

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

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Handwriting

planning strategy.[4]

Fig. 1

RESULT AND DISCUSSION

the correct grapho-motor scheme

Meld held beldelelle

Letter's Check-list parameters (Fig. 1): decrement of the

number of errors sign of an increased mental representation of

Static and kinematic parameters: "lelele" test: mean

curvilinear velocity increment (Fig. 2) during single stroke (p<

0,02), index of the old motor program substitution with with

another more automated, ables to produce a more fluent tract

The interaction between perceptive and motor aspects (for the

hand) and locomotive aspects (for the walking) is confirmed in the

Check-list Letters - Sentence copied in italics - More accurate mode

Example of writing test ('lelele') in a child before (left) and after (right) the rehabilitation program. In both cases the subject wrote for one minute. It is

evident that after the treatment the total number of written letters is more

than doubled as well as the corresponding curvilinear velocity

lab Millabellele

ldalelelelelelelele

blebblebblebbleble



This work presents the results pertinent to the evaluation of a new rehabilitation treatment, the Terzi Method, utilized to recover grapho motor problems and dysgraphia of 14 non-proficient handwriters italian children (www.ulss7.it).

Many different treatment approaches, mainly based on perceptual-motor, visual-motor, motor control, individualized interventions /exercises and supplementary handwriting instruction, have been applied for poor handwriting remediation in school-aged children [4].

In this paper a new treatment protocol (Spatio-temporal Terzi's Method <u>www.metodoterzi.it</u>) is proposed; it is based on a motor-cognitive approach [1] aimed to correctly process and integrate spatio-temporal information coming from different sensorial inputs (kinesthetic, vestibular, proprioceptive, tactile, visual) [5]. Its effectiveness are evaluated on the graphomotor problem and/or dysgraphia and the other correlated cognitive and motor functions.

MATERIAL AND METHOD

Sample group

14 children (2 girls, 12 boys, average age 9.7 years) Main diagnosis and comorbidity with graphomotor problem and/or dysgraphia. I.Q. included

between standard average and the border level (WISC-R) nο neurological damage.

Prevalence in (3-4% of the students from 8 to 13 vears old)

Standard test protocols

Before and after rehabilitation process: investigated areas

- Neurological: neurological examination
- · Cognitive/motivational: Wisc-R, WPPSI; Evaluation of the Leiter-R marker
- Visual-spatial and Spatio-temporal organization: V.M.I.; REY complex Figure Test; Apraxia constructive graphic performance ; Terzi Method evaluation Protocol
- Motor/praxic: Movement ABC: Bimanual praxia evaluation scale: Posture and grasping observation scheme
- · Handwriting: Letter's check-list.; analyses of the writing quality (sequence of 'lelele' and sentence to be transcribed in italic as better and as faster as possible) acquired by a digitizing tablet (Intuos3®, Watcom); static and kinematic parameters linked to pressure, trajectory and velocity features of each identified stroke [2].

Rehabilitation project

Treatment: Terzi Method for about 15 sessions of 45 min. each (individual or in couple), carried on by speech therapist and development age neuro psicomotion therapist.

Involvement: the "contract", the "evaluation", 10 minutes daily exercises (child); sharing the aims, strategies and enhancement of the child effort (family and teachers).

TERZI METHOD

Scientific basis

- Cognitive neuropsychology: Neuroscience and mental imaging
- Internal representation of the personal space can be modified through experience
- Space is a transverse sensory function

Characteristics

- Improves the construction of correct kinestetic-motor, proprioceptive and visual-spatial mental images through the body "lived experience" phase and "external representation"
- · Use diversified tasks (motor, visual, imitative, verbal) that fit to the age and the cognitive level of the subject . Ecologic and metacognitive approach to the task: it does not directly intervene in a sectoral way on the "error-symptoms", but it analyses the outcomes and it investigates the mental processes that could have

TERZI METHOD AND DYSGRAPHIA

Integration between motor mental imaging (in self perspective and external perspective) and visual-spatial image

Space close to the body that (static and dynamic)

POSTURE

SYNCHRONIZED RHYTHM Ø

- Wrist and limbs relaxation

synchronized with vocal computation

"ATTITUDE" and "TOUCHES" Ø O

- Correct metric and angular relations

among the positions of body parts

- Overcoming the midline body axis

MODELING WITH PLASTICINE Ø

- Pronosupination palm/hand-back

Movements of shoulder progression

GAME OF "THE PAINTER" Ø

- Tactile and proprioceptive sensitivity

Complex motor scheme

- Body axis perception,

- Bilateral integration

PEN GRASPING

Ø closed eyes

CONSTRUCTION OF

LETTERS Ø O

-Spatio-temporal

METRIC SPACE / GRAPHIC SPACE ØO - Qualitative and quantitative distinctions

and modal integration: translation. rotation, circle enance of stable metric parameters

> geometric analysis of each habetic symbol - Ambulatory construction of the letter in italic. blindfolded (on verbal or motor task)

Motor and grafic rapresentation

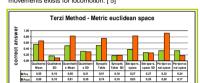
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Personal, peripersonal and extrapersonal space

Improves in the topological accuracy and temporal sequence, syncrony and timing of movements: in the mental rapresentation of space, both in the "lived experience" and in the "graphic rapresentation" (p< 0,0001); in the projects of motor planning (Terzi Method - Metric space Fig. 5).

It is possible that comparable coupling between eye and body movements exists for locomotion. [5]

The effectiveness of the Terzi's rehabilitation program is proved by statistically relevant improvements in the following areas:



Children say "I see letters with the eyes of my brain" (D. 6 y.o.)

Before to put the fold on his eyes: "Wait! I need to transfer my eyes to my feet" (L. 10 y.o.)

"I like to be the engineer that analyzes the project of a letter* (A. 9.7)

"I fell I improved ... even the teacher noticed that!"

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Visual-spatial and motor/praxis organization

· Visual-motor integration (V.M.I. Fig. 3) and coordination, on the graphic reproduction of geometric shapes of increasing difficulty.

• (Movement ABC Fig. 4) in the ability with the ball and in static and dinamic equilibrium



The application of the Terzi's rehabilitation method improves both the accuracy and speed parameters of: posture and pen grasping,

- graphomotor patterns
- handwriting quality.

The digitizing tablets allowed objective quantitative kinematic analyses of the writing quality. It measures the treatment efficacy and evaluates what parameters are more sensitive to the recovery process in non-proficient hand writers children

The Terzi Method approach improves the mental and visual-spatial imaging through the conscious use of body movements. Since space is a transverse sensory function, this approach improves

not only the handwriting, but also the cognitive processes that utilize the mental images representation.

