Age-related changes in left-or-right motor selective inhibition in children with and without Developmental Coordination Disorder

Introduction: The present study investigates the developmental changes of the capacity to selectively inhibit left or right hand after performing symmetrical movements in typically developing (TD) children and with Developmental Coordination Disorder (DCD) from 7 to 12 years old. METHODS: Right-handed TD children (N=12; 107 +/- 14 months; MABC score >15th centile) and age- and sex-matched children with DCD (N=12; 108 +/- 15 months; MABC score <15th centile) participated. First, the spontaneous tempo of each child was tested. Then, he/she was required to (1) start with a bimanual symmetrical tapping (in synchrony with an auditory metronome) and then (2) inhibit the tapping of their left finger while continuing the tapping of the right finger or conversely. We assessed the number of additional taps for the finger expected to stop and the changes in the mean tempo and its variability for the continuing finger after the inhibition cue. For each condition, t-tests were carried out to compare the group differences in each variable independent of age. Correlations were performed for each group and each condition in order to assess age-related changes of each variable. The p value was fixed at p=.05. RESULTS: No Group difference was found in the spontaneous tempo (600ms). TD children presented an age-related decrease in the number of additional taps of the left finger’s tapping (r(12)=-0.659; p<0.05) which was not the case for the right finger. In addition, TD children presented an age-related increase of the stability of the continuing left finger’s tempo (r(12)=0.805; p<0.05) which was not the case for the right finger. Compared to children with DCD, TD children significantly accelerated the right finger’s tapping (t(11)=2.270; p<0.05) during the transition between bimanual and unimanual tapping. Children with DCD produced less accurate symmetrical tapping (t(11)=2.193; p<0.05), revealed an increased instability of the right finger’s tapping (t(11)=2.262; p<0.05) and more supplementary left taps (t(11)=2.407; p<0.05) without any age-related change. INTERPRETATION: TD children exhibited an age-related improvement in inhibiting and continuing their non-dominant left finger, suggesting a left-right asymmetrization in the control of each hand. This pattern of results was not observed in children with DCD who exhibited difficulties in inhibiting the left finger’s tapping and continuing the right finger’s tapping, suggesting no left-right asymmetrization. These findings provide a substantial contribution to researches about development of mirror movements’ inhibition in TD and DCD children. Particularly, they put forth the importance to take into account left-right asymmetries to detect fine motor difficulties in children with DCD.

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