Scope of Ethology, Innate of learned behavior (Section – II)

BSc. Part I Zoology (Hons) Paper II

Learning

Habituation

Habituation is a simple form of learning and occurs in many animal taxa. It is the process whereby an animal ceases responding to a stimulus. Often, the response is an innate behaviour. Essentially, the animal learns not to respond to irrelevant stimuli. For example, prairie dogs (*Cynomys ludovicianus*) give alarm calls when predators approach, causing all individuals in the group to quickly scramble down burrows. When prairie dog towns are located near trails used by humans, giving alarm calls every time a person walks by is expensive in terms of time and energy. Habituation to humans is therefore an important adaptation in this context.

Associative learning

Associative learning in animal behaviour is any learning process in which a new response becomes associated with a particular stimulus. The first studies of associative learning were made by Russian physiologist Ivan Pavlov, who observed that dogs trained to associate food with the ringing of a bell would salivate on hearing the bell.

Imprinting

Imprinting enables the young to discriminate the members of their own species, vital for reproductive success. This important type of learning only takes place in a very limited period. Lorenz observed that the young of birds such as geese and chickens followed their mothers spontaneously from almost the first day after they hatched. He discovered that this response could be imitated by an arbitrary stimulus if the eggs were incubated artificially and the stimulus were presented during a critical period that continued for a few days after hatching.

Imitation

Imitation is an advanced behaviour whereby an animal observes and exactly replicates the behaviour of another. The National Institutes of Health reported that capuchin monkeys preferred the company of researchers who imitated them to that of researchers who did not. The monkeys not only spent more time with their imitators but also preferred to engage in a simple task with them even when provided with the option of performing the same task with a non-imitator. Imitation has been observed in recent research on chimpanzees; not only did these

chimps copy the actions of another individual, when given a choice, the chimps preferred to imitate the actions of the higher-ranking elder chimpanzee as opposed to the lower-ranking young chimpanzee.

Stimulus and local enhancement

There are various ways animals can learn using observational learning but without the process of imitation. One of these is *stimulus enhancement* in which individuals become interested in an object as the result of observing others interacting with the object. Increased interest in an object can result in object manipulation that allows for new object-related behaviors by trialand-error learning. Haggerty (1909) devised an experiment in which a monkey climbed up the side of a cage, placed its arm into a wooden chute, and pulled a rope in the chute to release food. Another monkey was provided an opportunity to obtain the food after watching a monkey go through this process on four separate occasions. The monkey performed a different method and finally succeeded after trial-and-error. Another example familiar to some cat and dog owners is the ability of their animals to open doors. The action of humans operating the handle to open the door results in the animals becoming interested in the handle and then by trial-and-error, they learn to operate the handle and open the door.

In local enhancement, a demonstrator attracts an observer's attention to a particular location. Local enhancement has been observed to transmit foraging information among birds, rats and pigs. The stingless bee (*Trigona corvina*) uses local enhancement to locate other members of their colony and food resources.

A well-documented example of social transmission of a behaviour occurred in a group of macaques on Hachijojima Island, Japan. The macaques lived in the inland forest until the 1960s, when a group of researchers started giving them potatoes on the beach: soon, they started venturing onto the beach, picking the potatoes from the sand, and cleaning and eating them. About one year later, an individual was observed bringing a potato to the sea, putting it into the water with one hand, and cleaning it with the other. The individuals living in contact with her soon expressed this behaviour; when they gave birth, their young - a form of social transmission, also expressed this behaviour.

Teaching

Teaching is a highly specialized aspect of learning in which the "teacher" (demonstrator) adjusts their behaviour to increase the probability of the "pupil" (observer) achieving the desired end-result of the behaviour. For example, killer whales are known to intentionally beach themselves to catch pinniped prey. Mother killer whales teach their young to catch pinnipeds by pushing them onto the shore and encouraging them to attack the prey. Because the mother killer whale is altering her behaviour to help her offspring learn to catch prey, this is evidence of teaching. Teaching is not limited to mammals. Many insects, for example, have been observed demonstrating various forms of teaching to obtain food. Ants, for example, will guide each other to food sources through a process called "tandem running," in which an ant will guide a

companion ant to a source of food. It has been suggested that the pupil ant is able to learn this route to obtain food in the future or teach the route to other ants. Crows, specifically New Caledonian crows, also exemplify this behaviour of teaching. The adults (whether individual or in families) teach their young adolescent offspring how to construct and utilize tools. For example, *Pandanus* branches are used to extract insects and other larvae from holes within trees.

Animal Behavior

Animal behavior is what animals do or avoid doing. The difference between an innate behavior and a learned one is that innate behaviors are those an animal will engage in from birth without any intervention. Learned behavior is something an animal discovers through trial, error and observation. Most learned behavior comes from the teaching of the animal's parent or through experimentation with its environment.

Innate Behavior

Instinct is a powerful force in the animal world. It dictates the behaviors necessary for survival, especially in species that don't get much guidance from their parents. These behaviors are programmed into an animal at a genetic level. An innate behavior is inheritable, passing from generation to generation through genes. It is also intrinsic, meaning that even an animal raised in isolation will perform the behavior, and stereotypic, meaning that it is done the same way every time. Innate behaviors are also inflexible and are not modified by experience. Finally, they are consummate, which means that the behavior is fully developed from the animal's birth.

Example of Innate Behavior

Sea turtle hatchlings provide one of the best examples of innate behavior. They hatch never having seen their parents, so there is no opportunity for acquiring learned behavior. Yet, sea turtle hatchlings instinctively dig their way out of the buried hatchery. Even though this digging can take days, the hatchlings time themselves so that they emerge at night, when they are safest as they struggle toward the sea. There is no parent present to tell them they must wait for nightfall or that they must get to the sea. It is simply an innate knowledge, an instinct that drives them to action.

Learned Behaviors

Learned behaviors come from experience and are not present in an animal at its birth. Through trial and error, memories of past experiences and observations of others, animals learn to perform certain tasks. Generally, learned behaviors are not inheritable and must be taught to or learned by each individual. They are extrinsic, meaning they do not occur in animals kept isolated from others or away from the opportunity for trial and error. They are permutable, meaning that they can change over time, in contrast to the rigid repetition of an innate behavior.

Learned behaviors can also be adapted to suit changing conditions, and they are progressive, meaning the behavior can be refined through practice.

Example of Learned Behavior

Honeybees provide an interesting example of learned behavior. While the desire to find nectar is innate in a honeybee, they learn to associate given colors with the food they are seeking. In experiments reported by North Carolina State University, sugar water was put in a yellow dish, while regular water was put in a blue dish. The honeybees learned that the yellow dish contained food and visited it while ignoring the blue dish, even when the positions of the dishes were changed. When regular water was put in the yellow dish and sugar water in the blue dish, however, the honeybees continued to visit the yellow dish until they learned through trial and error that what they wanted was now in the blue dish.

Complex Behavior

Behavior is actually more complicated than "innate" or "learned." Most behaviors are a mix of the two, neither completely innate nor entirely learned. For instance, some innate behaviors -- such as flying in insects -- can be perfected over time and through experience. Locusts know how to fly from birth, but they get better at it with practice, eventually learning to expend less energy to accomplish the same flight. The same is certainly true of foals, born with the knowledge of how to walk; it still takes time for the foal to learn how to operate its legs.