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Temperamental Characteristics of Young Children Who Stutter

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Abstract

The purpose of this investigation was to assess the temperamental characteristics of children who do (CWS) and do not (CWNS) stutter using a norm-referenced parent-report questionnaire. Participants were 31 CWS and 31 CWNS between the ages of 3;0 (years;months) and 5;4 (CWS: mean age = 48.03 months; CWNS: mean age = 48.58 months). The CWS were matched by age (±4 months), gender, and race to the CWNS. All participants had speech, language, and hearing development within normal limits, with the obvious exception of stuttering for CWS. Children's temperamental characteristics were determined using the Behavioral Style Questionnaire (BSQ; S. C. McDevitt & W. B. Carey, 1978), which was completed by each child's parents. Results, based on parent responses to the BSQ, indicated that CWS are more apt, when compared to CWNS, to exhibit temperamental profiles consistent with hypervigilance (i.e., less distractibility), nonadaptability to change, and irregular biological functions. Findings suggest that some temperamental characteristics differentiate CWS from CWNS and could conceivably contribute to the exacerbation, as well as maintenance, of their stuttering.

Keywords

stuttering; temperament; children; development; Behavioral Style Questionnaire

Temperament refers to biologically based individual differences in behavioral characteristics or reactions that are present in infancy and are relatively stable across context and over time (Bates, 1989; Wachs, 1999). Most researchers would agree that temperament consists of seven to nine major dimensions—for example, negative emotionality, difficultness, adaptability to new situations or people, activity level, self-regulation, reactivity, and sociability–positive emotionality (see reviews by Rothbart & Bates, 1998; Wachs, 1999). These temperamental characteristics interact with other developmental influences, particularly from the social environment, to yield the totality of personality (Thompson, 1999).

It has become increasingly clear that temperamental individuality plays an important role in human functioning (Strelau, 1998). For example, temperament has been found to contribute to cognitive development (e.g., Miceli, Whitman, Borkowski, Braungart-Rieker, & Mitchell, 1998; Singer & Fagen, 1992), academic achievement (e.g., Martin, Drew, Gaddis, & Moseley,

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1988; Martin, Olejnik, & Gaddis, 1994), behavioral adjustment (e.g., Kyrios & Prior, 1990, Windle, 1989), and language acquisition (e.g., Dixon & Shore, 1997; Dixon & Smith, 2000). Thus, it comes as no surprise that researchers have begun to examine the relationship between temperamental characteristics and various speech and language disorders, such as delayed language development (e.g., Caulfield, Fischel, DeBaryshe, & Whitehurst, 1989; Paul & James, 1990; Paul & Kellogg, 1997) and stuttering (e.g., Embrechts, Ebben, Franke, & van de Poel, 2000; Lewis & Goldberg, 1997).

Recently, theorists have suggested that children who stutter (CWS) may possess more vulnerable or inherently sensitive temperaments (compared to typically developing peers), which may contribute to their susceptibility to begin, continue, or conversely, to recover from stuttering (e.g., Conture, 1991, 2001; Guitar, 1998; Zebrowski & Conture, 1998). Others (e.g., Riley & Riley, 1979, 2000; Smith & Kelly, 1997; Starkweather & Gottwald, 1990) have described similar variables that may contribute to stuttering, for example, “attending problems,” which are characterized by distractability, perserveration, hyperactivity, inability to concentrate on tasks, and low frustration tolerance (Riley & Riley, 1979, pp. 283–284). However, despite this growing interest in the relationship between temperamental variables and stuttering, there have been relatively few empirical investigations of the temperamental characteristics of CWS relative to children who do not stutter (CWNS).

