Learning to Imagine: A Motor Imagery Assessment of Sensorimotor Representations in Children aged 5 to 8

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Abstract

Motor imagery (MI) provides a behavioural tool to evaluate sensorimotor representations. However, its characterisation in young children remains debated. This study investigated the developmental trajectory of MI across early primary school years using a multi-task battery.

One hundred and eighteen children aged 5–8 years (61 females), spanning four French educational classes (GSM, CP, CE1, CE2), completed executed and imagined trials of standing up, typical gait, precision gait, drawing, and cube handling. Psychometric properties of the battery were evaluated. To ensure feasibility, engagement with imagery tasks was verified by comparing executed-imagined consistency in complexity-duration structure (i.e., complex tasks take longer both when executed and when imagined). Developmental differences were evaluated in terms of execution–imagery isochrony and variability across classes.

Internal consistency was excellent (α = .91–.98) and test–retest reliability ranged from moderate to excellent (ICC = .68–.92). Engagement increased by age but already exceeded 70% in the youngest group. Isochrony improved with age for simpler, highly practised tasks (typical gait, standing up), whereas more complex tasks (precision gait, cube handling) showed stable performance across classes. Variability decreased with age, and older children's performance became increasingly influenced by task complexity demands.

Findings demonstrate that mental chronometry can reliably capture MI abilities in children as young as five, revealing both developmental gains and task-specific constraints. These results highlight the feasibility of MI assessment in early childhood, warranting the need for longitudinal neuroimaging approaches to clarify mechanistic insights.

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