



Course C01

Think Ethology... **...zooming in on animal behaviour**

An Advanced Certificate in the Science of Animal Behaviour

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Course Sample **For Prospective Students**

Unit 2: How and Why Scientists Study Animal Behaviour

Ethologists and psychologists approach the study of animal behaviour from different points of view. To an ethologist, the main question tends to be, What DO animals do? Ethologists watch animals to see how they earn their living, how they maximize reproduction, and how they are adapted to their environments. In other words, ethologists view what an animal is doing in terms of its foraging, its reproduction, or its avoidance of hazards. Read Wynne, pages 7-9, for a brief overview of differences between ethologists and psychologists.

To a psychologist, the main question is: 'What CAN an animal do?' Psychologists are interested in an animal's ability to learn, and how (and how much) an animal's behaviour can be modified over its lifetime.

If this distinction brings to mind the classic Nature/Nurture discussions from your secondary school education, it is not surprising. For many years, as these disciplines matured, scientists argued about the relative importance of the Nature of an animal, that is to say, its genetic inheritance; or the Nurture of its development over its lifetime. On the one hand, ethologists thought that species of animals were adapted to their habitats and thus their behaviour was in their Nature, or genetically based. On the other hand, comparative psychologists didn't like the idea that behaviour was predetermined by genes, and thought of adaptive behaviour developing as the result of experiences; or Nurture. Thus, much of the scientific, as well as popular literature was based on the Nature/Nurture controversy.

It's probably helpful to keep Nature and Nurture in mind as you progress through this course. But at the same time it is critical to learn that neither the animal's nature nor its nurture alone provide a distinct pathway to adult behaviour. Animal behaviourists of today realise that those terms are no longer relevant when trying to measure a behaviour. We will try to deal with this problem in Unit 5.

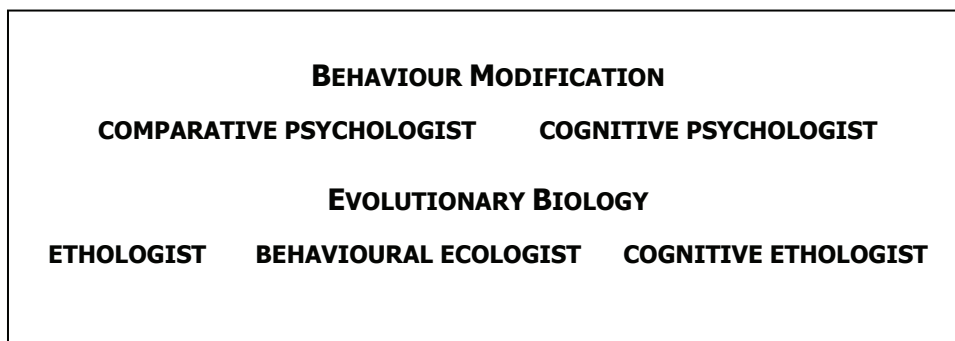
This course is focused on ethology. Ethologists themselves are divided into sub-groups such as cognitive ethologists (Unit 5), or the largest group, behavioural ecologists (Unit 4). They believe that an animal was selected to behave in a certain way, and that the selective process was based on the animal's ability to find enough to eat, to reproduce, and to avoid hazards. If you looked at a journal such as *Animal Behaviour*, you would find that each of the papers is concerned with one of these three areas. If you were a strict Darwinian you would concede that evolution by natural selection leads to a well-adapted animal, one with efficient survival techniques. The animal exists within a species that shares mutual behaviours:

- a) feeding behaviour (finding food, capturing it, chewing, swallowing, and digesting it);
- b) reproductive behaviour (finding mates and choosing among them, courting them and copulating, as well as raising and caring for young); and
- c) hazard avoidance behaviour (running and hiding or giving alarm calls, and threatening potential predators).

Eating is a way of capturing the energy of sunlight. Plants convert sunlight into a useable product by means of photosynthesis. Photosynthesis is the mechanism whereby carbon dioxide (CO₂) and water (H₂O) are converted to sugar (C₆ H₁₂ O₆).

Unit 5: Cognitive Ethology

Cognitive ethology is the study of the mental abilities of an animal or a species. Often it is difficult to separate cognitive psychology from cognitive ethology, and for good reason. These two approaches to cognition, or the acquisition of knowledge, are not very different and the boundaries between them can be muddy. The difference lies with the underlying assumption of the researcher. If you think that mental abilities allow an animal to change its behaviour and act in insightful ways, and you are interested in the limits of their behavioural abilities, then you are a cognitive psychologist. On the other hand, if you are interested in the evolution of mental abilities and how one species relates to another, or how an animal's mental abilities relate to its behavioural ecology, then you are probably a cognitive ethologist. Do read the first chapter in Wynne's book.



