

# SCOPE OF ETHOLOGY

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Ethology is the study of animal behaviour to find out natural responses of animals to various environmental stimuli. Ethology involves laboratory as well as field studies and has strong relationship with other sciences such as ecology, environmental science, neurology, physiology, psychology and evolution.

The beginning of modern ethology commenced with the experimental as well as field studies done by the Dutch biologist Nikolas Tinbergen, Austrian biologists Konrad Lorenz and the German Karl von Frisch, who were jointly awarded Nobel Prize in 1973 for their contribution to this new science.

The study of the behavior of animals is wish to learn more about its scientific approaches intrigued by their own observations. The main challenge is to understand the fundamental nature of the scientific approach that must be used to study behavior more formally. Only a rigorous experimental characterization of behavioral phenomena will yield common generalities on how and why animals do what they do - rather than providing a simple catalog of anecdotes. The study of behavior thus critically depends on our ability to phrase our general inquiry as a series of questions that can be answered with standard scientific approaches, that are amenable to experimental probes, and which lead to an explicit and unambiguous interpretation of its results.

## Proximate Explanations Neural, Endocrine, and Genetic Mechanisms

It explains how a behavior is elicited and coordinated. It includes a search for the impact of genetic components, physiological mechanisms, environmental conditions needed, and hormones on behavior.

## Ontogeny Development

The behavior is present because the individual developed an ability to do it this way.

## Survival Value

Explanations are phrased as ultimate causes that explain why a behavior has evolved. Selection ought to favor individuals with behaviors that help it increase its reproductive success. The behavior is present because the individual inherited them from parents who were historically successful with this behavior.. This includes a search for functional significance or adaptiveness of behavior.

## **LABORATORY STUDIES**

### **Neuroanatomical techniques**

Different types of behaviour are controlled by specific regions of the brain. If a particular part of the brain is damaged, the behaviour of the animal is altered. Broca (1861) identified speech area on the cerebral cortex by the slurring of speech of a patient as a result of injury to the brain. Brain parts can be damaged by making cuts with a knife or by the neurotoxic kainic acid and behaviour is observed.

Stereotaxic equipment can be used to place small and precise injuries in brain. Micropipettes can be used to inject minute quantities of chemicals in precise locations of brain, such as limbic system, and behaviour can be recorded.

### **Neurophysiological techniques**

Physiological studies can be done by recording electrical activity of brain by EEG or by stimulating different areas of brain by planting electrodes. Alpha, Beta, Theta and Delta waves are recorded by EEG. Alpha waves that are believed to emanate from the parietal and occipital lobes of brain reveal resting and peaceful relaxed state of brain that is otherwise alert. Beta waves are produced in frontal lobes and indicate the daily mental activity, concentration and thought. Theta waves denote emotional stress and sometimes hallucination. Delta waves are generated in deep sleep.

### **Neurochemical techniques**

These techniques involve stimulation of parts of brain by drugs such as alcohol, opium, hashish, bhang etc. which alter the behaviour of the animal. Tranquilizers, barbiturates and drugs like calmpose, larpose etc. are psychoactive drugs which affect the brain and change the behaviour of animals.

Hormones such as estrogen and testosterone can be introduced into hypothalamus through canulation and the behaviour changes can be recorded. Adrenalin, histamine, testosterone and dopamine stimulate different parts of the limbic system. The modern techniques, e.g. PET scanning, CT scans, MRI etc. detect glucose utilization in different parts of brain, which is an indication of activity of that part.

## **FIELD STUDIES**

### **BEHAVIORAL SAMPLING METHODS**

#### **Focal Animal Sampling**

In this sampling method an individual from a group of animals is selected and all behaviours are recorded for a specified time period. During the specific period, all activities that the animal performs are recorded, while the activities of the other animals of the group are not recorded.

After the time period is over, the observer moves to another individual of the group to record its activities. This continues until all animals of the group have been observed for the specified time period. Individuals are identified by marks and named. Jane Goodall conducted such studies on chimpanzees. This method provides unbiased data on a wide variety of questions about the animals and is generally considered most satisfactory approach to studying animal behaviour.

### **Libitum sampling**

A group of animals is selected and the observer remains with this group for a considerable period of time to observe all activities of the group. No constraints are placed as to what should be recorded and when.

All behaviours including interactions among the individuals are recorded in field notes. For instance Diana Fossey observed gorillas by living with the group whole day and observing all kinds of behaviour. Because the observer can never keep track of every minute activity of animals, the results of these observations can be biased depending on the situations that attract the observer's attention.

### **Instantaneous Sampling**

In this method the observer records the behaviour of an individual in a group at predetermined time intervals, e.g. hourly or half hourly or per minute. The observer records the state of the animal rather than events. The sample interval should be as short as possible and behaviours should be easily identifiable.

### **Continuous Sampling**

In this method, the observer simply records all the activities of the animals while they are being watched. This sampling method is very helpful in recording the sequence of activities that make the behaviour, such as courtship display in birds or fighting sequences in deer or moose.

### **Scan Sampling**

In scan sampling the behaviour of all individuals of a group of animals are recorded at fixed time intervals. This involves rapid scanning of the whole group of subjects at regular interval and behaviour of each individual is recorded. Usually the observer restricts himself to recording of few categories of behaviour. An example of scan sampling would be to observe a group of animals and record the behaviour of each animal per unit of time. This provides data on the distribution of behaviour states in group for a long time period.

### **All Occurrence sampling**

Sometimes certain behaviours are performed by several animals at the same time. For example, one animal starts the alarm call and other animals follow. In such cases the behaviour can be recorded as one event. One can record the number of alarm calls per unit of time, which will provide rate of occurrence of the behaviour in a fixed period of time.

## **Sequence Sampling**

In this method, focus is on an interaction instead of on the individuals. The whole sequence is recorded from beginning to end. For example, the aggressive and submissive behaviours can be recorded in social primates. Various types of interactions in social insects such as ants, termites and honey bees can be recorded by sequence sampling.

## **One-zero sampling**

Recording of the occurrence is done in “Yes” or “No”, depending on the activity performed or not. The results can be presented in frequencies. For example attack behaviour in territorial animals or infant-killing in monkeys.

## **Tracking Animals**

In order to study the behaviour of animals in their natural environment it is important that the animals are spotted in the wild, identified and studied without disturbing them. Animals can be identified by natural marks such as broken horn or tail, body scars or ear notches. Size and shape of the horns and tusks, facial features or pattern of stripes and spots can also be of help in identification. Photographs can be taken or drawings are made to record the identifications.