**Measuring behaviour**

*Practical techniques*

There are three main methods of measuring behaviour: Focal sampling, scan sampling, and ad lib recording.

 **1. Focal sampling.** Focal sampling is probably the most common method used in animal behaviour research. It involves observing the behaviour of a single individual for an extended period, for example 10, 20 or 40 mins, and recording at regular intervals (e.g., 20s or 30s) what that individual is doing.

You should first spend some time watching what the animal does, and then choose some categories which capture the main discrete forms of behaviour. So for example you might divide sheep behaviour into categories and assign a code to each, such as ‘Stand (S)’, ‘Walk (W)’, ‘Feed (F)’, ‘Run (R)’, ‘Vigilant (V)’, ‘Social interaction (I)’. You also need to decide how you want to categorise the type of animal that you are watching. Is it a male or a female? Can you divide into size or age categories, e.g. Small Medium Large, Juvenile, Young adult, Old adult?

Next decide the length of the focal, and the sampling interval. The duration depends on how many individuals you want to sample from, how much time you have, and how long it is realistically possible to keep the animal in sight. It’s not a good use of time to do a 1 hour focal on an animal that might fly off in the first 5 mins. The choice of sampling interval should allow each time point to be independent from the previous and subsequent ones. So for example there is little point sampling a sheep every 2 seconds since they don’t switch between behaviours very often.

Generally speaking a reasonable choice of focal duration would lie somewhere between 5 min and 20 min, and a sampling interval of 10 s to 30 s.

**2. Scan sampling.** Scan sampling is used when you want to have a record of what a group or population of animals are doing simultaneously. For example, you might want to know how many individuals (or what proportion of individuals) in a group are feeding at a particular moment in time, how many are vigilant, and so on. This can help you investigate how animals respond as a group or population to changes in their environment (e.g., whether they behave differently when in bushy or open habitat or when group size differs). It can also enable you to test whether each individual acts independently of others or whether there is some degree of coordination, whether some members of a group do more of a certain activity than others etc.

Again, you need to first spend some time watching what the animals are doing to come up with a categorisation system, and decide how long you are going to scan sample. The aim is for each scan to represent an independent sample of the behaviour of multiple individuals, and although the aim is to capture behaviour at exactly the same ‘instant’ in time, it does take some time to count, categorise and write down the behaviour of a number of individuals. Obviously there is no point choosing a sampling interval of 1 minute if it takes you a minute to figure out what everyone is doing!

If you are faced with a large group (e.g. 50 sheep) then it makes sense to divide the group up into manageable chunks. Typically an interval of 1 min to 5 mins will work well, with a total duration of 20 to 60 mins.

To conduct the scan, use a stopwatch and write down at each time interval of how many animals are a) visible b) out of these, the number that are engaged in the behaviours of interest e.g. S, W, F, R… in the example provided above.

**Combining Focal and Scan sampling** It is also possible to combine scan and focal watches - so, you may do a focal on one individual for 10 mins, with a scan sample of the group at the beginning, in the middle, and at the end (i.e., at 5 min intervals). This can give you the benefit of a general picture (via the scan sample) and more detailed individual behaviour (via the focal watch).

**3. Ad lib recording.** For rare but interesting behaviour, you also want to be able to write stuff down as it happens. E.g. If there is a quick chase, or there is a fight among the animals, or something like that, you miss it if you restricted yourself to scan sampling or because you are doing a focal on the ‘wrong’ individual. For anything like this it is useful to allow space for an ‘ad lib’ column on your focal or scan sample datasheet, or to write down time and descriptions of what has happened in a separate notebook, with a reference number that links it back to the focal or scan sample in which it occurred.

Remember that the point of organising focal and scan sheets is so that you have a simple, standard way to record behaviour in a way which will allow you later to boil things down to a simple number such as ‘vigilance rate’ or something like that, which is what you are going to end up using for statistical analysis. Note you will inevitable end up collecting lots of information on things that you might not use ultimately – that’s just the way it is with recording behaviour. But to make the decision about what to include and what not to include in your analysis, or which behaviours to lump together, you need to have this information written down in a detailed way in the first place. So for example in the analysis you might lump several categories of behaviour (e.g., feeding and resting) together as ‘non-vigilant’ – it depends on what question you are asking. But if you haven’t split behaviour into these categories in the first place then you can’t later ask further questions of the data – e.g., about feeding behaviour per se.

**Before you start**

It is good practice before starting any kind of data collection in the field to write down as standard all relevant information about the time and conditions which might affect the observations. For example, you could record your data on sheets or in a notebook with date, time, weather, temperature, location, group or colony ID, observer ID at the top. Under this you can use a table to record your focal, scan or ad lib observations.

**Focal watch data sheet - example**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Focal data sheet |  |  |  |  |
| Date |  | Location: | Time: |  |  |
| Animal ID |  | Weather: | Group ID |  |  |
|  |  |  |  |  |  |
| Interval  | Behaviour | Nearest Neighbour (NN) Dist | N.N. ID | Habitat | *Comments/ad lib* |
| 1 | W | 10 | ? | Open | *(nearest neighbour measured to nearest ~1m)* |
| 2 | W | 5 | BZ | O |  |
| 3 | V | 5 | BZ | O |  |
| 4 | V | 5 | HS | O |  |
| 5 | R | 7 | HS | O |  |
| 6 | R | 8 | HS | O |  |
| 7 | X |   |   | Scrub |  |
| 8 | X |   |   | S |  |
| 9 | X |   |   | S |  |

 (note: in this illustration W = walk, V = vigilant, X = Rest, F = feed)

**Scan sample data sheet - example**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scan sample data sheet |  |  |  |  |  |  |
| Date |  | Location: | Time: |  |  |  |  |  |  |
| Animal ID | Weather: | Group ID |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Interval  | Habitat | Run | Rest | Walk | Vigilant | Chase | Feed | Unseen | Comments/ad lib |
| 1 | S | 1 | 5 |  |  |  |  | 1 |  |
| 2 |  |  | 7 |  |  |  |  |  |  |
| 3 |  |  | 7 |  |  |  |  |  |  |
| 4 |  |  | 2 | 3 | 2 |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |