

Can monkeys choose optimally when faced with noisy stimuli and unequal rewards?

February 13 2009

Even when faced with distractions, monkeys are able to consistently choose the path of greatest reward, according to a study conducted by researchers from Princeton and Stanford Universities.

The study, published February 13th in the open-access journal *PLoS Computational Biology*, adds to the growing evidence that animal foraging behavior can approach optimality, and could provide a basis for understanding the computations involved in this and related tasks.

In the article, Feng and colleagues address ongoing experiments relating to monkeys' abilities to distinguish among moving stimuli. Monkeys were trained to identify the direction of motion of a field of randomly-moving dots, a fraction of which move coherently in one of two possible directions. But unlike most previous studies in which all correct choices were equally rewarded, different sized rewards were now associated with different stimuli, and the researchers developed a mathematical model to predict how the animals should balance sensory information and prior expectations regarding rewards, in order to maximize their net returns. The study is unique in that it assesses not only the accuracy of decisions, but also the overall harvesting efficiency.

Remarkably, the monkeys devised a near-optimal strategy. Across the course of several hundred choices in each daily session, with randomly interspersed coherence and reward conditions, their typical harvesting efficiency fell within 1-2% of the theoretical maximum. These findings reveal impressive decision-making ability, and raise important questions

about the neural mechanisms that underlie it.

More information: Feng S, Holmes P, Rorie A, Newsome WT (2009) Can Monkeys Choose Optimally When Faced with Noisy Stimuli and Unequal Rewards? PLoS Comput Biol 5(2): e1000284.
doi:10.1371/journal.pcbi.1000284
[dx.plos.org/10.1371/journal.pcbi.1000284](https://doi.org/10.1371/journal.pcbi.1000284)

Source: Public Library of Science

Citation: Can monkeys choose optimally when faced with noisy stimuli and unequal rewards? (2009, February 13) retrieved 9 April 2024 from <https://phys.org/news/2009-02-monkeys-optimally-noisy-stimuli-unequal.html>

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