ABSTRACT

The purpose of this follow-up study was to assess whether attentional processes of preschool children who stutter (CWS) impacted stuttering severity during two attention tasks: (1) a traditional cueing task and (2) an affect cueing task. Participants were five CWS rated as mildly severe (mildCWS) and five CWS rated as moderately severe (modCWS; according to the Stuttering Severity Instrument, 3rd edition, [Riley, 1994]). During both cueing tasks participants focused on a fixation point and provided nonspeech motor responses (i.e., button pressing) to target stimuli preceded by visual cues (i.e., highlighted box) occurring in either the same location (i.e., valid trials) or in the opposite location of the target stimuli (i.e., invalid trials). Participants' reaction times (RT) were measured (in milliseconds) from the onset of presentation of the target stimuli ("cookie") to the onset of the participant's nonspeech motor response (i.e., button pushing) as well as frequency and type of erroneous response during both tasks. Results indicated that there were no significant betweengroup differences in RT or in overall errors. However, there were differences in the relation between errors and RT, with increased errors correlating with slower RT for mildCWS but not for modCWS. Findings were taken to suggest that the severity of stuttering may have some affect on the ability to modulate or adjust attentional processing based on performance accuracy.

PARTICIPANTS

MEASURES

Traditional Cueing Task

the monitor (see Figure 3).

each child prior to the task.

traditional cueing task.

the prize".

ffect Influencing Instructions

Finding 1: No between-group differences in

as no significant interactions involving talker

group (CWSmild - CWNSmod; condition x

talkergroup, $F_{(1.8)} = 1.32$, p = .28; cue type x

talkergroup, $F_{(1.8)}^{(1.0)} = 1.79$, p = .22; condition x

that both mildCWS and modCWNS exhibited

significantly faster (lower) RTs in response to

Interpretation: When attention was cued to a

valid cues when compared to invalid cues

specific location, regardless of condition

(Traditional - Affect) both mildCWS and

modCWNS were able to process information

appearing at that location faster than when

attention was cued to an opposite location.

regardless of condition.

cuetype x talker group, $F_{(1,8)} = .28$, p = .61). As

with the initial study, there was a significant main

effect of cue type, F_(1.8) = 30.99, p <.01, indicating

button-pushing RT, $F_{(1,8)} = .020$, p = .89 as well

Affect Cueing Task

•5 mildCWS (SSI-3 Total Score *m* = 14.00, sd = 0)

•5 modCWS (SSI-3 Total Score m = 22.60, sd = 3.13)

in chronological age 4:0-5:11; t[8]= -.43, p = .68.

parents signed an informed consent, and children assented

Stuttering Severity Instrument – 3 (SSI-3)

ratings according to the SSI-3, t[8]= -6,143, p <.0001.

None of the 10 children had received formal intervention for stuttering or any other communication disorder.

•Stuttering severity - as determined with the SSI-3 - was

conversational sample 1-2 weeks prior to data collection.

of the centralized fixation point (see Figure 2).

>The 56 cue-target trials consisted of three cue-target

cue" trials) which were randomly presented with targets

measured using frequency, duration and physical concomitants

associated with stuttering during a 300-word clinician-child

>Participants were presented with 56 cue-target trials which

included: (1) a preparatory visual stimulus, (2) a peripheral cue

and (3) a visual target stimulus, presented to the left or the right

combinations ("valid cue" trials, "invalid cue" trials, and "no-

appearing with equal frequency on the right and left location of

>Each participant was asked to detect and respond to the visual

target stimulus by pressing a button on a button response box.

