behavior (ii) Courtship behavior

(c) Give **two** ways in which animals avoid predation.

5.(a) Using examples, explain the meaning of **displacement activity**.
(b) What is the importance of the following forms of behavior to the survival of organisms in community?
i) Territorial behavior ii) Courtship behavior**.**

6.(a) Differentiate between **learned** and **instinctive** behavior.
(b) What is the importance of each of the following forms of behavior in animals?
i) Imprinting ii) Habituation iii) Associative learning/conditioning.

(c.) Distinguish between **operant conditioning** and **classical conditioning**.

7.(a) Describe a type of behavior that appears to be a combination of genes and environment.

(b) Suggest how instructional conditioning could be used in dog training.

8.(a) Distinguish between **territoriality** and a **territory** as used in behavior.

(b) Give **two** examples of animals that commonly display territorial behavior.

(c.) Outline any **four** advantages of territorial behavior to such animals.

THE END

1. "The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy." **Martin Luther King, Jr.**
2. "The greatest mistake you can make in life is to continually be afraid you will make one." **Elbert Green Hubbard**
3. "Victory belongs to the most persevering." **Napoleon Bonaparte**
4. "Nothing can stop the man with the right mental attitude from achieving his goal; nothing on earth can help the man with the wrong mental attitude." **Thomas Jefferson**
5. "It´s never too late to be what you might have been." **George Eliot**
6. "Do not spoil what you have by desiring what you have not; but remember that what you have was once among the things only hoped for." **Epicurus**