

# Maturation of Widely Distributed Brain Function Subserves Cognitive Development

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Cognitive and brain maturational changes continue throughout late childhood and adolescence. During this time, increasing cognitive control over behavior enhances the voluntary suppression of reflexive/impulsive response tendencies. Recently, with the advent of functional MRI, it has become possible to characterize changes in brain activity during cognitive development. In order to investigate the cognitive and brain maturation subserving the ability to voluntarily suppress context-inappropriate behavior, we tested 8–30 year olds in an oculomotor response-suppression task. Behavioral results indicated that adult-like ability to inhibit prepotent responses matured gradually through childhood and adolescence. Functional MRI results indicated that brain activation in frontal, parietal, striatal, and thalamic regions increased progressively from childhood to adulthood. Prefrontal cortex was more active in adolescents than in children or adults; adults demonstrated greater activation in the lateral cerebellum than younger subjects. These results suggest that efficient top-down modulation of reflexive acts may not be fully developed until adulthood and provide evidence that maturation of function across widely distributed brain regions lays the groundwork for enhanced voluntary control of behavior during cognitive development. © 2001 Academic Press

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