Inhibitory Control in Adults who Stutter: preliminary findings

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1. Introduction

- Inhibitory control (IC), as described by Rothbart (1989), is the capacity to plan and to suppress inappropriate approach 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 emotional, 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) differences in IC were found between CWS and CWNS (Eggers, et al., 2009 & 2010) (Figure 1).
- IC plays a significant role in determining how various mental processes work together in the successful performance of a task (Dowesett & Livesey, 1999) and is strongly related to the conscious use of attention (Kochanska, '97).

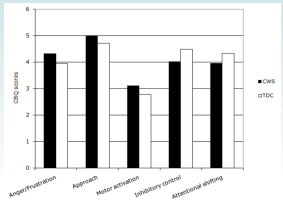

Figure 1. Mean Scores on the CBQ Scales with Significant Between-Group Differences for CWS and TDC

2. Aim of the study

- To examine whether previously found questionnaire-based differences on IC in CWS are also apparent in AWS, as measured by a direct, behavioral, neuropsychological computer task.

3. Participants

- 48 adults (42 men and 6 women): 24 AWS (mean age= 27;01; SD = 9;4) and 24 age (± 1Y) and gender-matched AWNS (mean age= 27;01; SD = 9;2); all native Dutch speakers, with no known/reported neurological, psychological, developmental problems, normal hearing (Wood, 2003), and normal or corrected to normal vision.
- Subtest Vocabulary & Block Design of the WAIS (Wechsler, 2000).
- Socio-economic status based on the educational level.
- Diagnosis AWS: min. 3 % WWD and/or MWR, and at least 'mild' on the SSI-3, based on a sample of min. 300W.

4. Procedure

- Participants were all paid volunteers, recruited after initial contact with their fluency specialist or self-help group (for the AWS). All tests were conducted in a quiet setting at the home of the participant during one or two visits by a trained student.

Figure 2. Go- and nogo-target of the ANT gonogo-task.

- Gonogo-task (De Sonneville, 2005): go-stimulus (50%): participants 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 ($p > .05$).
- Analysis of variance showed a significant difference between the two participant groups on the gonogo-task-variable 'false alarms', i.e., the failure to inhibit pressing the response button to a nogo-signal (dependent variable). Participant group was the independent variable, $F(1, 46) = 5$, $p < .05$ (Figure 3).

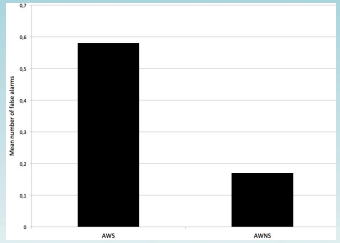

Figure 3. Mean 'false alarm'-scores for AWS and AWNS ($p < .05$).

6. Conclusions

- AWS, as a group, exhibited a less controlled response style, with more frequent reactions to nogo-signals. This finding 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 PWS 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.

7. Acknowledgements

- This research was part of the Bachelor's thesis of De Wreede Yezera and was funded by Lessius University College. The authors would like to thank all the participants and fluency specialists who participated in this study.

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