Neuronal mechanisms of learning in children

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Do children really learn better than adults? And if so, which mechanisms in the brain make learning better in children? In our research we try to answer these questions with methods of cognitive neuroscience. As a model, we investigate visual perceptual learning. This refers to a long-lasting improvement in a visual task (e.g., detecting a visual orientation or motion direction in noise) through training.

We examined children in elementary school age during and after visual perceptual learning using functional magnetic resonance spectroscopy (fMRS). With this non-invasive imaging technique, one can measure neurochemical changes in the brain that take place in the course of learning. Our results showed that children exhibit a rapid and large increase of GABA, a chief inhibitory neurotransmitter, in visual parts of their brain during and after visual perceptual learning.

This increase of GABA is instrumental in converting new learning into a long-lasting memory trace, referred to as stabilization of learning. This rapid and strong stabilization of new learning by means of GABA enables children to learn faster and more than adults because their learning is more resilient to forgetting. Inhibitory GABAergic processing appears to be critically involved in learning and memory processes in children.