# Study suggests bigger brains in birds translates to less stress

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Like the collective motions of bird flocks, the patterns result from the concerted interactions of many individual particles without a central coordinator. Credit: Wikipedia.

(Phys.org) —A team of researchers with members from the U.S. Hungary, France and Spain has found that birds that have proportionally bigger brains tend to experience less stress than those with proportionally smaller brains. In their paper published in *Proceedings of the Royal Society B*, the team describes how they studied data obtained from prior research efforts that captured stress hormone levels for 119 different species and found those birds with the largest brains relative to their body size, had the lowest levels of stress hormones in their blood during stressful events.

In humans, when something causes stress, hormones known as glucocorticoids flood our system. Their purpose is to trigger the famous fight-or-flight response. Other animals have the same hormones in their systems, and thus, researchers can test the level of stress in them by noting their hormone levels. In this new effort, the researchers wondered if birds with proportionally bigger brains, experienced less stress due to being smarter than their cousins with proportionally smaller brains. They found data in 189 previous studies with birds that also included hormone level data. Using this information, the researchers compiled a database that allowed them to compare birds by relative brain size. They found that on average, the larger the brain relative to body size, the less the amount of stress hormone produced during similar circumstances, e.g. stress inducing situations.

The researchers looked for changes in hormone levels due to a wide variety of stress inducing situations, as well as during different parts of the birds' life cycle, e.g. during migration, brooding, etc. The results came back the same: birds with bigger brains relative to their body size, such as owls and crows, had lower amounts of stress hormones in their blood during stressful events than birds with smaller brains relative to body size. They noted that it wasn't just a matter of big birds versus small birds—it was the relationship between the size of their brains and the size of their bodies that mattered.

The researchers suggest that differences between birds have come about as an adaption to dealing with stress hormones—if any animal, including humans, lives with heightened levels of stress hormones in their bodies over extended periods of time, they tend to suffer for it and die younger.

**More information:** Do smart birds stress less? An interspecific relationship between brain size and corticosterone levels, Published 11 September 2013 DOI: 10.1098/rspb.2013.1734

## Abstract

Vertebrates respond to unpredictable noxious environmental stimuli by increasing secretion of glucocorticoids (CORT). Although this hormonal stress response is adaptive, high levels of CORT may induce significant costs if stressful situations are frequent. Thus, alternative coping mechanisms that help buffer individuals against environmental stressors may be selected for when the costs of CORT levels are elevated. By allowing individuals to identify, anticipate and cope with the stressful circumstances, cognition may enable stress-specific behavioural coping. Although there is evidence that behavioural responses allow animals to cope with stressful situations, it is unclear whether or not cognition reduces investment in the neuroendocrine stress response. Here, we report that in birds, species with larger brains relative to their body size show lower baseline and peak CORT levels than species with smaller brains. This relationship is consistent across life-history stages, and cannot be accounted for by differences in life history and geographical latitude. Because a large brain is a major feature of birds that base their lifetime in learning new things, our results support the hypothesis that enhanced cognition represents a general alternative to the neuroendocrine stress response.