



Selective Effects of MPH as Measured by CPT Among Children with ADHD

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Abstract

Background: Many studies have questioned the ability of the CPT to consistently and reliably monitor response to MPH. The objective of this study was to determine the effects of short term MPH administration on single and multiple parameters of attention in previously drug naïve children with ADHD, employing the MOXO-CPT.

Methods: The study included 265 children age 6-12 years, diagnosed with ADHD. All participants performed the CPT twice. Participants were randomly divided into an intervention group (N=245) who received MPH treatment before the second test, and a control group (N=20) who did not receive any intervention.

Results: Participants in the intervention group demonstrated improvement in all CPT parameters, while the control group showed worsened performance. These differences were significant for the timing and attention parameters. Results showed that the sensitivity of the CPT to MPH effects increased as more CPT parameters were used for evaluation. .

Conclusions: The MOXO-CPT was proven to be highly effective in detecting the influence and selective effects of MPH administration in children with ADHD. Results indicated that MPH efficacy should be assessed by a combination of CPT parameters, instead of separate indices of attention.

Background

Studies regarding CPT ability to detect MPH effects revealed mixed results. This inconsistency may stem from different methodologies, including MPH dosage, stimuli characteristics, and ADHD subtypes. Importantly, different domains of attention seem to respond differently to MPH (Blum et al. 2011; Huang et al. 2007). This study was aimed to determine the effects of short term MPH administration on single and multiple parameters of attention in previously drug naïve children with ADHD, employing a variant of the CPT; the MOXO-CPT (Berger and Goldzweig 2010).

Method

Participants: The sample included 265 children diagnosed with ADHD, aged 6 to 12 years. Of them, 187 (70.57 %) boys and 78 girls (29.43%). All participants were referred to the out-patient pediatric clinic of the Neuro-Cognitive Center, Pediatric Division, based in tertiary care university hospital

Procedure and Measures: Participants were randomly divided into an intervention group (N=245) who received MPH treatment and a control group (N=20) who did not receive any intervention. All children performed the **MOXO -CPT**, a computerized test with a duration of 15.2 minutes. The test contains eight levels of 114 seconds long, each includes three types of elements: a target stimulus, a non-target stimulus, and a "void" period. The test also includes three types of interfering stimuli that serve as distracters (visual, auditory, and combination of visual and auditory). Immediately after completing the MOXO-CPT for the first time, only children in the intervention group received a single dose of immediate release MPH (an average dose of 0.3 mg/kg body weight). After 60 minutes interval participants of both groups were retested by the MOXO- CPT.