·After completing the Traditional Cueing Task, each participant

completed the Affect Cueing task (Perez Edgar and Fox, 2005;

2006) which was identical to the traditional cueing task with the

instructions considered to heighten stress levels were presented to

·After being presented with affect influencing instructions, each

child participated in 56 cue-target trials in the same format as the

"You didn't do okay that time. Let's play the game again. And

this time you HAVE to press all of the right buttons as fast as you

can to win the game and take this really cool prize home. But, if

you lose the game, you don't get a prize and I will have to keep

exception that before the Affect Cueing Test influencing

•There was no statistically significant between-group difference

•There was a significant between group difference in severity

•The study protocol was approved by the Institutional Review Board

at Vanderbilt University, Nashville, Tennessee. For each participant,

INTRODUCTION

Emotion Regulation, Attention, and Stuttering

·Recent accounts of childhood stuttering suggest that emotions play a key role in its development (Conture et al., 2006). CWS have been shown to be more reactive to change (Karrass et al., 2006; Schwenk et al., 2006), less adaptive to novelty (Anderson et al., 2003; Embrechts et al., 2000), and less efficient in self-regulating their emotional responses (Karrass et al., 2006; Schwenk et al., 2006), when compared to CWNS.

·Effective attention regulation (AR), an important aspect of emotion regulation (ER), helps minimize the effects of negative or distressing situations by shifting or diverting attention away from one task to another. This process is thought to be fundamental to the development of selfregulation (Perez Edgar & Fox, 2005).

·Differences in AR have been reported in adults who stutter (e.g., Bosshardt, 1999, 2007, Bosshardt, Ballmer, & de Nil, 2002) and CWS (Karrass et al., 2006; Anderson et al., 2003; Schwenk, et al., 2006; Johnson, 2008). These findings suggest that people who stutter are less efficient in regulating attention (i.e., focusing, maintaining and shifting) in response to challenging situations (Karrass et al., 2006; 2008). However, it is unknown whether regulatory changes may impact stuttering severity. Posner Cueing (PC) Task and Stuttering

•In developmental psychology, the PC task has been used to assess covert attention, disengagement, shifting, and engagement by requiring the participant to provide a motor button pressing response in reaction to a target presented on the left or right of a fixation point displayed on a computer screen (e.g., Perchet & Garcia Larrea, 2000; Perchet et al., 2001).

·Previous research has reported that when attention is orientated to a specific location, information appearing at or near that location is processed faster and more efficiently than target stimuli appearing in an uncued location (e.g., Posner & Cohen, 1984: See Figure 1).

•Affect manipulation has also been paired with the PC task to also examine the impact of emotional variables on attentional processes. Findings suggest that adding an affect component results in faster (shorter) RTs and increased errors and validity difference (Perez Edgar & Fox, 2005; Perez Edgar et al., 2006; Johnson, 2008). •The PC task has been used with CWS in an initial preliminary study (Johnson, 2008). During this study, results indicated no significant differences between CWS and CWNS in RT, frequency or type of erroneous responses or error type during both tasks. However, difference between CWS and CWNS were significantly influenced by the introduction of stress-heightening instructions. Findings were taken to suggest that speed of attentional disengaging, shifting and re-engaging did not differ between CWS and CWNS, but that the nature of CWS errors was influenced

by the affect-stimulating condition. •Thus, the purpose of this follow-up study was to assess attentional differences between mild severity CWS (mildCWS) and moderate severity CWS (modCWS) during a traditional and affect cueing task. Perhaps, modCWS, in comparison to mildCWS, would exhibit less ability to allocate their attentional resources in order to respond quickly and accurately, especially when emotion is present

A Behavioral Study of Attention Regulation in Preschool Children Who Stutter: JAMES MADISON **Follow-up Analyses**

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METHODS

DEPENDENT VARIABLES

>Nonverbal Reaction Time (RT; milliseconds, ms)

oRT was measured for accurate responses only during each trial type (i.e. valid and invalid) for both experimental conditions (i.e. traditional and affect cueing tasks). RT was measured in milliseconds (ms) from the onset of the presentation of the target to the onset of the participant's button pressing response which was automatically tabulated by E-Prime.