Findings from published studies, based on several different methodologies, have generally indicated that young CWS, when compared to CWNS, are (a) less successful in maintaining attention and adapting to their environment (Embrechts et al., 2000), (b) more reactive to environmental stimuli (Wakaba, 1998), and (c) more sensitive, anxious, introverted, and withdrawn (Fowlie & Cooper, 1978; Glasner, 1949). Several unpublished studies have also reported that CWS tend to have higher levels of sensitivity than CWNS (LaSalle, 1999; Oyler, 1996, 1999; Oyler & Ramig, 1995). One contradictory finding was that of Lewis and Goldberg (1997), who found that children at-risk for stuttering exhibited temperamental profiles consistent with high adaptability to change and a positive approach to new stimuli. Findings from this study may be difficult to interpret, however, due to the fact that the children at-risk for stuttering were classified on the basis of a measure of stuttering chronicity (i.e., the Cooper Chronicity Prediction Check-list [CCPC]) that documents presence/absence of stuttering rather than using more direct indexes of stuttering (e.g., percentage of stuttering-like disfluencies or stuttering severity).

Most of the above studies of temperament in relationship to stuttering have used preschoolers as participants. There are three additional studies, one published and two unpublished, in which school-age CWS were included as participants (Fowlie & Cooper, 1978; Oyler, 1996; Oyler & Ramig, 1995). These researchers reported significant differences in temperamental characteristics between school-age CWS and CWNS—for example, CWS are reportedly more sensitive and withdrawn than CWNS (Fowlie & Cooper, 1978). Similarly, Guitar (2003) found that adults who stutter, when compared to adults who do not stutter on a standardized test of temperament, scored significantly higher on the temperamental trait labeled “nervous.” Direct comparison between results with preschool CWS and school-age CWS or adults who stutter, however, may be confounded by the fact that temperamental sensitivity in school-age children and adults may have been influenced by their typically longer experience with stuttering than preschoolers.

Thus, there is the possibility that for CWS there may be some degree of relationship between time since onset (TSO) of stuttering and their temperamental characteristics. Although most (e.g., Buss & Plomin, 1984; Kagan, 1989; Rothbart & Derryberry, 1981) would agree that temperament is relatively stable and genetically determined, the degree to which particular temperamental characteristics are expressed can be strongly influenced by environmental

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factors (see Kagan, 1994; Rothbart & Bates, 1998). Given these concerns, as well as the fact that some studies (e.g., LaSalle, 1999; Lewis & Goldberg, 1997; Wakaba, 1998) have reported using relatively small sample sizes (e.g., 6–12 children per participant group), further empirical study of the temperamental characteristics of a larger sample of CWS is needed to better discern the association between these characteristics and stuttering onset and development. Any such study should also employ widely used standardized tests of temperament, more stringent participant selection criteria (e.g., requiring that all participants score at the 20th percentile or higher on standardized speech-language tests), and occur prior to any prescribed treatment and relatively near to the onset of stuttering.

Temperament may be measured by direct (e.g., behavioral observation) and/or indirect (e.g., parent inter-view/questionnaire) methods. Although direct observation of children's temperament may reduce some of the bias associated with parent interview or questionnaire methods (see Kagan, 1994, for discussion of these issues; cf. Rothbart & Bates, 1998), the information provided is limited in both time and scope (i.e., the range of behaviors that can be readily observed during a single period of time is limited). In contrast, parents have observed their children regularly over extended periods of time, yielding a more comprehensive view of the child's temperamental characteristics. Furthermore, use of parental input (e.g., case history, developmental checklists, etc.) and interview has a long history in the fields of speech-language pathology, psychology, and others, and has been documented as reliable (e.g., MacArthur Communicative Development Inventories; Fenson et al., 1993). Truly, no one method (i.e., direct vs. indirect observation) of studying temperament in young children is likely to capture all its facets and degrees of variance; however, parental reports of temperamental characteristics of young children have been shown to provide one important perspective (see Rothbart & Bates, 1998).

To standardize, as well as quantify such parental observations, several parent-report questionnaires for assessing temperament in infants and children have been developed and are widely used (Strelau, 1998), with some of these instruments being based on large normative samples, such as the Behavioral Style Questionnaire (BSQ; McDevitt & Carey, 1978). The BSQ measures temperament in 3- to 7-year-old children and has its theoretical foundation in the pioneering work of Thomas and Chess (1977), who studied temperament by interviewing parents of young children throughout their early development (i.e., the New York Longitudinal Study [NYLS]). The BSQ assesses the temperament of children along nine temperament characteristics or dimensions, identified through the NYLS: activity level, rhythmicity (daily cycle regularity), approach or withdrawal, adaptability, threshold of responsiveness (sensory threshold), intensity of reaction, quality of mood, distractibility, and attention span/persistence. Importantly, McDevitt and Carey (1978) reported relatively high test–retest (based on a sample of 53 children) and internal consistency (based on a sample of 350 children, 175 boys and 175 girls) reliabilities of .89 and .84, respectively, for the BSQ, which makes it a reasonable means of assessing temperament in young children.

