

The developmental trajectories of adaptive cognitive control in typically developing children

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Adaptive cognitive control (CC), a flexible interplay between reactive and proactive CC modalities, changes during development. Previous studies employed separate tasks to investigate the effect of contextual predictability on adapting distinct mechanisms of CC, including shifting, response inhibition or control interference. However, less is known about the developmental trajectories of adaptive CC in more demanding experimental environments requiring to both implement visuo-spatial attentional control and motor response inhibition. The present study delves into the developmental trajectories of adaptive CC in 126 typically developing children and pre-adolescents (4-14 years olds) based on contexts' predictability manipulation. We used the Addy game, a cued-goNogo computerised task, in which a List-Wide Proportion Congruency manipulation was used to create Predictive (78% validity) and Non-predictive (50% validity) blocks. These were presented in fixed order across participants who were unaware about the manipulation. To assess how inhibitory control adapts to different predictive contexts 17% of the trials within each block were NoGo. Overall, we found that adaptive CC interacted with age in terms of attentional control. Indeed, a reaction time (RT) speeding-up for invalid trials occurred at all ages. However, in preschool-aged children this implied slower RTs at valid trials, while only pre-adolescents efficiently adjusted RTs in both conditions. However, only preschoolers showed lower noGo accuracy in predictive blocks, suggesting a reduced contextual-based response inhibition. In conclusion, for the first time we show that CC adaptation to contextual-based, implicit predictability follows distinct developmental trajectories for visuo-spatial attentional control and response inhibition.

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