

The cerebellum provides clues to the nature of human intelligence

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Research suggests that intelligence in humans is controlled by the part of the brain known as the 'cortex', and most theories of age-related cognitive decline focus on cortical dysfunction. However, a new study of Scottish older adults, reported in the April 2011 issue of *Cortex*, suggests that grey matter volume in the 'cerebellum' at the back of the brain predicts cognitive ability, and keeping those cerebellar networks active may be the key to keeping cognitive decline at bay.

The study looked at 228 [older adults](#) living independently in the Aberdeen area, who had been part of the Scottish Mental Survey of 1947. This survey had tested Scottish children born in 1936 and at school on 4th June 1947 using the Moray House intelligence test. The [cognitive abilities](#) of the participants were tested again, now at age 63-65 years, and their brains were also scanned, using a neuroimaging technique called voxel-based morphometry (VBM), to determine the volumes of grey and [white matter](#) in frontal areas and the [cerebellum](#).

The most interesting finding from this study is that [grey matter](#) volume in the cerebellum predicts general intelligence. However, results differ for men and women, with men showing a stronger relationship between brain volume in the cerebellum and general intelligence.

It has long been recognised that the cerebellum is involved in sensory-motor functions, including balance and timing of movements, but it is now believed that the cerebellum also plays an important role in higher-level cognitive abilities. "General intelligence is correlated with many

basic aspects of information processing efficiency which I believe depend upon the functioning of the cerebellum, including the speed and consistency of our perceptions and decisions, and the speed with which we learn new skills", notes Dr. Michael Hogan, first author of the study. "This is exciting research, as it suggests that there may be a backdoor route into maintaining higher cortical functions in old age, that is, through the sustained activation of cerebellar networks via novel sensory-motor and cognitive activities, all of which I believe the cerebellum seeks to regulate and automate, working in concert with the cortex."

More information: The article is "Cerebellar brain volume accounts for variance in cognitive performance in older adults" by Michael J. Hogan, Roger T. Staff, Brendan P. Bunting, Alison D. Murray, Trevor S. Ahearn, Ian J. Deary, and Lawrence J. Whalley, and appears in *Cortex*, Volume 47, Issue 4 (April 2011).

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