Molecular mechanics of risk-reward equation described

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The hungrier the mouse, the more risk it will take to grab cheese on the floor of a home with a house cat.

"But how does it make this risk-reward computation?" asks Michael Nitabach, professor of cellular and molecular physiology and professor of genetics at Yale.

The answer for worms—and potentially mammals such as people—is that the nervous system reverses the usual flow of information from sensory input areas to higher sensory-motor integration centers, Nitabach and colleagues report Nov. 17 in the journal *Neuron*.

Nitabach's team, led by Yale graduate student D. Dipon Ghosh, compared the nervous systems of hungry and sated worms engaged in a task that requires them to cross a dangerous barrier that could kill them in order to obtain food. They found that signals that lead to the decision whether to cross this barrier act in a "top-down" fashion.

Instead of solely receiving and processing information from sensory areas, higher-order integration centers signal the sensory areas to implement the decision. This same reverse top-down flow of information occurs in the brains of human beings and other mammals, but it has not previously been linked to risk-reward decisions.

"The studies provide unprecedented insight into the detailed neural circuit computations underlying risk-reward decision-making in any animal," Nitabach said.

More information: D. Dipon Ghosh et al. Neural Architecture of Hunger-Dependent Multisensory Decision Making in C. elegans, *Neuron* (2016). DOI: 10.1016/j.neuron.2016.10.030

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