Rehabilitation of graphomotor disturbances by means of the spatio-temporal Terzi's method

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Many different treatment approaches, mainly based on perceptual-motor, visual-motor, motor control, individualized interventions/exercises, and supplementary handwriting instruction, have been applied for handwriting remediation in school-aged children. In this paper a new treatment protocol (Terzi's method; www.metodoterzi.it), based on a motor-cognitive approach aimed to correctly process and integrate spatio-temporal information coming from different sensorial inputs (kinesthetic, proprioceptive, tactile, visual) is proposed, and its effectiveness is evaluated on 14 non-proficient handwriters children attending primary school. All children undergo the treatment for about 15 sessions of 45 min. each. The treatment affects the construction of mental images in order to organize both the personal space (bodily scheme, bilateral integration, fingers fine motor control) and extra-personal space (spatio-temporal geometrical analysis of each letter and its reconstruction by means of a suitable motor planning blindfold deambulation). The blindfold condition permits to reduce the processed information, boosts the mental representation of each letter as well as the learning of more efficient graphomotor patterns, with a consequent allographic recovery. In order to evaluate the treatment effectiveness, standard test protocols (Movement ABC, Test of Visual-Motor Integration (V.M.I.)) as well as a Letter's Check-list, a sequence of 'lelele' and a sentence to be transcribed in cursive as better and as faster as possible, were administered, before and after the rehabilitation process. The writing was also acquired by a digitizing tablet and a series of static and kinematic parameters linked to pressure, trajectory and velocity features of each identified stroke was calculated. The effectiveness of the Terzi's rehabilitation program was proved by significant improvements in visual-motor integration (by means of the V.M.I.), in motor control (by the Movement ABC) as well as in writing legibility. The latter was evaluated by means of the Letter's Check-list parameters and confirmed by the mean velocity increment ($p<0.01$) during single stroke (that is an index of the old motor program substitution with a more automated one, able to produce a more fluent tract) as well as along the whole curvilinear written tract ($p<0.02$) and the mean width of a stroke ($p<0.02$).

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