



Sympathetic arousal of young children who stutter during a stressful picture naming task



Hatun Zengin-Bolatkale^{a,*}, Edward G. Conture^a, Tedra A. Walden^b

^a Department of Hearing and Speech Sciences, Vanderbilt University, 1215 21st Avenue South, Suite 8310 MCE South Tower, Nashville, TN 37232-8242, United States

^b Department of Psychology and Human Development, Peabody College, Vanderbilt University, 230 Appleton Place, Nashville, TN 37203-5721, United States

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ABSTRACT

Purpose: The purpose of the current study was to investigate sympathetic arousal of young children who do and do not stutter during a stressful picture-naming task under instructions to name pictures as rapidly as possible.

Method: Thirty-seven young children who stutter (CWS) and 39 young children who do not stutter (CWNS) served as participants. Dependent measures consisted of tonic skin conductance during a pretask baseline, a stress-inducing rapid picture-naming task, and post-picture-naming task condition.

Results: Findings indicated that, when chronological age was not taken into account, there was no between-group difference in tonic skin conductance level. When age was taken into account, however, there was a significant talker group \times age group interaction, with follow-up analyses indicating that 3-year-old CWS exhibited significantly higher sympathetic arousal than their CWNS peers, and their 4-year-old CWNS peers.

Conclusions: Findings were taken to be consistent with non-physiological results indicating an association between emotional processes and childhood stuttering. This association, at least for this cross-sectional study of tonic skin conductance level (SCL) during a picture-naming task, was moderated by children's chronological age. Such developmental differences may be associated with various processes, for example, attention, cognition, or physiology, or some combination of two or more of these processes. Future empirical study of these processes in young CWS and CWNS may profit from longitudinal measurement of converging lines of evidence from behavioral, parent and psychophysiological indexes of emotional reactivity and regulation.

Educational Objectives: After reading this article, the reader will be able to: (a) discuss salient findings in the literature regarding the association between emotional processes and childhood stuttering; (b) discuss sympathetic arousal, and how skin conductance is used to measure it; and (c) discuss the role of chronological age in the association between emotion and stuttering in young children.

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* Corresponding author at: Department of Hearing and Speech Sciences, Vanderbilt University, 1215 21st Avenue South, Suite 10261 MCE South Tower, Nashville, TN 37232-8242, United States. Tel.: +1 217 721 2019; fax: +1 615 936 6914.

E-mail addresses: hatun.zengin@Vanderbilt.Edu (H. Zengin-Bolatkale), edward.g.conture@Vanderbilt.Edu (E.G. Conture), tedra.walden@Vanderbilt.Edu (T.A. Walden).

1. Introduction

It has been hypothesized recently that emotional processes are associated with childhood stuttering (Conture & Walden, 2012; Conture et al., 2006). During the same time frame, findings from several empirical studies of the association between emotional processes and childhood stuttering appear to support this hypothesis (Anderson et al., 2003; Arnold et al., 2011; Eggers, De Nil, & van den Bergh, 2009; Eggers, De Nil, & van den Bergh, 2010; Embrechts, Ebben, Franke, & van de Poel, 2000; Johnson, Walden, Conture, & Karass, 2010; Karass et al., 2006; Kazenski, Guitar, McCauley, Falls, & Dutko, 2014; Schwenk, Conture, & Walden, 2007; Walden et al., 2012). Although none of these findings prove that emotion causes stuttering, it does suggest that emotion is associated with stuttering and that the nature of this association warrants further empirical study.

To date, empirical study of the association between emotion and childhood stuttering has involved three different methods: (1) caregiver reports or questionnaires (e.g., Anderson et al., 2003) (2) coded behavioral observation (e.g., Walden et al., 2012), and (3) psychophysiology (e.g., Arnold et al., 2011). In the brief literature review to follow, findings from each methodological approach will be presented to provide context for the present empirical study.

