1. Introduction

- Inhibitory control (IC), as described by Rothbart (1989), is the capacity to plan and to suppress inappropriate responses under instructions or in novel or uncertain situations.
- IC forms an integral part of Rothbart's model of temperament, which she defines as 'constitutional differences in reactivity and self-regulation'. Reactivity refers to motor, emotional, and attentional responses to internal and external stimuli. Self-regulation are those processes serving to modulate this reactivity (e.g., Approach/Withdrawal, Inhibitory control, and Attention). Temperamental concepts are being used to explain behavioral and physiological patterns and responses that are evoked under conditions of stress (e.g., novelty situations, unfamiliar persons).
- Using the Children's Behavior Questionnaire (CBQ) (Rothbart, et al., 2001) we found differences in IC between CWS and CWNS (Eggers, et al., 2009 & submitted) (Figure 1).
- IC plays a significant role in determining how various mental processes work together in the successful performance of a task (Dowsett & Livesey, 1999) and is strongly related to differences in IC between CWS and CWNS (Eggers, et al., 2009 & submitted) (Figure 1).
- According to Barkley (1997) response inhibition refers to three interrelated processes: a) inhibition of a prepotent response, b) stopping of an ongoing response, and c) protection of self-directed responses from competing events or interference.

2. Aim of the study

- To examine whether previously found questionnaire-based differences on IC can be corroborated by direct, behavioral, neuropsychological computer tasks.

3. Participants

- 60 children (48 boys and 12 girls): 30 CWS (4;10 – 10.00; mean = 7;05) and 30 age (± 3M) and gender-matched CWNS.
- All participants were included in the study and no child was excluded from the analysis.
- Exclusion criteria were: developmental problems, and normal or corrected to normal vision.
- Participants were all paid volunteers, recruited after initial contact with their fluency specialists who participated in this study and students Julie Germanes and Sophie Sambre for their support.
- 60 children (48 boys and 12 girls): 30 CWS (4;10 – 10.00; mean = 7;05) and 30 age (± 3M) and gender-matched CWNS.
- Differences for CWS, TDC, and CWVN.
- Go- and nogo-target of the ANT gonogo-task (De Sonneville, 2005): go-stimulus (50%): children need to press the button as soon as possible, go-signal. Several cortical areas play a modulating role in this proactive inhibition, with the major focus on the subthalamic nucleus (Ballanger, et al., 2009).
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4. Procedure

- Participants were all paid volunteers, recruited after initial contact with their fluency specialist (for the CWS) or through their schools (for the CWNS). All tests were conducted in a quiet setting at the home of one or two children by the first author, a qualified fluency specialist.
- Gonogo-task (De Sonneville, 2005): go-stimulus (50%): children need to press the button as soon as possible, nogo-stimulus (50%): tendency to press must be inhibited. signal duration: fixed, 800ms., valid response: 200-2300ms., events interval: fixed rate: 2800 ms.; 8 practice sessions & 48 trials (Figure 2).

5. Results

- Independent-samples t-tests were employed to evaluate possible differences on chronological age, SES, IQ-score, and a simple reaction time task. No significant between-group differences were found (p > .55).
- A MANOVA was used to test whether the two groups differed in gonogo-task variables. Participant group was the independent variable. The four dependent variables were: number of hits, misses, false alarms, and premature responses. The overall MANOVA was significant, F (3, 56) = 4.89, p < .005. Tests of between-subjects effects were significant for number of false alarms, F (1, 58) = 6.27, p < .05, and number of premature responses, F (1, 58) = 8.57, p < .005 (Figure 3).
- Mean reaction time for false alarms almost approached significance, t (44) = -1.99, p = .05. No significant differences in gonogo-task performance were found between CWS and CWNS.
- CWS exhibited a more controlled response style, with more frequent reactions to nogo-signals and more premature responses. This is compliant with our earlier CBQ-based findings on IC in CWS.
- Classically, IC was assumed to be triggered by nogo-signals; recent studies however link the go-signal to the release of IC. Inhibition may act proactively during pre-stimulus period, ending with the arrival & identification of a go-signal. Several cortical areas play a modulating role in this proactive inhibition, with the major focus on the subthalamic nucleus (Ballanger, et al., 2009).
- (Low) IC could increase the amount of stress-related situations that CWS encounter. IC could also play a role in linguistic processing, moderating error-detection or error-processing (e.g., Vasic & Wijnen, 2006). Clinical considerations are premature since further research is still needed. This may provide additional information on spontaneous recovery and on treatment outcome.

6. Conclusions

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8. References


Contact: kurt.eggers@lessius.eu