Department of Mathematics, Statistics and Computer Science
St. Francis Xavier University
presents

In the Shadow of the Snow Leopard: Foraging games between fierce predators and their prey

by
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Abstract:

Fierceness is not a property of the predator but rather the prey. It describes the prey's capacity to be fearful. Fearful preys adjust behaviors to balance food and safety. Stealthy predators adjust behaviors to directly influence their prey's fear and indirectly their capturability. Snow leopards illustrate why game of fear and stealth are real and of importance to the management of elusive predators. I will use this system as inspiration for developing two foraging games. In the first model, a large predatory cat moves from woodlot to woodlot in hopes of capturing deer. The cat decides how long to remain in a woodlot before moving on. The deer must decide their baseline level of fear. The cat depletes food patches by scaring deer away. The deer must balance the benefits of heightened fear (reduced predation) with the costs of lost feeding opportunities. A system of mule deer and mountain lions in Idaho test whether this game actually happens. The second model considers a nightly foraging game between gerbils and owls inhabiting a desert sand dune. Each night begins with a new pulse of seeds for the gerbils. The gerbils must choose their nightly activity schedule in light of depleting seeds and the tactics of the owls. In response, the owls must select temporal pattern to their nightly activity that keeps a profitable number of gerbils active during each stretch of the night. The model predicts complete activity of the gerbils and owls early in the night. Then the owls modulate their behavior downwards to exactly match the decline in seeds throughout the night. At the Evolutionarily Stable Strategy (ESS), the gerbils experience the same ratio of risk to reward throughout most of the night. Finally, we will see whether real gerbils and owls have studied the theory.

Refreshments will be served before the talk in AX24A