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Collective Animal Behaviour and their Factors

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Opinion Article

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DESCRIPTION

A type of social behaviour known as collective animal behaviour involves the coordinated actions of numerous, similar animals as well as the emergent characteristics of these groups. This can include the advantages and disadvantages of group participation, information sharing, the decision-making process, collective movement and synchronisation. Through the theory of biomimetics, studying the fundamentals of social animal behaviour has application to engineering issues that affect people. Deploying and controlling groups of flying or swimming micro-robots such as UAV's can be improved by understanding the rules by which an individual animal navigates in relation to its neighbours in a group. The study of collective phenomena or the recurring interactions between individuals that result in broad patterns, is where the foundation for collective animal behaviour was discovered. The foundation of collective phenomena arises from the concept that collective systems can be understood *via* a collection of procedures.

Protection from predators

Animal groups have been suggested to serve a variety of anti-predator purposes. The "predator confusion effect" postulated and demonstrated by Milinski and Heller is one potential strategy by which fish or bird groups may thwart predators. This topic is based on the assumption that because there are so many moving targets, the predator's visual channel becomes overloaded making it challenging for predators to distinguish individual prey from groups. Both experiments and computer simulations have supported Milinski and Heller's conclusions. The "many eyes" theory proposes a second potential anti-predator effect of animal gathering. According to this hypothesis, as the group size grows, the responsibility for searching the surroundings for predators can be distributed across a large number of people. This widespread cooperation might not only enable greater vigilance but it might also free up more time for individual feeding.

The "encounter dilution" effect is a third theory for an anti-predatory effect of animal aggregation. For instance, Hamilton suggested that animal gatherings were a result of "selfish" cover-seeking as a way to evade a predator. Different interpretation of the theory that included the probability of attack and detection. Since a predator is less likely to stumble upon a single group than a dispersed distribution, it was hypothesised that potential prey would profit from living together in the detection component of the theory. In the attack component, it was hypothesised that a larger population would make an attacking predator less likely to consume a particular animal. In conclusion, if the probability of detection and attack does not rise disproportionately with group size, an individual enjoys an advantage if they are in the larger of the two groups.

Increased locomotion efficiency

According to this hypothesis, groups of animals moving in a fluid environment may conserve energy by flying or swimming together similar to how cyclists may draught one another in a peloton. It is also believed that geese flying in a Vee formation conserve energy by soaring in the updraft created by the wingtip vortex created by the animal before them in the formation. It has also been demonstrated that ducklings conserve energy by swimming in a line. School of fish and Antarctic krill have both been suggested to swim more effectively in groups. Another illustration is homing pigeon behaviour. A homing pigeon that has been released from its roost with other birds in the group demonstrates enhanced efficiency and decision-making to reduce the distance of the path taken to return home hence conserving energy when flying between sites.

Reproduction and development

Reduced resource availability can cause reproduction rates and offspring development to vary with growing colony size and resource rivalry among group members. For instance, a study on groups of forest monkeys revealed that the development of young monkeys in greater group sizes was slower than that of those in smaller group sizes. The slower rates of newborn growth in the larger groups were severely impacted by the mother's lower levels of accessible nutrition which were closely associated to their lower levels of energy gain. Additionally, it was shown that females in larger population reproduced more slowly than females in smaller population.