Thus, the primary purpose of the present study was to determine whether a relatively large sample of young CWS and CWNS differ in terms of their parent-reported temperamental characteristics. Furthermore, given the aforementioned suggestions that the reported temperamental characteristics of CWS may be influenced by their experience(s) with stuttering, it was considered appropriate to assess the relation between temperamental characteristics and TSO. The BSQ, a norm-based inventory for determining temperamental characteristics in 3- to 7-year-old children, as reported by their parents, was used to accomplish this goal.

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Method

Participants

Participants were 62 children between the ages of 3;0 (years;months) and 5;4 who are CWS (n = 31; mean age = 48.03 months) and who are CWNS (n = 31; mean age = 48.58 months). The CWS were matched by age (±4 months), gender (6 girls, 25 boys), and race (3 African American, 28 White) to the CWNS. Each participant's socioeconomic status was determined using the Hollings-head Two-Factor Index of Social Position (Myers & Bean, 1968), which involved the assessment of each participant's "head of household" (father in case of dual-parent families, 95.2% of sample; mother in case of single-parent families, 4.8% of sample) occupation and educational level. There were no significant between-talker group differences in terms of social position, $t(52) = 0.12$, $p = .90$, with CWS having a mean social position score of 26.17, $SD = 14.76$ (lower ends of Hollingshead Classification II) and CWNS having a mean social position score of 26.67, $SD = 14.87$ (lower ends of Hollingshead Classification II).

All participants were native speakers of American English with no history of neurological, hearing, psychological, or academic/intellectual problems. All participants (a) scored at the 20th percentile or higher on three standardized speech-language tests (described below), (b) passed a hearing screening (see the *Criteria for Group Classification* section), (c) passed a general/oral motor functioning screening test (the Selected Neuromotor Task Battery [SNTB]; Wolk, 1990), and (d) had received no prior treatment for articulation, language, or stuttering concerns at the time of their participation in this study. All participants were paid volunteers in an ongoing series of studies concerning the relationship between stuttering and language/phonology (e.g., Anderson & Conture, 2000; Melnick, Conture, & Ohde, in press; Pellowski & Conture, 2002). CWS were identified for participation in these studies by their parents, who had heard about them through (a) an advertisement in a free, widely read, monthly parent-oriented magazine (*Nashville Parent*, estimated monthly readership of 230,000); (b) Middle Tennessee area speech-language pathologists, health care providers, daycare centers, and so on; or (c) referral to the Vanderbilt Bill Wilkerson Hearing and Speech Center for the initial assessment of childhood stuttering. Approximately 60% of the CWS were identified through the magazine advertisement, with the remaining 40% being equally divided between professional referral and referral for initial clinical evaluation of stuttering. All children who did not stutter were identified for participation through parental response to the magazine advertisement.

For the CWS, the reported TSO was obtained during the parent interview using a "bracketing" procedure, whereby the interviewer systematically narrows down the time of onset of stuttering (Yairi & Ambrose, 1992). For example, as described by Yairi and Ambrose (1992),

Examiner: When did the child begin stuttering?

Parent: Last winter.

Examiner: When during winter?

Parent: Around Christmas.

Examiner: Before or after Christmas?

Parent: I am sure it was after.

Examiner: Before or after New Year's Day?

Parent: After. He did not stutter on New Year's Day.

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Examiner: Was it a few days or weeks later?

Parent: It was a day or two after we returned from vacation and just before I went back to my job at school. I remember this very clearly.

Examiner: When did you go back to work?

Parent: January 5th.

Examiner: So, we are pretty close to pinning it down.

Parent: It must have been between January 3rd and 5th. (p. 785)

On the basis of this procedure, the average parent-reported TSO for the 31 CWS used in this study was 12.93 months (range = 4–23 months, *SD* = 5.12 months), with all CWS having a TSO of 23 months or less.

