

**BASICS OF ANIMAL BEHAVIOUR**  
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**(M.SC SEMESTER III CC 13)**

Broadly speaking, animal behavior includes all the ways animals interact with other members of their species, with organisms of other species, and with their environment.

Behaviour can be defined as an expressed course of action produced in organisms in response to stimulus from a given situation. It could simply be considered as what the animal does. The fundamental explanation of behavioural activity must begin with a stimulus and end with a response. Stimulus: Any change in the biotic and abiotic environments capable of eliciting or causing some sort of reaction or response in a living organism.

For example, temperature, pressure, radiation, gravity, or activities of other organisms within the immediate environment. For example, Dog might start drooling—a change in activity—in response to the sight of food—a stimulus.

Behavioral biology is the study of the biological and evolutionary bases for behavior. Modern behavioral biology draws on work from the related but distinct disciplines of ethology and comparative psychology.

- Ethology is a field of basic biology, like ecology or genetics. It focuses on the behaviors of diverse organisms in their natural environment.
- Comparative psychology is an extension of work done in human psychology. It focuses largely on a few species studied in a lab setting.

Behavioral biology also draws on many related areas of biology, including genetics, anatomy, physiology, evolutionary biology, and, of course, neurobiology—which traces the neural circuits that underlie animal behavior.

Components (types) of Behaviour

- Nature/innate - Instinct or genes determine behaviour
- Nurture/learned - Experience and learning influence behavior

### **1. Learned behaviour**

Learning can be defined as an adaptive change in individual behaviour as a result of experience. The degree of permanence of newly acquired learned behaviour patterns depends on memory storing information gained from the experience. Learning alters the range of behaviours shown by an individual, and allows it to adapt to and control its environment.

### Types of learned behaviours

- i. Habituation
- ii. Associative learning

#### **i. Habituation**

An animal should recognize important cues or signals in its environment and act in response to them in order to adapt to constantly changing environment. \*Continuous repetition of a stimulus not associated with reward or punishment (reinforcement) puts off any response to the stimulus. E.g. birds learn to ignore scare crow. Particularly important is the reaction to new signals. The importance of these signals have to be assessed, and the animal has to work out how to react to them. This is where learning is important - a suitable response can be learnt, rather than a trial and error effort after each presentation of the same stimulus. Take for example a rat that has just experienced an aversive stimulus (e.g. a very bright light). Immediately after this event, the rat may be extra sensitive to other cues (such as noises or lights) that it would not normally respond to. This is sensitization, a period of increased responsiveness following a reward or punishment (or 'reinforcement'). However, if the second stimulus is repeated without the reinforcer, the response of the animal should become reduced, and the stimulus may even be completely ignored eventually. This is habituation. The animal learns not to respond to irrelevant stimuli. This decline in response is specific to a given stimulus. If a new stimulus is presented the animal will react (i.e. it has not ceased responding simply because it is tired). Animals will not habituate to relevant stimuli e.g. those associated with predators, food or mates. Habituation is important in the development of a behaviour in young animals and helping to understand neutral elements in the environment, such as movements due to wind, cloud, shadows, wave action etc. It is based in the nervous system and is

not a form of sensory adaptation since the behaviour is permanent and no response is ever shown to the stimulus after the period of habituation.

## ii. **Associative learning**

Associative learning simply means that an animal learns to associate an event with a result. There are two types of associative learning: classical (Pavlovian) conditioning, and instrumental (operant or trial-and-error) conditioning.

a. **Classical (Pavlovian) conditioning** (conditioned reflex): Pavlovian conditioning involves the association of events over which the animal has no control. It is able to gain prediction of events in its environment. Pavlov's dog associated bell with the arrival of food and begins to salivate at the sound of a bell. At first, the dog didn't react to the stimulus alone, but after a few repetitions the stimulus was able to cause salivation, before the arrival of the food being given to the dog. The animal learns to associate a conditioned stimulus (e.g. a bell), with the onset of an unconditioned stimulus (e.g. the arrival of food). An unconditioned response (e.g. salivation) would only occur in response to an unconditioned stimulus prior to learning. Birds avoid eating black and orange cinnabar moth larvae because of bad taste and avoid all similarly coloured larvae even though they may be nutritious.

b. **Operant conditioning** (trial-and-error learning): Trial-and-error activities give rise to responses which are reinforced either by rewarding (positive) or punishment (negative). The association of outcome of a response in terms of reward or punishment increases or decreases respectively future responses. Instrumental conditioning therefore involves association of events with control. Possibly the most famous set of experiments examining this sort of learning were done by followers of the school of B.F. Skinner. The classic tool is the Skinner box. Here, the animal is placed in the box, which has some sort of reward for conducting a behaviour. For example, if the animal presses a lever, it receives a food pellet. By trial and error, the animal learns that pressing the lever delivers the reward. In this way, the animal gains prediction and control over events in its environment. The animal learns to associate its own behaviour with a particular outcome. If the outcome is rewarding e.g. access to food, the animal learns to repeat the behaviour that resulted in food access previously. It therefore learns a conditioned response to obtain food (unconditioned response).