Caregiver reports have been frequently used to empirically study the association between emotion and childhood stuttering (e.g., Anderson et al., 2003; Eggers et al., 2010; Embrechts et al., 2000; Felsenfeld, van Beijsterveldt, & Boomsma, 2010; Karass et al., 2006). Although some (Kagan, 1998; Strelau, 1983) have questioned the accuracy of parent reports and suggested that parents are biased informants, others (e.g., Henderson & Wachs, 2007) have suggested that “While parent report measures do contain some subjective parental components, available evidence indicates that these measures also contain a substantial objective component that does accurately assess children’s individual characteristics” (p. 402). Such pro and con opinions aside, several empirical studies based on parent report have shown that children who stutter (CWS), when compared to children who do not stutter (CWNS), exhibit significantly (a) lower ability to adapt or adjust to novelty and change (e.g., the ease and ability of a child to change his/her routine) (Anderson et al., 2003), (b) more emotionality (e.g., “crying intensely when hurt”) (Karass et al., 2006), as well as lower emotion regulation (e.g., “adjusting easily to changes in routine”) (Karass et al., 2006), (c) less success in adapting to new environments (Embrechts et al., 2000), (d) lower inhibitory control and attention shifting, but higher negative affect such as anger and frustration as reported by caregivers (Eggers et al., 2010), and (e) more attentional problems at ages 5 and 7 years of age (Felsenfeld et al., 2010). Noting the salience of attention to emotion, Rothbart (2011) states that, “Attention and emotion systems influence each other, with attention selecting or avoiding information about emotion, and emotion affecting how easily we can shift or focus our attention” (p. 76).

Coded behavioral observations have also been used to assess the association between emotion and childhood stuttering (Johnson et al., 2010; Jones, Conture, Frankel, & Walden, 2014; Ntourou, Conture, & Walden, 2013; Schwenk et al., 2007; Walden et al., 2012). Such behavioral observations include coding for behavioral signs of positive and negative affect (e.g., Jones, Conture, et al., 2014; Walden et al., 2012), expressive nonverbal positive (e.g., smiling) or negative behaviors (e.g., frowning, groaning) (Johnson et al., 2010), and shifts in attention (e.g., frequency and duration of looks away from or to a stimulus as in Schwenk et al., 2007). Results of these studies indicate that CWS, when compared to CWNS, exhibited (a) less habituation of attention to irrelevant background stimuli (Schwenk et al., 2007), (b) more negative emotional expression upon receiving an undesired gift (Johnson et al., 2010), (c) greater tendency to exhibit emotionally reactive behaviors prior to and during stuttered utterances than fluent utterances (Jones, Conture, et al., 2014), (d) greater stuttering with greater negative emotion during speaking, and less stuttering when negative emotion is accompanied by greater emotion regulation (Walden et al., 2012) and (e) more self-speech and negative emotional behaviors during an emotionally frustrating task (Ntourou et al., 2013).

Psychophysiological methods have also been used to study the relation of emotion to stuttering. To date, most psychophysiological studies of stuttering have involved adults who stutter (for review, see Bloodstein & Bernstein Ratner, 2008). More recently, however, some have employed various psychophysiological methods to study emotion in young children who stutter (Arnold et al., 2011; Jones, Buhr, et al., 2014; Ortega & Ambrose, 2011; van der Merwe, Robb, Lewis, & Osmond, 2011). Findings have shown that compared to CWNS, CWS exhibit (1) no significant between-group differences in EEG frontal asymmetries while children listened to neutral, happy and angry background conversations (Arnold et al., 2011); (2) less vagal (parasympathetic) activity, indicating less emotion regulation during baseline (i.e., neutral) video-viewing condition (Jones, Buhr, et al., 2014); (3) significantly lower overall salivary cortisol levels (relative to published norms) at two of three sampling occasions measured over three consecutive days (Ortega & Ambrose, 2011); and (4) no significant differences in salivary cortisol across three sampling situations (i.e., baseline, pre- and post-conversation) (van der Merwe et al., 2011).¹

Clearly, these studies—whether employing parent reports, coded behavior observations or psychophysiological measures—have made significant contributions to our understanding of the association between emotion and childhood stuttering. However, at present, there is a need to determine specific activity of young children’s autonomic nervous system

¹ Although some of these measures relate to the hypothalamic–pituitary–adrenal (HPA) axis (Ortega and Ambrose, 2011; van der Merwe et al., 2011) and others to cortical activity (e.g., frontal alpha asymmetries) (Arnold et al., 2011) associated with emotion, neither HPA axis activity nor cortical activity were the theoretical or methodological focus on the present study. For further review of these processes, the reader interested in HPA axis activity is referred to Ledoux (1998, Figure 8-1) and Barr (2012, p. 263–264) and for cortical activity associated with emotion Cacioppo, Tassinary, and Bertson (2007, pp. 56–84).

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