≻Accuracy

Figure 2.

oButton-pressing errors were measured for each trial type (i.e., valid and invalid) for the two experimental conditions (i.e., traditional and affect cueing tasks). Errors were categorized as one of two types (e.g., Perchet & Garcia Larrea, 2000):

(a) Omission errors- no response provided after the onset of target (b) Orientation errors- response does not correspond with the correct target side, these errors were also automatically recorded by E-Prime



Figure 1.

Components of visual-spatial

attention assessed during the PCT

edlacate



RESULTS



Finding 2a: No overall between group differences (mildCWS - modCWS) in overall errors across both conditions, $F_{(1,8)} = .980$, p =

Interpretation: mildCWS and modCWS exhibited a comparable amount of overall errors in both conditions.

Finding 2b: Although the initial study reported between group differences in error type for CWS and CWNS, present findings indicated no differences in error type between the two conditions for the CWS when grouped by severity, F_(1.8) = 2.38, p = .16. Interpretation: In other words, the type of error and the condition in which the errors were produced did not differ based on stuttering severity (mildCWS - modCWS).

Mean Overall Errors mildCWS modCWS Condition Mean Errors by Type

nitdews

RESULTS

Finding 3: For mildCWS, there were significant positive correlations between total errors and mean RTs.

• Traditional - Valid: r = .87, p =.05; Invalid: r = .93. p <.05

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• Affect - Valid: r = .95, p < .05; Invalid: r = .96, p < .05 For modCWS, there were no significant correlations between total errors and RTs in either condition.

• Traditional - Valid: r = -.26, p =.67; Invalid: r = -.45, p =.45

• Affect - Valid: r = -.31, p =.61; Invalid: r = .23, p = .71 Interpretation: This finding suggests that mildCWS were more than likely detecting their erroneous responses and adjusting their speed of responding accordingly. This follow-up finding is parallel to significant positive correlations for CWNS as reported in the initial study (Johnson, 2008)



Overall, present findings relative to RT and frequency of errors are consistent with initial findings in that no differences in RT or frequency of errors were observed between mildCWS and modCWS across either condition. Present findings do suggest that mildCWS differ from modCWS in how speed is adjusted during the task. These findings will be discussed below

DISCUSSION & CONCLUSION

This follow-up study resulted in 3 main findings, summarized below: •As with the initial study, both talker groups (mildCWS and modCWS) demonstrated significantly faster (lower) RTs in response to valid cues and slower (higher) RTs in response to invalid cues. Additionally, there were no overall differences in RTs when affect was manipulated. In other words, follow-up data suggests that RTs do not vary based on stuttering severity. These finding remains consistent with the initial findings as well as others using similar methodology (Perchet & Carcia Larrea, 2000; Poster & Petersen, 1990).

•The second main finding indicated that the amount or type of overall errors does not differ by stuttering severity. However, the initial study did indicate overall differences between CWS and CWNS in the type of errors exhibited across conditions.

•The third main finding was that for mild CWS, there was a significant correlation between increased errors and increased RTs in both conditions suggesting the ability to monitor error production and make adjustments to speed of responding, a similar finding seen in the initial study with children who do not stutter (Johnson, 2008). In the present study, no pattern was seen in moderate CWS.

Conclusion:

·Present follow-up analyses provide some preliminary data to suggest that the ability to regulate attention may vary based on stuttering severity. Possibly, children who stutter to a mild degree are capable of regulating attentional processes somewhat better or different than children who stutter to a moderate or severe degree. •Follow-up preliminary findings do suggest that the ability to adjust speed in response to error monitoring does vary based on stuttering severity. Specifically, based on the sample used for these analyses, mild CWS appear to adjust speed in response to increased error production , a finding similar to the performance of CWS in the initial study. •The present follow-up analyses should be interpreted as motivation to for future investigation to consider whether or not the ability to regulate attention may vary based on stuttering severity.

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Traditional Condition Affect Condition