Criteria for Group Classification

Children Who Stutter (CWS)—A child was assigned to the CWS group if he/she (a) exhibited three or more within-word disfluencies (WWD; i.e., sound/syllable repetitions, sound prolongations, broken words) and/or monosyllabic whole-word repetitions, per 100 words of conversational speech (Bloodstein, 1995; Conture, 2001), and (b) received a total overall score of 11 or higher (i.e., a severity equivalent of at least “mild”) on the Stuttering Severity Instrument for Children and Adults–Third Edition (SSI-3; Riley, 1994). Nine CWS were classified as mild, 20 as moderate, and 2 as severe.

Children Who Do Not Stutter (CWNS)—A child was assigned to the CWNS group if he/she (a) exhibited two or fewer within-word and/or monosyllabic whole-word repetitions per 100 words of conversational speech (Conture & Kelly, 1991), and (b) received a total overall score of 10 or lower (i.e., a severity equivalent of less than “mild”) on the SSI-3.

Procedures

Participants were tested in their homes and in a clinic room specially designed for testing young children, with each data collection session lasting approximately 1 to 1.5 hr. During the home visit, standardized speech and language tests were administered to the children and parents were given a copy of the BSQ. Parents were asked to collaborate on completion of the BSQ. Participants then visited the clinic 1 to 2 weeks later to participate in an informal parent–child conversational interaction for analysis of speech disfluencies and to complete a hearing screening. Parents returned their completed BSQ during the clinic visit, which was then scored, by computer-assisted means, using standardized procedures, programs, and norms provided by the publishers of the BSQ (Carey Temperament Scales, 1996). At the end of the clinic visit, parents were given feedback concerning their child's performance on the standardized speech and language tests, as well as on the temperament questionnaire.

Speaking/Testing Conditions

Standardized Speech-Language Tests and Hearing Screening—During the home visit, three standardized speech-language tests were administered to the children, including (a) the Peabody Picture Vocabulary Test–Third Edition (PPVT-III; Dunn & Dunn, 1997), (b) the Test of Early Language Development–Third Edition (TELD-3; Hresko, Reid, & Hamill, 1999), and (c) the Sounds in Words subtest of the Goldman–Fristoe Test of Articulation–Second Edition (GFTA-2; Goldman & Fristoe, 2000). In the clinic, each child's hearing was screened bilaterally with pure tones at 20 dB SPL for 500, 1000, 2000, and 4000 Hz under

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clinical conditions with minimization of ambient noise (American Speech-Language-Hearing Association [ASHA], 1990). In addition, a tympanogram was generated for each child using bilateral impedance audiometry from 800 to 3000 ohms.

Parent–Child Interaction—In the clinic, with the mother and/or father present, a 300-word conversational speech sample was elicited during a loosely structured parent–child interaction, lasting approximately 15 to 30 min. The parent(s) and child were seated next to each other at a small table with age-appropriate toys situated directly in front of him/her. The parent(s) and child interacted verbally with each other while playing with the toys. The parent–child interaction was videotaped using a Sony videotape recorder (Model BVU-200A) for the purposes of intra- and interjudge reliability measurements (see the *Disfluency Analysis* section).

Temperament Questionnaire

As previously indicated, the BSQ (McDevitt & Carey, 1978) is a widely used temperament test in preschool children (e.g., Gunn & Berry, 1985; Hatton, Bailey, Hargett-Beck, Skinner, & Clark, 1999; Sarafino, 2000; Schechter, Bernstein, Beck, Hart, & Scherzer, 1991). The BSQ has been standardized on a large normative sample of children (175 boys, 175 girls) and has test–retest and split-half reliabilities of .89 and .84, respectively. The BSQ's normative sample of children was predominantly White and representative of all socioeconomic levels, although there reportedly was a preponderance of middle class families (McDevitt & Carey, 1978), characteristics similar to the participants in this study.

