PERCEPTUAL-MOTOR COORDINATION CHILDREN WITH SPASTIC HEMIPARETIC CEREBRAL PALSY
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Interceptive action is a movement that requires the coordination and control of many redundant degrees of freedom of the body. Children with Spastic Hemiparetic Cerebral Palsy (SHCP) have limitations to their movement system and have to find solutions within their own action capabilities when performing interceptive actions by recruiting available degrees of freedom (Bernstein, 1967). Following the perception-action perspective, the aim was to get more insight into the ability of children with SHCP to adapt to their changed organismic constraints that are a result of the motor disorder, as well as how movement co-ordination is influenced by changing task constraints. The presentation reports a series of experiments aimed at exploring the movement co-ordination of the upper limbs in children with SHCP.

In the first experiment by Ricken, Savelsbergh and Bennett (2005), it was examined whether the coordination of reaching in children with SHCP would be modified when using the impaired compared to the non-impaired arm and whether task constraints (reaching a stationary or a moving ball), would influence movement coordination of the impaired or non-impaired arms. Findings showed that different movement strategies are used for the impaired arm (reduced elbow and shoulder excursion, accompanied by an increased trunk movement and a reduced movement speed) compared to the non-impaired arm. These results are not only explained by the motor disorder, but may also reflect an adaptive strategy that enabled them to successfully adapt their reach response to the impact requirements of the two conditions. The task constraints however, did not result in a change of the reach response when reaching with the non-impaired or impaired arm.

The effect of external triggers on movement coordination of interceptive actions in SHCP is further exploited in experiment 2 (Ricken, Savelsbergh & Bennett, 2007). Children were required to intercept a moving ball while walking, in which the ball velocity approaches the participant at three different speeds. It was found that children with SHCP adapted their walking and reaching kinematics according to the increasing ball velocities when using both the impaired and non-impaired arm. The implication is that children with SHCP are able to couple the velocity information of the ball with their own actions. The modified timing constraints however, did not enable them to fully overcome their impairment, as they still showed an increased trunk movement and decreased elbow excursion with a decreased peak velocity using the impaired arm. Still, the external timing constraints of the fastest ball approach velocity did facilitate movement of the impaired arm to a certain extent (elbow excursion increased and peak-velocity increased with increasing ball velocity in both arms). More insight was gained in how children with SHCP use information to guide their actions.


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