Larger brain does indeed mean smarter

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The subject of brain size has intrigued humans ever since Darwin suggested that our relatively large brain size is what explains our intelligence compared with other species. Although this claim is widely accepted, until recently there was no proof to back it up. This is because it is near impossible to compare intelligence of different species; what counts as intelligence for one species says nothing about another species. However, a few years ago, the Kolm Lab at Uppsala University in Sweden took a new approach to examining this age-old issue. Rather than comparing different species, they managed to identify the guppy (*Poecilia reticulata*) as a species with natural variation in brain size, which is also easy and quick to breed. They would examine intelligence within the *same species*.

From a starting population of these guppies, the lab picked individuals with either unusually large or small brains for their bodies, and bred them together. This is what pet-breeders have done for hundreds of years, selectively breeding for specific traits, and explains the differences we see between the Chihuahua and the Great Dane dog breeds for example. Astonishingly, after only three generations this selective breeding of guppies resulted in two groups of individuals, one with larger brains and one with smaller brains. Although this had been attempted before with mice, this work in the 60s and 70s had never really taken off due to the intensity of the experiments, which involve raising, breeding, and then dissecting thousands of animals. With this success, next up was for the Kolm Lab to see whether larger brains really do mean smarter. Following a series of experiments based on a simple counting exercise, they found that females with large brains were better than small-brained females.

Although this provided some exciting evidence for the link between brain size and intelligence, further work was required to back it up. In order to do this, I designed some experiments that would do just that. Using a series of complex maze tests in which individuals had to learn their way out of a maze, I found that those with larger brains seemed to have better memories and be better at spatial learning. This not only backs up previous results, but also provides many new avenues for future study. How will this increased intelligence affect different aspects of fitness (the ability to survive and reproduce), such as avoiding predator and the ability to find food? We're looking forward to hearing the results!

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