

CHAPTER 1: THE STUDY OF BEHAVIOUR

This chapter is concerned with the following points:

1. What is behaviour and what questions can be asked when considering any given behaviour?
2. How behaviour is observed and recorded.
3. The quantification of behaviour.
4. Writing up a project on behaviour.

WHAT IS BEHAVIOUR?

Animal behaviour is the expression of an effort to adapt or adjust to different internal and external conditions, i.e. behaviour can be described as an animal's response to a stimulus.

The actions of animals are directed toward:

1. keeping themselves alive (i.e. individual survival), and
2. reproduction (i.e. species survival).

It is worth pointing out at this stage that animals do not act for the 'good of the species'. This is an archaic view – in fact, it is more appropriate to think of them as acting for the good of their genetic material and to think of genes as being selfish (Dawkins, *The Selfish Gene*).

Behaviour has evolved by natural selection and a knowledge and understanding of it has always been a practical matter for early trappers, hunters, traditional shepherds and herdsman. It is a sequence of movements with a beginning (appetitive behaviours), a middle and an end (the consummatory act). The study of behaviour (ethology) involves not only what an animal does but also when, how, why and where the behaviour occurred (Lehner, 1979). Social behaviour involves the development of relationships in which animals build up regular patterns with each other and their environment. This is a dynamic process and leads to stable relationships. These relationships are important when we examine domestic and captive animal behaviour (applied ethology).

Only by understanding animal behaviour can we really begin to appreciate whether the way we keep animals is appropriate. There are a number of ways of considering behaviour. The father of modern behaviour science is Niko Tinbergen, who established fundamental methods of analysing behaviour. Tinbergen's four questions can be asked of any behaviour:

1. *Causation (mechanism)*: How is the behaviour accomplished?

For example, cockroaches running away from one of their most effective predators, toads, use wind-sensitive hairs on their cerci to predict the point at which the toad has committed itself to a strike in a certain direction. The cockroaches then turn and immediately run away once the strike is initiated.

2. *Function*: How does the behaviour contribute to the animal's survival and reproductive success?

An animal that behaves most appropriately in a given situation will be the one most likely to succeed, e.g. fighting, feeding, breeding. For example, cockroaches running only when they are certain of an actual threat.

Therefore, they don't waste energy on unnecessary effort.

3. *Development (ontogeny)*: How does the behaviour develop during the animal's lifetime? Some key issues here would include, for example, does the animal have to learn the behaviour or does it behave appropriately without prior experience? Also, how much can an innate behaviour be modified after birth?

When you think about the relationship between age and behaviour you might also like to think about a dog cocking its leg and how this behaviour develops. It is not present at birth but instead appears as a product of hormonal activity at puberty. This is a useful reminder, therefore, that genes and the environment continue to interact throughout life.

4. *Evolution*: How did the behaviour evolve (same as asking how the horse's hoof evolved) is asking how did a certain behaviour develop (e.g. beak-wiping in zebra finch is thought to exist in 'embryonic form in the bow-minus-wipe of the closely related spiced finch and striated finch). A more puzzling question may be how stereotypic behaviours evolve in the absence of environments that elicit them.

HOW BEHAVIOUR IS OBSERVED AND RECORDED

Before behaviour is recorded a decision must be made about what responses are to be observed. This will depend on what questions must be answered. Some things to be considered are:

1. Choice of relevant observations.
2. Careful definition of the behaviour to be observed and methods of ensuring clarity and so avoiding confusion among observers.

- a. The behaviour must be described on a strictly empirical basis: based on observation and experiment. Alternatively, one can refer to an existing ethogram (a catalogue of the behavioural repertoire) for the species in question.

- b. The behaviour must not have an interpretation of functional or inferred aspect such as sleeping, yawning, was bored, happy, restless. These words do not describe the behaviour observed but are observers' subjective opinions of what was observed.

3. Choice of observation schedule. This is important as it will affect the type of data collected: observations can focus on one individual (or one dyad or one litter or other husbandry unit) for a specified amount of time (focal animal sampling) or be a record of the behaviour of each individual or all the behaviours evident in a whole group of subjects as observed at a single instant every day, once per week (scan or time sampling).