As mentioned above, parents were given the BSQ during the home visit. In a two-parent home (95.2% of total sample of 62 children), parents were asked to respond collaboratively (i.e., work together on the scoring of the BSQ) and return the completed BSQ at the time of the clinic visit (typically 1 to 2 weeks later). Considering that many researchers report only modest levels of interparent agreement on parent-report measures of temperament (see reviews by Rothbart & Bates, 1998; Slabach, Morrow, & Wachs, 1991; Wachs, 1999), the fact that parents were asked to respond collaboratively would appear to be a major strength of this study's design. Upon receipt of the BSQ, parental collaboration in filling it out was verified by the third author, where appropriate (i.e., in the case of a two-parent family).

As previously mentioned, the BSQ assesses the parent-reported temperamental characteristics of children from 3 to 7 years old along nine dimensions: activity level, adaptability, approach–withdrawal, mood, intensity, distractibility, attention span/persistence, sensory threshold, and rhythmicity. Brief descriptions of these dimensions are as follows:

1. Activity level: The amount of physical motion in a child's behavior (e.g., during sleep, eating, play, dressing, bathing, etc.). Sample item: The child runs to get where he/she wants to go.
2. Adaptability: The ease or difficulty with which behaviors can be changed in a desired way. Sample item: The child adjusts easily to changes in his/her routine.
3. Approach or withdrawal: The nature of the initial response to a new situation (e.g., people, situations, places, toys, foods, etc.). Sample item: The child is outgoing with strangers.
4. Quality of mood: The extent of positive or negative emotion (mood) in various situations. Sample item: The child is annoyed at interrupting play to comply with a parental request.

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5. Intensity of reaction: The energy level of responses, regardless of their quality or direction. Sample item: The child reacts strongly (cries or complains) to a disappointment or failure.
6. Distractibility: The effectiveness of extraneous stimuli in drawing attention away from ongoing behaviors. Sample item: The child stops an activity because something else catches his/her attention.
7. Attention span/persistence: The length of time during which a child pursues a particular activity (attention span) and his/her ability to continue the activity in the face of distractions (persistence). Sample item: The child spends over an hour reading a book or looking at the pictures.
8. Sensory threshold (threshold of responsiveness): The amount of stimulation (e.g., sounds, light, taste, smell, or feel) required to evoke a discernable response from a child. Sample item: The child becomes upset or cries over minor falls or bumps.
9. Rhythmicity (regularity): The regularity or irregularity of physiologic functions (e.g., sleep, hunger, and elimination). Sample item: The child spontaneously wakes up at the usual time on the weekends and holidays.

The BSQ contains 100 questions about or descriptors of behaviors pertaining to the nine temperamental dimensions. Parents are asked to rate their child on each of these items using a 6-point scale with 1 indicating the behavior is “almost never” and 6 “almost always” true of their child. Scores given for each item were summed for each of the nine dimensions and converted to *z* scores (range = ±4) based on normative data (*N* = 350) (McDevitt & Carey, 1978). Positive *z* scores indicated more difficult to manage temperamental attributes, whereas negative *z* scores indicated more manageable temperamental attributes. For example, a high score on the approach–withdrawal dimension suggests a tendency to physically and emotionally withdraw when initially confronted with a new stimulus (e.g., a person, place, or situation), whereas a low score indicates a greater tendency to approach new stimuli.

Analysis of BSQ Results

The BSQ was scored during the clinic visit by the first or second author using the Carey Temperament Scales (CTS) Profile Writer software (Carey Temperament Scales, 1996). Scores for each questionnaire item were entered into the CTS Profile Writer, and a report was generated containing numerical (*z* score) and pictorial (bar graph) data (see Conture, 2001, Figure 2.4, for examples of individual graphs). The bar graph depicted the *z* scores for each of the nine temperament dimensions (i.e., as a deviation from a mean or average score of zero). For example, if a child's score on the activity dimension was exactly average for his/her age, he/she would receive a *z* score of 0. Numbers between 1 and 4 on either side of the mean represent standard deviations. For example, a *z* score of +1 is 1 *SD* above the mean, whereas a *z* score of −3 is 3 *SD*s below the mean, when compared to the BSQ norms.

