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News & Comments

Colonies of Ants Behave Like Neural Networks

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Like neurons in the brain, individual ants create decision-making networks. A new study suggests that colonies of ants make decisions collectively, with the magnitude and size of the stressor requiring a decision to determine the outcomes. To arrive at a group response, ants combine sensory information about their environment with colony parameters. The most interesting aspect of this process is that it is similar to how neural networks make decisions.

According to the team, decision-making involves maximizing benefits and minimizing costs through a series of computations. Animals use sensory response thresholding to decide whether to engage in costly behaviors, like running away, when a sensory input like pain surpasses a certain level. An insufficient input will result in an insufficient response.

A key goal of the study was to investigate how group dynamics influence the type and manner in which collective information is processed. An ant colony was introduced to highly controlled temperature changes using their system. Color-coded dots were used to mark each insect and follow its movements on the video to determine the behavioral responses of the colony as a whole.

When the temperature was raised to 34 degrees Celsius, which is uncomfortably warm for the insects, a colony of 36 workers and 18 larvae readily evacuated their nest. It was surprising, however, to find that colony size affects the decision to move for a colony of over 200 individuals, temperature levels above 36 degrees were required to move them.

How, then, do ants make decisions based on the size of the colony when they are unaware of the total size of the colony? The authors believe the explanation lies in the fact that pheromones, the chemicals ants use to communicate, scale in strength as the number of ants increases. Effective communication can be described mathematically and how numbers can influence it.

In addition, moving a colony may be more difficult as it grows. To convince them that relocating is worthwhile, higher temperatures - more discomfort - will be needed. By introducing more parameters into the experiment and observing how the insects react, the team plans to refine their theoretical model of ant colony decision-making.

KEYWORDS

Ants, decision making, video, high temperature, neural networks, neural science, Neuroscience, neurons, research, experiment, latest research.