4. Some factors to be considered when observing behaviour include:

- a. spacing arrangements between animals (pigs tend to huddle together in a group, sheep graze in flocks and continually monitor each other so a fixed distance between them is maintained, dams and their offspring having a relationship that is undergo-

- ing change from birth to weaning and often beyond);
- b. orientation;
- c. posture;
- d. various behavioural rhythms that occur over different times and seasons;
- e. behaviour is influenced by the age and sex of the animal and also by its past experience.

The recording of observations can be done in different ways:

1. By the observer using a notebook and pencil. The position of the observer may influence the animal's behaviour (a so-called operator effect) and it should always be stated whether the observer was in full view of the animals or hidden from them (e.g. in an established hide or by using mirrors).
2. Using video-tape recordings. Despite the initial costs of setting up a video system, it is currently the most common technique in long-term studies of animal behaviour. Topics worth noting when considering the use of video footage in behavioural studies include
 - a. video can be used under normal lighting conditions but infra-red cameras will be required if a 24-hour record is needed and artificial light would create behavioural artefacts;
 - b. good microphones plumbed into the video recorder are the most convenient means of linking vocalisations with behavioural patterns.
3. Single-event recorders can be an efficient means of creating data from many animals at the same time without the need for video analysis. For example, infra-red beam breakage can be recorded for simple behaviours such as a horse putting its head in a bucket.

THE QUANTIFICATION OF BEHAVIOUR

Once the behavioural sequences have been recorded, by one or several methods, they must be quantified so the behaviours can be analysed. Quantification is giving numbers to behaviours and it can be done in several ways:

1. The frequency and/or magnitude can be recorded for behaviours that are unitary or discreet (Calhoun, 1975), e.g. defecation, urination, stretches, shakes.
2. Duration of behaviour can be recorded, e.g. for how long does a pig drink, a chicken dust-bathe, or a fight last between two goats? To quantify these types of behaviour in full both the frequency and duration should be recorded over a specified time period.
3. If the social relationships in a group of animals is being studied, it is necessary to record which animal initiates a behaviour (performer) and which animal it is directed toward (recipient). It is also worth noting which animal terminates the interaction. This is important in agonistic interactions where the relationship between two animals involves conflict (fighting, threat, avoidance or displacement at a service point).
4. Information can be taken from recording devices and quantified.
5. Once a behaviour has been quantified the observations can be repeated and checked.

In any behavioural experimental set-up, details of the experiment must be carefully recorded so the experi-

ment can be repeated by other observers.

In the past many behavioural studies included no quantitative data at all and were often anecdotal. This does not mean they were of no value. In fact they stimulated the interest and enthusiasm that has led to the truly scientific studies of animal behaviour.

WRITING UP A PROJECT ON BEHAVIOUR (ETHOLOGICAL RESEARCH)

This involves the following sections:

1. Introduction
 2. Materials and methods
 3. Results
 4. Discussion
 5. References (if used)
 6. Abstract or summary
1. Introduction
 - a. States aims and objectives of study,
 - b. OR hypotheses under investigation.
 - c. Literature review is not necessary for a short student project.
 2. Materials and methods
 - a. Species—their numbers, breed (if applicable), age, sex (and whether or not they were desexed).
 - b. Environmental context—temperature, humidity, wind, etc. For field observations a scale map or plan is useful.
 - c. Observational techniques and strategies (a schedule is a useful inclusion giving time and duration).
 3. Results
 - a. Include basic data of what was actually seen.
 - b. Results should be clearly and concisely stated and relevant tables referred to.
 - c. The behaviours studied should be defined—a table is a good way to do this.
 4. Discussion
 - a. Once the results have been stated any noteworthy points should be discussed in order.
 - b. If previous studies help throw light on any point these may be referred to.
 - c. Comments on how the current study adds to what was already known.
 - d. Any justifications explaining shortcomings can be put here.
 - e. Any ideas generated from the study.
 5. References (if used)

REFERENCES

- Calhoun, W.N. 1975. Quantification of behaviour. In: *Animal Behaviour in Laboratory and Field*. (2nd ed.) Eds. E.O. Price, A.W. Stokes. W.H. Freeman and Co., San Francisco.
- Dawkins, R. 1989. *The Selfish Gene*, Oxford University Press. Oxford, UK.
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