In Unit 5 we will approach animal behaviour as if we were cognitive ethologists.

Two years ago when I was fishing in Canada on a large river system I came across a pool formed by sticks and logs and weeds. I knew that if I cast my lure into that pool I might get a big fish. I also knew if a fish grabbed the lure and 'ran' I would get all tangled in the brush and the line would break, the fish would get away, and I'd lose my lure. So I put on an old lure, one that I wouldn't mind losing. I put on a slow swimming lure, to maximize the time it would take me to draw it across the pool. I made a perfect cast so that the lure dropped just short of the opposite shoreline.

Think how many mental processes are going on in my head to perform all the various activities in the above paragraph. I've got a problem to solve and there are literally hundreds of decisions and assessments and memories that I have to bring into play. Let's see.

- **1st sentence:** I have a sense of time. I can remember how long ago this story took place. I can distinguish years from weeks, days, hours and minutes.
- **2nd and 3rd sentence:** I can form a mental representation of what I can't see. Not only can I anticipate a fish but then I can represent that fish behaving in a specific way in the future. Most exciting is I can take some fixed moment in the past and represent the future of that moment even though, for my story, it is still in the past. And I can figure the probabilities of what might happen. I can also remember what that hypothesis was two years later. I don't just remember what...

Unit 6: Evolutionary Development Part 1- Shape and Behaviour

In this Unit we will look at the subject of behavioural development - included in the bigger subject of evolutionary development. It is based on the observations that organisms are much more flexible than Darwinian (or Mendelian genetic) outlines ever thought or admitted. An individual organism has the capacity to attain several different shapes during its development, which implies that it can display novel behaviour. These novel forms and behaviours can be adaptive and selected for. Realise however that the Evolutionary Development (or Evo-Devo) argument departs from Darwinian theory in that novelty is a creation of development, and not natural selection per se.

Adult animals behave in species-typical ways. That implies that their behaviour is genetic - that is to say that their behaviour evolved as the species evolved, as I suggested in Units 2, 3, 4 and 5 of this course. In a sense, each animal has a species-typical shape and thus it cannot help behaving in a species-typical way. If it looks like a wolf then it must behave like a wolf.

There is a problem with accepting the concept of species-typical behaviour as only a genetic outcome. The implication of 'only genetic' is that the genes are a kind of map and that they predetermine the outcome of development. But to ethologists, it is clear that developmental environments of animals have a profound effect on their adult behaviour.

A common phenomenon of dog development is that pups raised in kennels past their 'critical' or 'sensitive' period of social development are often shy of human beings. They may also be shy of any new sights, smells and sounds, and that can be a real problem when one tries to train them for a specific task. Gun dogs can be frightened of gunfire - they are 'gun shy' - if not exposed to the sound of gunfire or similar loud bangs before the end of the critical (sensitive) period. In the USA, I found that some guide dogs spooked uncontrollably when they heard a bus backfire and some of them couldn't be taught to cross an iron grating in a sidewalk, or they avoided and were fearful of tile floors or stairs. It is rare that even an expert trainer can train those dogs to ascend or descend stairs with confidence. Extreme shyness to novelty in its adult environment may preclude the dog from ever becoming a working dog, such as a service dog. It is next to impossible to train a kennel-raised dog not to be frightened of simple things like stairs.

Shyness to novelty may be species-typical, but what constitutes novelty is part of the animal's developmental experience. Does that mean that the behaviour of a kennel-shy spooky dog is genetic? Well, yes. Spooky dogs are spooky in species-typical ways. One might say that the kind of shyness exhibited is characteristic of dogs raised in a kennel.

One might argue then that every environmental stimulus affects the growing pup and no two pups will ever behave exactly the same, simply because no two pups can ever grow up in identical environments. One might also wonder if two genetically identical dogs (twins) can develop totally different behaviours depending on their developmental environments. Which one would be 'selected for' in an evolutionary sense? Isn't that interesting? If one twin was selected for and the other against, it would make some kind of strange Darwinian argument that it is not the genes that are important, but rather it is the environment in which those genes grow up that is being selected for. That gives rise to a whole new kind of thinking about animal behaviour called Evolutionary Development (Evo-Devo).



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