Proximate and Ultimate causes of behaviour

Proximate causes of behavior are immediate, mechanistic factors (hormones, nerves, stimuli) explaining "how" a behavior occurs, causation and ontogeny are summarised as the "proximate mechanisms", while ultimate causes are evolutionary reasons (survival, fitness) explaining "why" a behavior evolved. adaptation and phylogeny are the "ultimate mechanisms".Both are essential for understanding behavior, often divided into Tinbergen's four questions:

Nikolaas Tinbergen, a Dutch ethologist described four questions he believed should be asked of any animal behaviour, which were:

1) Causation (mechanism): what are the stimuli that elicit the response, and how has it been modified by recent learning? How do behaviour and psyche "function" on the molecular, physiological, neuro-ethological, cognitive and social level, and what do the relations between the levels look like?

2) Development (ontogeny): how does the behaviour change with age, and what early experiences are necessary for the behaviour to be shown? Which developmental steps and which environmental factors play when / which role? (compare: Recapitulation theory)

3) Function (adaptation): how does the behaviour impact on the animal's chances of survival and reproduction?

4) Evolution (phylogeny): how does the behaviour compare with similar behaviour in related species, and how might it have arisen through the process of phylogeny? Why did structural associations (behaviour can be seen as a "time space structure") evolve in this manner and not otherwise?*

.These explanations are complementary rather than mutually exclusive—all instances of behaviour require an explanation at each of these four levels.

For example, the function of eating is to acquire nutrients (which ultimately aids survival and reproduction), but the immediate cause of eating is hunger (causation). Hunger and eating are evolutionarily ancient and are found in many species (evolutionary history), and develop early within an organism's lifespan (development).

Bird Migration: Proximate causes include changing day length and temperature (stimuli)

triggering hormonal changes. The ultimate cause is that birds that migrated survived better and reproduced more than those that stayed.

Animal Fighting: Proximate cause is a surge in adrenaline or testosterone in response to a rival. The ultimate cause is securing resources (territory/mates) to increase reproductive success.

Examples of Proximate causation

1) Hormonal changes during breeding seasons trigger courtship behavior in birds.

2) The presence of a predator stimulate the release of stress hormone, leading to fight or flight response.

3) Learning through classical conditioning allows animals to associate a specific stimulus with a particular outcome (Pavlov's dog)

Examples of Ultimate causation

1) Evolution of camouflage in prey Species help it in Protection and survival

2) Development of elaborate courtship display in male birds increases the chance of attracting mates.

3) Evolution of seasonal migration in birds allow them to exploit seasonal resource and avoid harsh winter conditions