

2012 International Meeting for Autism Research: Using a Newly Developed Computer-Based Program to Evaluate Learning of Visuomotor Procedures in Children with Autism: A Pilot Study



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Using a Newly Developed Computer-Based Program to Evaluate Learning of Visuomotor Procedures in Children with Autism: A Pilot Study

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2:00 PM

L. Sparaci^{1,2}, **M. Vespignani**³, **D. Formica**⁴, **L. D'Elia**⁵, **G. Valeri**⁶ and **S. Vicari**⁷, (1)Institute of Cognitive Sciences and Technologies (ISTC), National Research Council of Italy (CNR), Rome, Italy, (2)Neuroscience Department, Children's Hospital Bambino Gesù, Rome, Italy, (3)Biorobotics Laboratory, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, (4)Biomedical Robotics and Biomicrosystems Lab, Università Campus Bio-Medico, Rome, Italy, (5)Neuroscience Department, Children's Hospital Bambino Gesù, Rome, Italy, (6)Neuroscience Department, Children's Hospital Bambino Gesù, Rome, Italy, (7)U.O.C. Neuropsichiatria Infantile, Dipartimento di Neuroscienze, Ospedale Pediatrico Bambino Gesù, Rome, Italy

Background: The ability to learn visuomotor procedures is particularly important for children, as it underlies the capacity to acquire the complex movement sequences that characterize communication environments, such as gestures or writing abilities. Recent studies have shown altered learning of visuomotor procedures in children with autistic spectrum disorders (ASD), using different visually guided motor tasks (i.e. serial reaction time and pursuit rotor task), underscoring how this may influence the development of appropriate social communicative skills. However, a task aimed at learning of visuomotor procedures, similar to handwriting, in children with ASD and easily employable in educational or clinical environments was still lacking.

Objectives: Inspired by the recent literature, we designed a computer-based program that allows, with the aid of a digital tablet, to evaluate learning of visuomotor procedures, similar to the ones involved in handwriting. After extensive trials on children with typical development, we conducted a preliminary study to assess the effectiveness of this program in evaluating these abilities in children with ASD.

Methods: Fourteen children participated to this pilot study: seven children with ASD (chronological age $7;7 \pm 2.0$; IQ 94.3 ± 19.0), seven children with typical development (TD, chronological age $7;4 \pm 1.6$; IQ 105.7 ± 12.7), matched on gender, chronological age and non-verbal cognitive level, evaluated using Raven's Progressive Matrices. Overall visuomotor abilities of all children were also evaluated, using the VMI Test. The designed computer program required to track movements of a target presented on the computer screen using the digital pen and tablet. The program allowed to establish: overall time on target and overall distance from target, but it also allowed to reconstruct the movement strategies employed in the tracking process. Task trials were devised to evaluate effectiveness of the computer task in measuring: implicit visuomotor learning after practice, decrement in performance in presence of an altered stimulus, consolidation of acquired skills after a delay and specific strategies employed during learning.

Results: Showed that all children displayed implicit learning of the chosen visuomotor procedure, but children with ASD showed different performance, compared to children with TD, in presence of an altered stimulus, in relation to consolidation and in strategies adopted to track the moving target, therefore providing novel data on altered learning of visuomotor sequences in children with ASD.

Conclusions: Initial observations seem to indicate that this novel computer-based program may allow to gain a better understanding of specific aspects of visuomotor procedure learning, which are altered in children with ASD. Our future endeavor will be to better this tool in order to elaborate a program that may inform teachers and

dedicated therapists on differential learning strategies adopted by children with ASD, while constructing a learning task that recruits abilities required during handwriting acquisition.

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