

## Topic List

Week 1- Introduction and stakeholder

Week 2- Stakeholder perspectives

Week 3- Ethics and animal welfare concepts

Week 4- Measuring biological function using behaviour

Week 5- Measuring biological using physiology

Week 6- Measuring affective states

Week 7- Fitness measures and methodological issues

Week 8- Housing

Week 9- Housing 2

Week 10- Painful husbandry procedures and animal slaughter/ euthanasia

Week 11- Companion animal ownership

Week 12- Zoo animals and rationally addressing welfare issues

## Week 4- Measuring biological functioning using behaviour

4 main responses to a stressor

1. Behavioural responses (normally the frontline response)
2. Autonomic nervous system
3. Neuroendocrine system
4. Immune system

Observing and recording behaviour

- Ethograms need to be exhaustive, exclusive, functional and well-defined

1. They catalogue behaviour Sampling method (recording techniques)

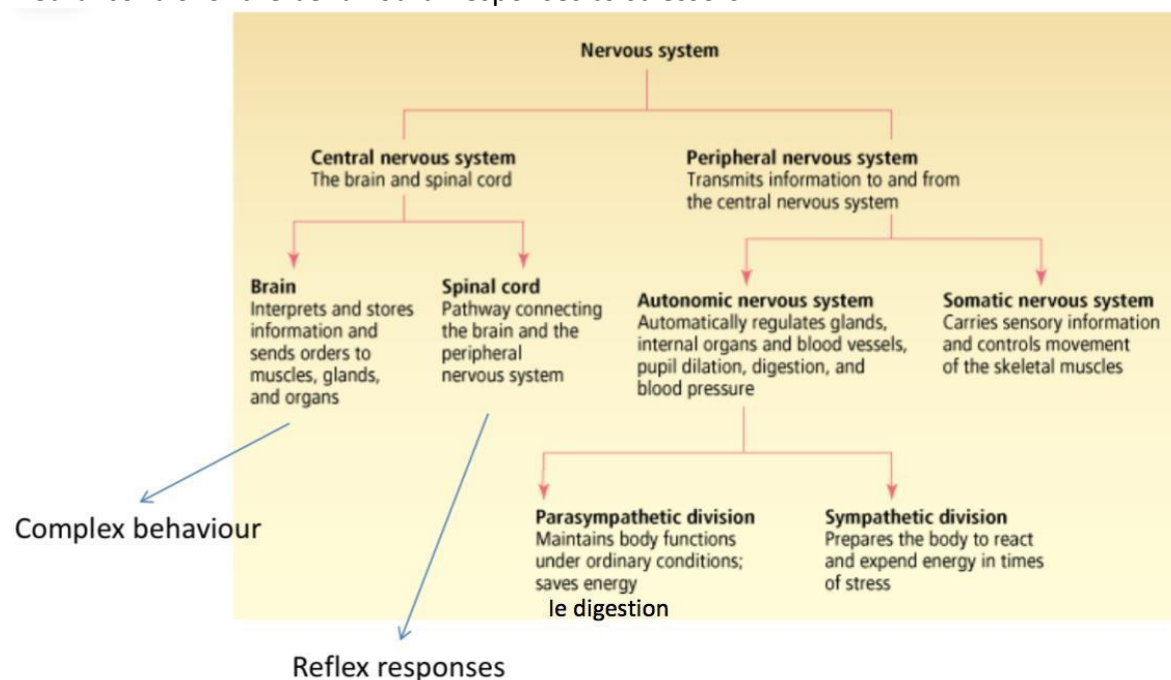
- Time sampling: The observation period of interest is sampled. There are 3 types of sampling techniques used for sampling in time

1. **Point sampling** (or instantaneous sampling)- Involves observing animals at regular intervals. Used for behaviours that occur frequently

