

The Study of Animal Behaviour - an introduction.

The study of animal behaviour originated from the separate disciplines of **Psychology** (which originated from the study of the human mind) and **Ethology** (the biological study of behaviour). These two disciplines typically have very different approaches to the study of animal behaviour. Psychologists are generally concerned with how behaviours are produced and how they are learned, and generally involve the study of species under laboratory conditions. In contrast, biologists are trained to approach the study of behaviour using Darwin's theory of evolution and are thus more concerned with the function and evolution of behaviours. Moreover, field studies of animal behaviour and the ecological conditions in which behaviour arises, has led to a third discipline of **Behavioural Ecology**. These different approaches to the study of behaviour have often led to very different explanations for the same behaviour.

In 1973 the Dutch ethologist and ornithologist Dr Niko Tinbergen won the Nobel Prize for his paper on the four questions that should be asked of any animal behaviour. His paper highlighted the differences in the way psychologists, ethologists and behavioural ecologists ask questions during studies of animal behaviour. The four questions of animal behaviour each lead to different, but complimentary explanations of the same behaviour, namely:

- **How is the behaviour produced?** For example, what is the specific cause of the behavioural response and what are the underlying neurobiological, psychological and physiological mechanisms that enable the behaviour to be produced and controlled?
- **How does the behaviour develop?** For example, is the behaviour an instinct gained at birth or is it something that has to be learned? If so, how is it learned, and what factors affect the learning process?
- **What is the purpose of the behaviour?** For example, what is the animal trying to achieve by doing this behaviour? Does it help their survival or their ability to reproduce?
- **How did the behaviour evolve?** For example, how did the behaviour evolve and what factors could have contributed to the moulding of the behaviour over the course of evolutionary history?

As a result of Tinbergen's work, current studies of animal behaviour always clarify which of these four questions the study aims to investigate, and in many cases studies focus on multiple questions. For example, a study of roaring behaviour in male lions could investigate the function of the behaviour (a territorial display to ward off other male lions to ensure exclusive mating access to the female pride) and how the behaviour develops (male lions do not start roaring until they reach sexual maturity and the size and strength of the lion affects the intensity of the roar).

What Are Behavioural Studies Used For?

Studies of animal behaviour can be used in a number of different ways. The traditional purpose of studying animal behaviour is to give us insights into the natural world and to understand more about the evolution of human behaviour. In more recent years studies of animal behaviour have

been used to compliment conservation projects both in situ (i.e. in the wild) and ex situ (in captivity).

In situ studies often involve understanding more about the feeding behaviour, habitat use and social interactions of animals to understand exactly what resources they need and how adaptable their behaviour is to a changing environment.

Ex situ studies can give us insights into animal welfare by detecting behavioural signs of stress and by monitoring the efficacy of husbandry techniques in reducing this stress. Ex situ studies can also help us understand how to improve zoo enclosures to encourage natural behaviour.

How to Design a Behavioural Study

All studies of animal behaviour involve detecting repeated patterns of behaviour in response to induced changes (i.e. an experiment in which the researcher manipulates the surrounding of the animal and monitors their response) or in a natural setting (i.e. field observations). Either way, it is important to determine exactly what types of behaviour you want to look at and how these will help answer your research question. In addition to carefully choosing your study individuals and behavioural categories, it is important to determine the most appropriate sampling and recording technique for your study.

Behavioural categories

As behavioural studies involve detecting patterns from repeated observations of behaviour, it is necessary to define clearly the different types of behaviour exhibited by the study animal(s). This is done by creating a table of behavioural categories with detailed descriptions, collectively known as an ethogram.

Table 1: Example of an ethogram used in a study of primate (wild howler monkeys) behaviour

Behaviour	Definition
Feed	Pulling food sources towards the body using hands and mastication of food while food item is in hand or mouth.
Move	The changing of positions within a tree or movement between trees by any mode of locomotion. If holding food while moving then the behaviour should be recorded as feeding
Rest	Inactivity in a sitting, standing or laying position
Social	All interactions between two or more individuals. Interactions may be affiliative and include behaviours such as social grooming (manipulation fur of another individual with hands and / or mouth) and playing or may be agonistic and include all types of aggression (threats, chases, lunges, strikes and bites)
Vigilant	Stationary position with head raised, scanning the surroundings and looking into the distance

Other	Includes all types of behaviour not assigned to the above categories
Out of View	Monkey is temporarily out of view so it is not clear what they are doing

Sampling and recording method

When conducting behavioural observations it is not always possible to record all the behaviour of each individual, especially if you are observing a group of animals. Behavioural studies therefore use a standardized set of sampling and recording methods to ensure accurate and reliable data collection. The most commonly used sampling methods are:

- **Scan sampling** (visually scanning a group of individuals from left to right, noting the behaviour of each individual)
- **Focal animal sampling** (observing one particular individual only and recording all instances of its behaviour)
- **All occurrences sampling** (noting every time a particular behaviour occurs)
- **Ad libitum sampling** (the researcher just notes down whatever is visible and seems relevant at the time. This method is commonly used for pilot studies when it is not yet clear of the types of behaviour relevant to the research question)

These sampling methods are accompanied by **two main recording methods**

- **Continuous recording** : frequency and durations of behaviour are recorded in real time.
- **Instantaneous recording** : behaviour is recorded at regular intervals to give repeated “snap shots” of behaviour. Intervals between different recording bouts can range between 30 seconds or 30 minutes.

Statistical analyses

Behavioural studies involve detecting patterns from repeated observations of the study animal(s) and so the results of these studies are not always obvious. Statistical analyses is therefore a major part of behavioural research in which we look for significant differences in the behaviour of different groups of individuals (e.g. comparing male and female behaviour) or determine if specific behavioural responses are significantly more likely to occur in a particular set of circumstances (e.g. if male dominance displays are more likely to occur when female are present – in other words, are males more likely to “show off” in front of the females compare to when they are just with other males). Statistical tests can also help account for individual differences in behaviour and help detect general patterns of behaviour from group living animals, even if the behaviour of each individual is not always the same.