

Auditory and Visual Perceptual Category Learning in Adults with ADHD: Implications for Learning Systems and Domain-General Factors

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Abstract : Attention deficit hyperactivity disorder (ADHD) has been associated with both suboptimal functioning in the striatum and prefrontal cortex. Such abnormalities may impede the acquisition of perceptual categories, which are important for fundamental abilities such as object recognition and speech perception. Indeed, prior research has supported this possibility, demonstrating that children with ADHD have similar visual category learning performance as their neurotypical peers but use suboptimal learning strategies. However, much less is known about category learning processes in the auditory domain or among adults with ADHD in which prefrontal functions are more mature compared to children. Here, we investigated auditory and visual perceptual category learning in adults with ADHD and neurotypical individuals. Specifically, we examined learning of rule-based categories – presumed to be optimally learned by a frontal cortex-mediated hypothesis testing – and information-integration categories – hypothesized to be optimally learned by a striatally-mediated reinforcement learning system. Consistent with striatal and prefrontal cortical impairments observed in ADHD, our results show that across sensory modalities, both rule-based and information-integration category learning is impaired in adults with ADHD. Computational modeling analyses revealed that individuals with ADHD were slower to shift to optimal strategies than neurotypicals, regardless of category type or modality. Taken together, these results suggest that both explicit, frontally mediated and implicit, striatally mediated category learning are impaired in ADHD. These results suggest impairments across multiple learning systems in young adults with ADHD that extend across sensory modalities and likely arise from domain-general mechanisms.

Keywords : ADHD, category learning, modality, computational modeling

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