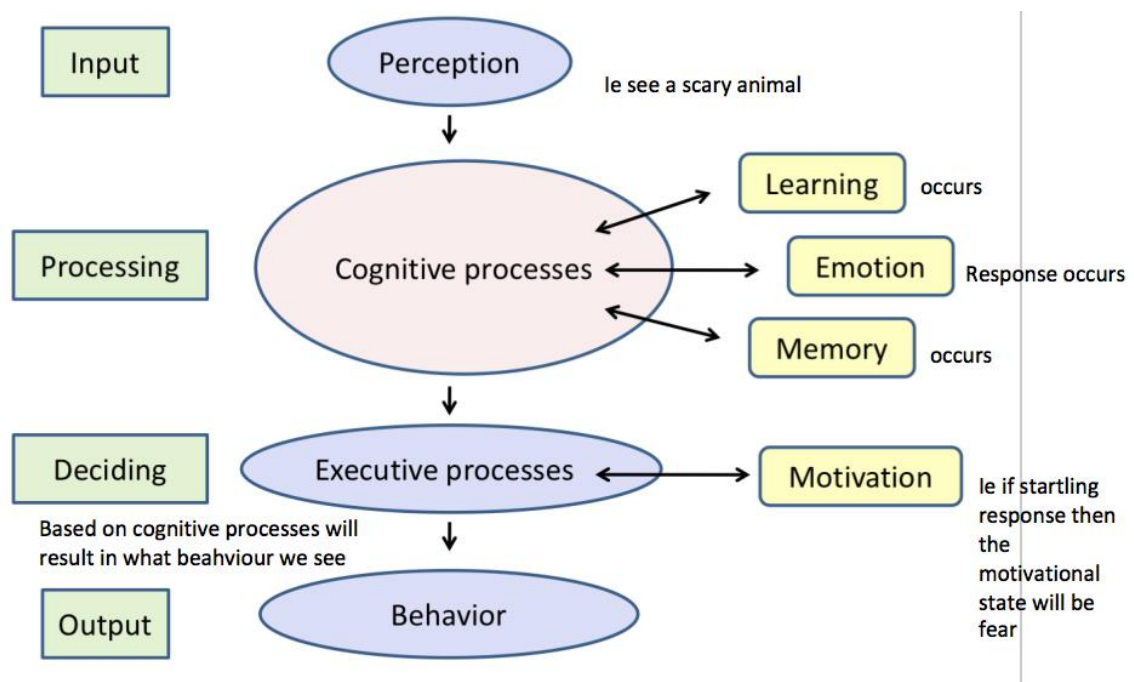
2. **Period occurrence sampling** (or one-zero sampling)- Involves recording whether a behaviour occurs (one) or doesn't (zero) in a short interval of time (sample period). For when behaviours occur rarely and/or are short-term behaviours ie biting. Eg look at one minute every 2 hours and record if the behaviour occurs or not

3. **Period sampling**- Involves continuous observations on behaviour but recording all or only some behaviours within predetermined time periods during the period of interest ie recording feeding behaviours only during the period where the animal is eating

Neural control of the behavioural responses to stressors



## Control of purposeful behaviour



## Main brain structures involved in purposeful behaviour

- The brain is organized into 3 interconnected layers:
  1. Central core- composed of 5 main regions that regulate life, 3 being:
    - Thalamus: Begins process of interpreting sensory information (the brain's sensory switchboard). It determines the fundamental properties (ie is it good or bad) before forwarding the information to the appropriate area of the cerebral cortex
    - Cerebellum: Coordinates body movement, controls posture and maintains equilibrium
    - Reticular formation: Signals the cerebral cortex to attend to the new situation and remain alert (even during sleep)
  2. Cerebral cortex- Directs the brain's higher cognitive and emotional states. Contains 4 lobes that oversee all forms of conscious experience including perception, emotion, thought and planning:
    - Frontal lobe: Assists in motor control and cognitive activities such as planning and decision making
    - Occipital lobe: Processes visual information and passes conclusions to the parietal and temporal lobes
    - Parietal lobe: Assists in sensory processes, spatial interpretations and attention
    - Temporal lobe: Assists in auditory and visual perception
  3. Limbic system- Mediates motivated behaviour, emotional states and memory processes (the brain's "emotional centre"). It contains 3 main regions:
    - Hippocampus: Plays an important role in emotion, learning and memory
    - Amygdala: Plays a role in aggression, fear, eating, drinking and sexual behaviour
    - Hypothalamus: Regulates processes in the body through its connection to the CAN, ANS and endocrine system

## Behavioural responses

- Reflexes
  - Simple reflexes typically involve involuntary, brief, unitary muscle movements that may be limited to a discrete body part
  - Includes things like withdrawal from a painful stimulus as well as the startle response, pupillary contraction and the eye blink
  - Reflex responses are adaptive in eliciting an instant response to a noxious (harmful) stimulus such as a sharp or hot object
  - Occurs without conscious thought (signal travels to and from the spinal cord)
- Complex behaviours
  - More complex behaviours generally involve more than simple reflexes (where processing in the brain occurs)
  - Complex behaviours (such as locomotion, courtship, feeding, aggression, avoidance etc) often involve many muscle systems that work together to produce a sequence of events, and often appear to be directed towards a specific goal
  - These goal-directed behaviours are influenced by what we call the **motivational states** of the animals are clearly dependent upon the situation in which the animal finds itself (ie its internal state past experiences)

## Indicators of welfare problems

- The most obvious indicator that an animal is experiencing difficulty in coping with a problem is often a behavioural response ie tail biting of piglets
- Common behavioural indicators of poor coping:
  - Fearfulness
  - Aggression
  - Redirected and displacement behaviours and stereotypies (stereotypies are repetitive behaviours that serve to obvious function ie bar-biting)

## Short-term behavioural responses to stressors

- Occur within seconds, minutes, maybe even hours
- 1. Orientation reactions (an organism's immediate response to a change in its environment, when that change is not sudden enough to elicit the startle reflex)
  - Common to many types/ intensities of stimulation and are not by themselves indicators that the animal is encountering a problem
  - The disturbance effect will depend on:
    - The stimulus characteristics (ie intensity duration etc)
    - The context in which it occurs (ie familiarity, following another disturbance etc)
    - The animal's previous experience
  - If the challenge is substantial, it may be followed by a startling response and defensive or flight reactions (of different intensity depending on the factors cited above)
- 2. Startle responses
- 3. Defensive or flight reactions
- The intensity, duration and frequency of these responses can be used as an index of disturbance