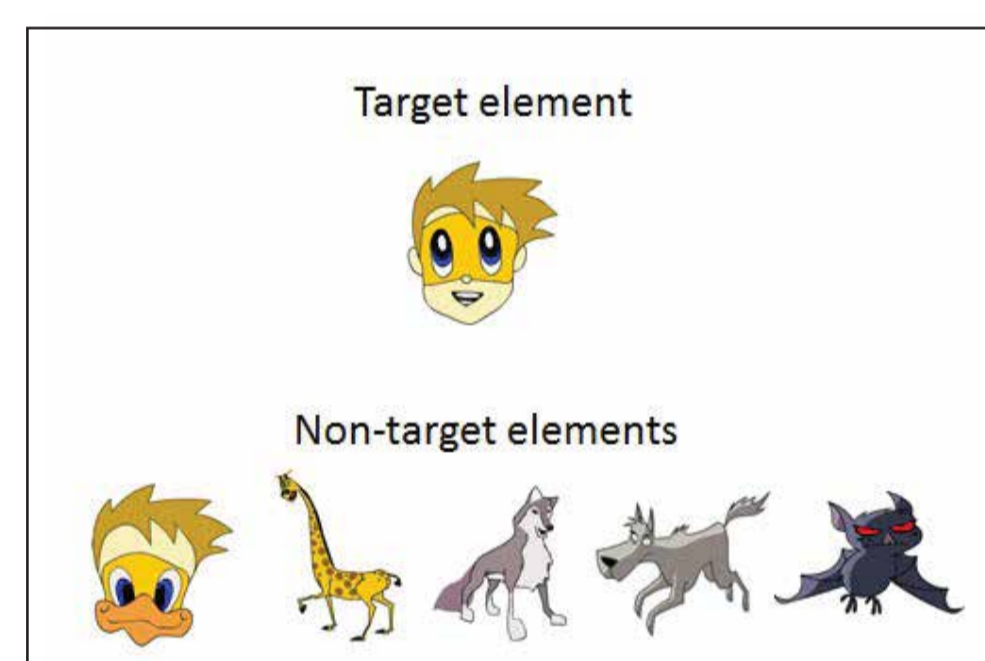


Figure 1 : MOXO CPT stimuli

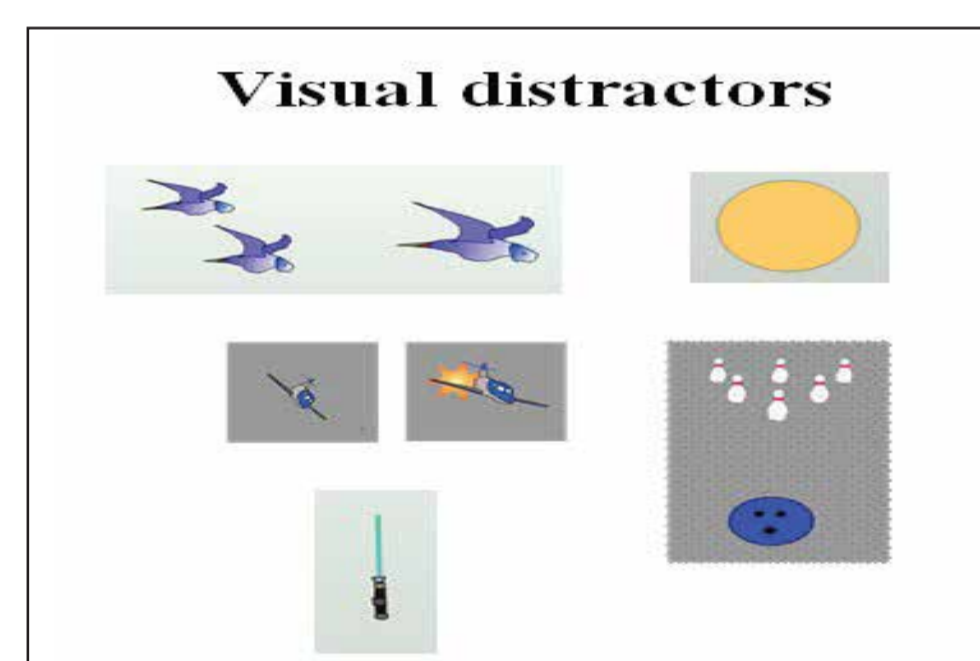


Figure 2 : MOXO CPT distracters

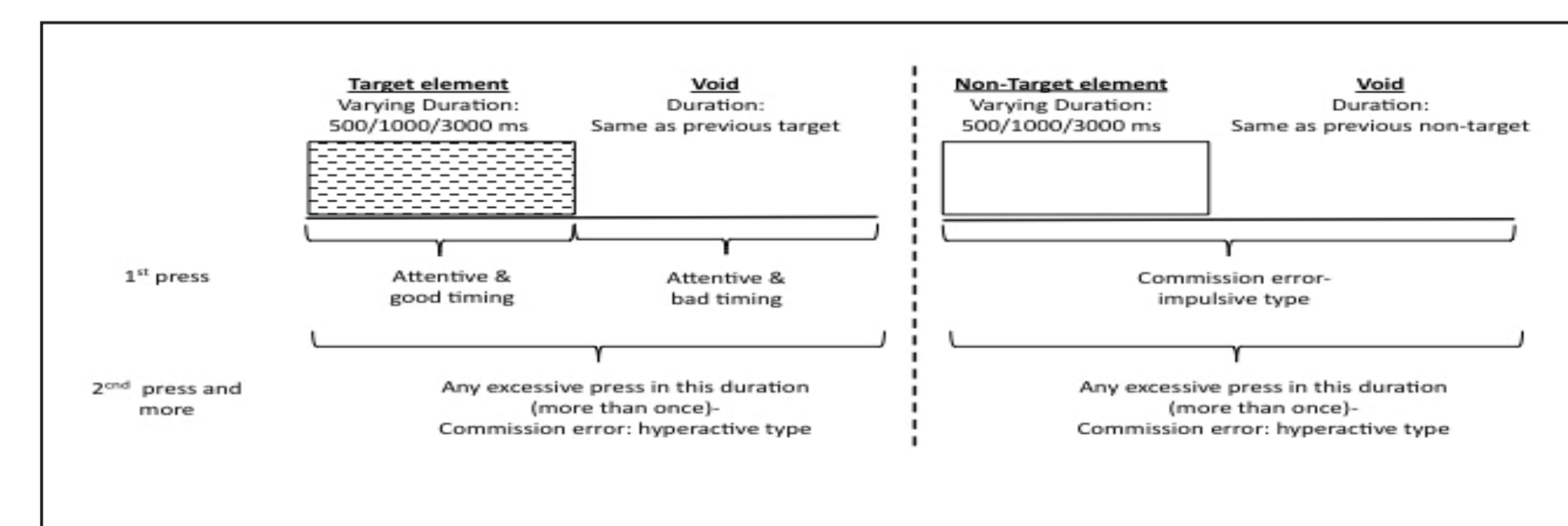


Figure 3 : MOXO CPT trial description

Results

Participants in the intervention group showed significantly greater improvement in sustained attention and in the number of responses performed on accurate timing comparing to the control group. However, the groups did not significantly differ in the degree of improvement in their impulsive and hyperactive responses. In addition, the difference between the two groups in the percentage of improved participants increased with the number of parameters used for evaluation.