Disfluency Analysis

Speech Disfluency Measures—A 300-word conversational speech sample was extracted from the clinic sample and analyzed for the following speech disfluency measures: (a) mean frequency of all speech disfluencies (within- and between-word disfluencies) per 100 words, based on the 300-word speech sample, and (b) mean frequency of within-word disfluencies (i.e., sound/syllable repetitions, sound prolongations, broken words) and monosyllabic whole-word repetitions per 100 words, based on the 300-word speech sample. Speech disfluency measures (total and within-word speech disfluencies) for the two talker groups (i.e., CWS and CWNS) were analyzed using pairwise *t* tests to verify disfluency status for children in each of the speaker groups. Not surprisingly, given the aforementioned talker group classification

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criteria, CWS exhibited significantly more total, $t(49) = -4.89$, $p < .01$, as well as within-word, $t(49) = -4.66$, $p < .01$, speech disfluencies than CWNS. Thus, the two groups were clearly differentiated on the basis of total disfluencies as well as stuttering behavior.

Intra- and Interjudge Measurement Reliability—Intra- and interjudge reliability measures were obtained for the mean frequency of all speech disfluencies (within- and between-word disfluencies combined) and the mean frequency of within-word disfluencies. Fifteen participants were randomly selected from both the CWS and CWNS groups ($n = 30$). The 300-word conversational speech samples from these participants were then used for intra- and interjudge measurement reliability, representing approximately 20% of the total data corpus (i.e., 300 words per participant for a total of 9000 words). Intrajudge reliability was assessed by having the first author judge each speech sample for the mean frequency of total and within-word speech disfluencies on two different occasions, separated by a period of 1 month. Interjudge reliability was assessed by having the second author judge each speech sample for the two speech disfluency measures. Intra- and interjudge reliability scores for total and stuttered speech disfluency measures were assessed across participants using the following formula: agreements /(agreements + disagreements). Intra-judge reliability for the mean frequency of total and stuttered speech disfluencies was .95 and .94, respectively, whereas interjudge reliability for the overall mean frequency of total and stuttered speech disfluencies was .92 and .93, respectively.

Data Analyses

A multivariate analysis of variance (MANOVA) was used to assess between-group differences (i.e., CWS vs. CWNS) for each of the nine temperament dimensions on the BSQ. For CWS, Pearson product–moment correlation coefficients were used to examine relationships between parent-reported TSO of stuttering and any BSQ dimensions that appear to significantly differentiate CWS from CWNS.

Results

Between-group differences for the nine dimensions of the BSQ (see Table 1) indicated significant between-group effects for adaptability, $F(1, 60) = 6.14$, $p = .016$; distractibility, $F(1, 60) = 7.45$, $p = .008$; and rhythmicity, $F(1, 60) = 4.93$, $p = .03$. In essence, CWS scored above the mean on the adaptability ($M = 0.56$, $SD = 0.87$) and rhythmicity ($M = 0.66$, $SD = 0.93$) dimensions and below the mean on the distractibility dimension ($M = -0.30$, $SD = 0.83$) compared to CWNS (adaptability, $M = 0.008$, $SD = 0.87$; rhythmicity, $M = -0.009$, $SD = 1.39$; distractibility, $M = 0.25$, $SD = 0.78$; see Figure 1). Thus, it would appear that parents judged 3- to 5-year-old CWS to be (a) slower to adapt their behavior in response to change in routine, (b) more vigilant during tasks, and (c) more irregular in their physiologic functions (e.g., sleep, hunger, and elimination) than did the parents of age-, gender-, and racially matched CWNS. Of the remaining six temperament dimensions, only attention span/persistence approached significance, $F(1, 60) = 3.40$, $p = .07$.

On an individual participant basis, 8 of the 31 CWS (25.8%) scored +1.0 or more standard deviations above the mean on the adaptability dimension (i.e., slower to adapt to changes in the environment), whereas only 4 of the 31 CWNS (12.9%) scored +1.0 or greater standard deviations above the mean on this dimension. Similarly, 11 CWS (35.5%) scored +1.0 or greater standard deviations above the mean on the rhythmicity dimensions (i.e., less regular in their biological functions), with only 6 CWNS (19.4%) scoring +1.0 or more standard deviations above the mean on this dimension. Conversely, 6 CWS (19.4%) scored −1.0 or more standard deviations below the mean on the distractibility dimension (i.e., less likely to be distracted by sights, sounds, or irrelevant events during tasks), whereas only 1 CWNS (3.2%) scored −1.0 or more standard deviations below the mean on this dimension (see Table 2).

