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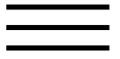
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Wolf-pack (*Canis lupus*) hunting strategies emerge from simple rules in computational simulations

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Abstract

We have produced computational simulations of multi-agent systems in which wolf agents chase prey agents. We show that two simple decentralized rules controlling the movement of each wolf are enough to reproduce the main features of the wolf-pack hunting behavior: tracking the prey, carrying out the pursuit, and encircling the prey until it stops moving. The rules are (1) move towards the prey until a minimum safe distance to the prey is reached, and (2) when close enough to the prey, move away from the other wolves that are close to the safe distance to the prey. The hunting agents are autonomous, interchangeable and indistinguishable; the only information each agent needs is the position of the other agents. Our results suggest that wolf-pack hunting is an emergent collective behavior which does not necessarily rely on the presence of effective communication between the individuals participating in the hunt, and that no

hierarchy is needed in the group to achieve the task properly.

Highlights

â–º We present a multi-agent model where wolf agents obey two rules to hunt a prey agent. â–º The first rule is move towards the prey until a safe distance to the prey is reached. â–º The second rule is when close enough to the prey, move away from the other wolves. â–º These two simple rules are enough to reproduce the wolf-pack hunting ethogram. â–º No communicative skills and no hierarchy are needed to complete the hunt properly.

Keywords

Collective behavior; Emergence; Wolf-pack hunting

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