

In a battle of brains, bigger isn't always better

October 8 2014



Left hemisphere of J. Piłsudski's brain, lateral view. Credit: public domain

It's one of those ideas that seems to make perfect sense: the bigger the brain, the more intelligent the creature. While it is generally true, exceptions are becoming increasingly common. Yet the belief persists even among scientists. Most biologists, for example, assume that rats, with larger brains, are smarter than mice. Cold Spring Harbor

Laboratory (CSHL) scientists now challenge this belief. They compared mice and rats and found very similar levels of intelligence, a result that could have powerful implications for researchers studying complex behaviors and learning.

Are [rats](#) really smarter than mice? The question is more important than it sounds. For more than a decade, rats have been the rodent of choice for scientists studying how the brain arrives at decisions. They are relatively inexpensive to keep and are the subject of extensive protocols for studying cognitive function. Yet the last few years have seen an explosion in the number of [genetic tools](#) available to study their smaller cousins, mice. These tools enable scientists to turn genes on and off within specific populations of neurons – specificity that is critical to understanding how complex behaviors arise. Many investigators have shied away from using these new tools, however, believing that mice simply are not as intelligent as rats.

CSHL Professor Anthony Zador and Santiago Jaramillo, Ph.D., were skeptical. "Mice have the potential to greatly accelerate our research. We didn't want to discount a very powerful option based on anecdotal evidence of their inferiority," explains Zador.

The team systematically compared how rats and mice learn to perform a moderately challenging auditory task and found that their performance was similar. "This was a task that tested perceptual ability as well as adaptability, and we were very surprised to see that mice and rats performed about the same," says Jaramillo, a former postdoctoral researcher in the Zador lab who now heads his own lab at the University of Oregon.

The researchers were able to find only one difference: rats learned somewhat faster than mice. According to Zador and Jaramillo, the training protocol, which was developed and optimized specifically for

rats, might account for the slight advantage.

The finding of roughly equal intelligence has broad implications for cognition research. "We've found that [mice](#), and all the genetic tools available in them, can be used to study the neural mechanisms underlying decision-making, and they might be suitable for other cognitive tasks as well," says Zador.

More information: "Mice and rats achieve similar levels of performance in an adaptive decision-making task" appears online in *Frontiers in Systems Neuroscience* on September 18, 2014. The authors are: Santiago Jaramillo and Anthony Zador.

journal.frontiersin.org/Journal/2014.00173/abstract

Provided by Cold Spring Harbor Laboratory

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