# Study of published research suggests both brain size and brain-to-body ratio are factors in intelligence in birds

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An international team of researchers has found evidence that both total brain size and the size of a brain in relation to the body are factors that

determine intelligence in animals. In their paper published in the journal *Nature Ecology and Evolution,* the group describes their study of published papers involving research on intelligence in animals.

Prior research and some anecdotal evidence has suggested that brain size plays a major role in how intelligent a creature can be—humans and other primates have very large brains, for example. But some animals with very small brains have been seen to demonstrate intelligence as well—corvids and parrots, for example, have been observed carrying out tasks thought only possible by humans. Because of such exceptions, scientists have been unable to nail down just what exactly accounts for different levels of intelligence among animals.

In this new effort, the researchers looked to see if other researchers might have already found some clues that could help settle the matter. They looked at research conducted on 111 species of birds (not including owls because they are too difficult to study in the wild) where both brain size and brain areas such as the pallium were examined and measured. As they did their analyses, they looked for three major features. The first was whether intelligence appeared to correlate with specific parts of the brain, such as the pallium. The second involved looking at the differences in the number of neurons in brain regions to see how densely packed they were. And the third involved looking at developmental history of the brain in species identified as having some degree of intelligence.

The researchers found evidence that both brain size and brain/body size ratio play a major role in intelligence levels. They also found that the pallium appeared to be the most significant part of the bird brain involved in intelligence—the cerebellum was the second-most significant area. And they found evidence of neuronal growth continuing for some species into adulthood. They conclude by suggesting that, ultimately, the answer to whether brain size or brain/body ratio is more important may

be neither. It might be that one feature is more important in some creatures and the other feature more important in others.

**More information:** Daniel Sol et al, Neuron numbers link innovativeness with both absolute and relative brain size in birds, *Nature Ecology & Evolution* (2022). DOI: 10.1038/s41559-022-01815-x

Press release