### **iii. Latent or exploratory learning**

Animals explore new surroundings and learn information which may be useful at a later stage (hence latent) and mean the difference between life and death. E.g. In mice, knowledge of the immediate environment of its burrow may help it escape from a predator. At the time of acquiring this knowledge, it has no apparent value, hence not all behavioural activities are apparently directed to satisfying a need or obtaining a reward.

### **iv. Insight learning**

This is the highest form of learning which does not result from immediate trial-and-error learning but may be based on information previously learned by other behavioural activities. Insight learning is based on advanced perceptual abilities such as thought and reasoning.

### **v. Imprinting**

A simple and specialized form learning occurring during receptive periods in an animal's life. Imprinting involves young animals becoming associated with, and identifying themselves with another organism, usually a parent, or some large object. E.g. Chicks hatch with an innate tendency to approach and follow their mother. They have already imprinted on her vocalizations. After hatching (24 - 36 hours) they imprint on her visual appearance. Geese and ducklings form social attachments shortly after birth.

## **2. Innate behaviour**

Innate behaviour involves a collection of responses that are predetermined by the inheritance of specific nerve or cytoplasmic pathways in multicellular or single-celled organisms. As a result of these 'built-in' pathways a given stimulus will produce invariably, the same response. These behaviour patterns have developed and been refined over many generations (selected) and their primary adaptive significance lies in their survival value to the species. Innate behaviour patterns include orientations (taxes and kinesis), simple reflexes and instincts. Instincts are extremely complex and include biological rhythms, territorial behaviour, courtship, mating, aggression, altruism, social hierarchies and social organization.

Instincts are complex, inborn, stereotyped behaviour patterns of immediate adaptive survival value to the organism and are produced in response to sudden changes in the environment. It can be considered as 'unlearned species-specific motor patterns' or species-characteristic behaviour. These responses are handed down from generation to generation and, having successfully undergone the rigorous test of natural selection, clearly have important survival significance. However, instinctive behaviour patterns are not completely inflexible because all aspects of the development in an organism whether anatomical, biochemical, physiological, ecological or behavioural, are the result of the influence of constantly varying environmental factors acting on the genetic framework. In view of this, some behavioural patterns may not be purely instinctive (genetic) or purely learned (environmental), but influenced by a combination of the two.

### **Motivation**

The concept of motivation encompasses a variety of factors that modify the extent and nature of any behavioural response. At any given moment in time, an animal usually has a range of behaviours which it could exhibit. The study of motivation is interested in determining what the causal factors (or driving forces) are behind a behaviour. No animal exists in isolation from its external environment. The environment the animal lives in may change, for example, food may appear or disappear, a predator may attack, the temperature could fall, or offspring may start begging for food. These may all cause changes in the animal's behaviour. The same stimulus does not always evoke the same response in the same organism. The difference is always circumstantial and may be controlled by either internal or external factors. E.g. Presenting food to a starved animal will produce a different response from that shown by an animal that has been fed. In between two extremes, responses of varying strengths will be produced depending on the degree of hunger experienced. However, if the act of feeding will place a hungry animal in danger of being attacked by a predator, the feeding response would be stopped until the danger is passed.

Many behavioural responses associated with reproduction have a motivational element. E.g. Many female animals are only receptive to mating attempts by males at certain times of the year which coincide with the period of oestrus and have the adaptive significance of ensuring that mating coincides with the optimum time for fertilization, and therefore the production of offspring at the most favourable time of the year. These behavioural patterns are known as biological rhythms. In many

species, the degree of motivation or drive coincides in males and females, but in other species, some system of communication between sexes is essential to express the degree of motivation. In many primates, the timing of oestrus is signaled by a swelling and change of colour of the genital area of the female and this is displayed to the male. Such behaviour reduces the likelihood of a male attempting to mate at the time when the female is not receptive. The signals used to bring about a change in behaviour are known as sign stimuli. Depending on their origin or function, they are classified as motivational, releasing or terminating stimuli.

**Motivational stimulus** may be external, e.g. increasing day length induces territorial and courtship behaviour in birds, or internal, e.g. depleted food stores in the body results in seeking for food. Releasing stimulus may be a simple stimulus or sequence of stimuli produced by a member of a species which evokes a behavioural response in another member of the same species. E.g. Young herring gull chicks normally peck at a red spot on the yellow lower mandible of the parent's bill to signal the parent to regurgitate fish which the young then swallows. Terminating stimulus completes a behavioural response and may be external or internal. E.g. External visual stimuli of a successfully completed nest will terminate nest building in birds, likewise, a full stomach will terminate feeding.

It is likely that both internal and external factors often have an effect at once (they interact). For example, chickens will normally forage throughout the day. However, when a hen is brooding eggs, she will be much less likely to feed, even if food is available in the environment. Thus, there is a subtle interplay between current internal factors, and external one