

Striatal and Cortical Components of Inattentive Responses: An Experimental and Computational Study of the Wisconsin Card Sorting Test in Adults with ADHD traits

Andrea Caso

Birkbeck, University of London, London, United Kingdom

Richard Cooper

Birkbeck, University of London, London, United Kingdom

Abstract

Attention Deficit and Hyperactivity Disorder (ADHD) is a neuropsychiatric condition with a neurodevelopmental course that often persists in adulthood. Although it is conceptualised as a categorical disorder, ADHD traits are present in the general population. ADHD constitutes an important paradigm because its aetiology is related to both frontal and striatal circuits, but it is unclear what localised operations could be at fault when ADHD symptoms arise. We present a study where 50 adults, of which 14 had a diagnosis of ADHD, performed a speeded and unspeeded variation of the Wisconsin Card Sorting Test (WCST) and completed a set of questionnaires, including the Conners Adult ADHD Rating Scales (CAARS). Results indicate that sorting errors on the WCST did not differ between groups. However, when response times were characterised in terms of parameterised ex-Gaussian distributions for the unspeeded part of task, moderate correlations were found between the parameter corresponding to the thickness of the tail of the distribution and subscales of the CAARS measuring inattention and impulsivity. This suggests that inattention and/or impulsivity explain the occasional slower responses of ADHD participants. We consider the results in the context of an existing computational model that simulates cortical and basal ganglia operation in the WCST, where a qualitative exploration supports a distinction between cortical and striatal components of the psychological processes that lead to performance of participants with ADHD traits.