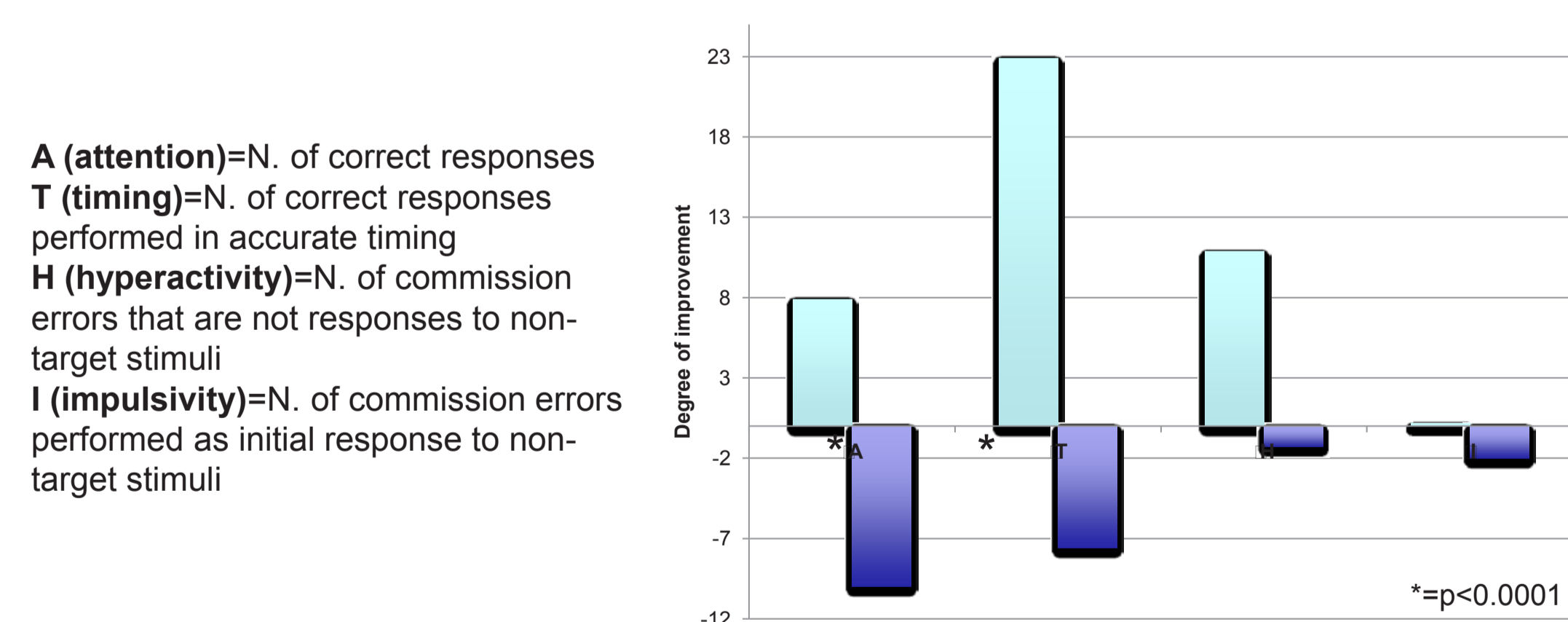


Figure 4: Differences between the groups in the degree of improvement

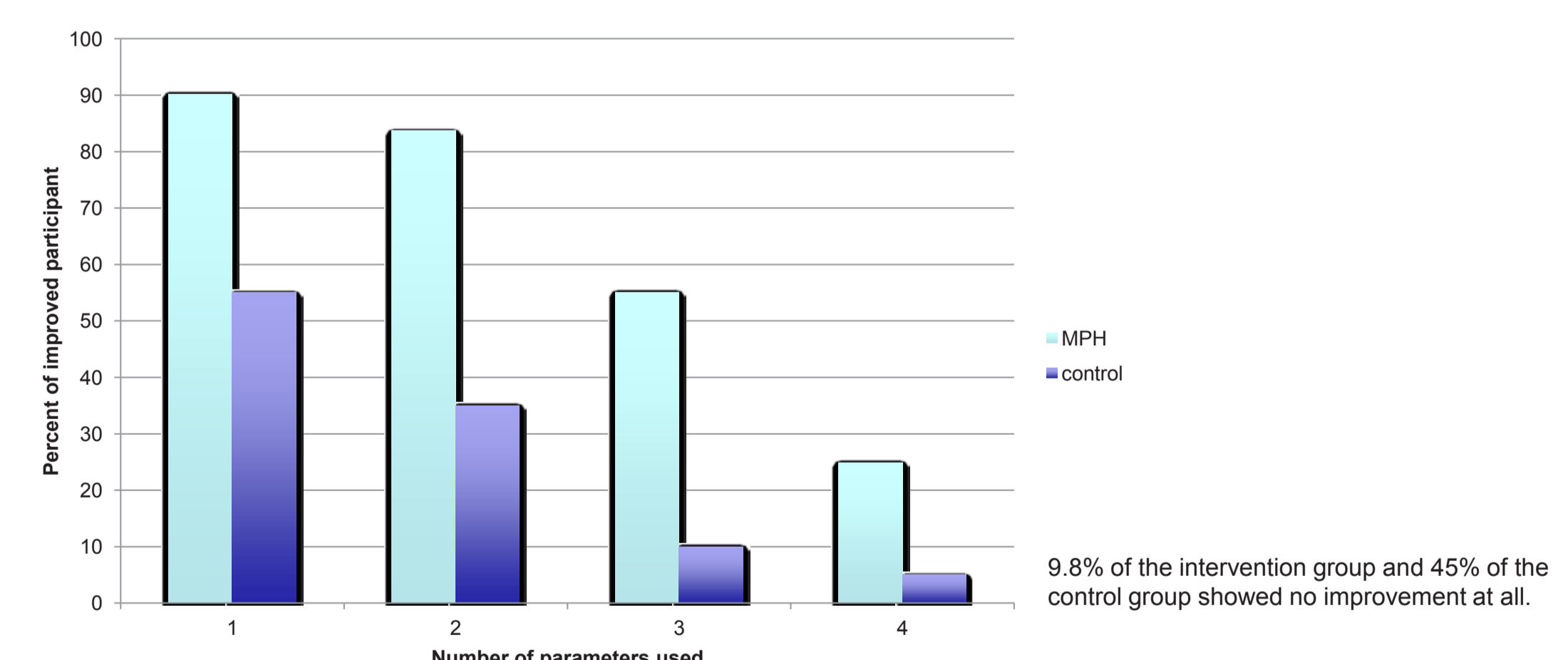


Figure 5: Percentage of improved participants, by number of parameters used

Conclusions

- ADHD children treated with MPH showed greater improvement in all CPT parameters comparing to non-medicated children with ADHD. The differences between the groups were significant in the ability to sustain attention and to respond on accurate timing.
- The sensitivity of the MOXO-CPT to MPH effects increased as more performance parameters were used for the evaluation of child performance. The most prominent difference (10 times more) between intervention and control groups was demonstrated when measuring the timing-hyperactivity combination, which may reflect independent attention functions. Thus, results indicated that MPH efficacy should be assessed by a combination of CPT parameters, instead of separate indices of attention.

About the MOXO

The MOXO ADHD Test is an innovative CPT test, serves as an objective tool used to evaluate patient's attentive profile. The MOXO test contains distractor systems which is helpful in simulating daily environment and provides accurate measurements of all four core symptoms of ADHD – hyperactivity, inattention, timing and impulsivity.