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Pearson product–moment correlation coefficients indicated no significant correlation between TSO of stuttering and either the adaptability ($r = .06$, $p = .75$), distractibility ($r = .16$, $p = .42$), or rhythmicity ($r = .14$, $p = .47$) dimensions for CWS. In other words, the length of time for which a child has reportedly been stuttering does not appear to be related to either of the three temperamental characteristics that significantly differentiated the two talker groups, at least for preschoolers who have been stuttering, on average, for 12.93 months (range = 4–23 months, *SD* = 5.12 months). This finding is consistent with the general observation that temperamental characteristics are relatively, not absolutely, stable across time and various situations (Rothbart & Bates, 1998; Wachs, 1999).

Discussion

The present findings, based on parental responses to a standardized questionnaire on childhood temperament, are taken to suggest several interrelated conclusions. First, 3- to 5-year-old CWS, as a group, scored higher than CWNS on the adaptability dimension, suggesting that they may be slower to adapt to new situations or people. Second, seemingly consistent with these observations, they also scored lower than CWNS on the distractibility dimensions, which suggests that they may be less distractible or hypervigilant when engaged in a task. Finally, CWS scored higher than CWNS on the rhythmicity dimension, suggesting that they tend towards nonregularity in bodily or daily physiological functions. What follows is a further discussion of these three conclusions.

CWS, as a Group, Appear Slow to Change Behavior in Novel Circumstances

The present findings, based on parent-reported temperamental characteristics, indicate that CWS appear to be slower to adapt to novelty than CWNS. Such individuals may have the tendency to be shy, quiet, cautious, emotionally reserved, and perhaps fearful when confronted with unfamiliar events or people (Kagan, 1989, 1994). Present findings of nonadaptability to change among CWS are consistent with results from other published studies (e.g., Embrechts et al., 2000; Fowlie & Cooper, 1978), as well as conference presentations (LaSalle, 1999; Oyler, 1999), and would seem to have several implications regarding the onset, development, and maintenance of stuttering.

Young children who adapt slowly to change may have difficulty separating from their parents, making initial adjustments to school, and making friends (Chess & Thomas, 1991). If difficulties entering new or different social situations are more common for CWS, they may interact less frequently and intensively with their environments, preferring to maintain ongoing behavior rather than venture into new or different contexts or interactions. Such responses might result in less frequent communication, which, in turn, may lead to fewer opportunities for communicative practice, feedback, and development. As suggested by Paul and Kellogg (1997) in an empirical study of language-delayed preschoolers, such temperamental characteristics may affect the entirety of children's speech and language development. Clearly, further empirical study is needed to explore this relationship in CWS, as well as in those who exhibit other speech-language disorders. It is not entirely unreasonable, however, to suggest that a slowness to change behavior in a new situation may decrease, in whole or in part, the quantity of a child's verbal output and/or even disturb the quality of that output (e.g., the child exhibiting more single word utterances than complex utterances) and that such changes in output may, in turn, affect the child's speech fluency. Furthermore, one might suggest that this temperamental characteristic might contribute to the often reported co-occurrence of stuttering and speech and language delays/disorders; for example, children who stutter have been shown to exhibit less well-developed receptive vocabulary skills (e.g., Anderson & Conture, 2000; Meyers & Freeman, 1985).

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The difficulties CWS may have in adapting their behavior to changes in routine, novelty, and differences may be explained in at least three different ways. This is not, of course, to dismiss the contribution of other variables to childhood stuttering, but only to suggest that temperament makes its own contribution. The first, or "temperament drives stuttering," explanation suggests that some of the unease, nervousness, or lack of comfort that CWS experience when talking to new people, in new situations, and/or about new topics, has as much to do with their "slowness to adapt" to novelty as it does the fluency of their speech. Perhaps this helps explain why their disfluencies are less pronounced in familiar, routine, predictable, or otherwise unchanged contexts. To counteract these reactions on their part, some CWS may try to stay with the same activity, situation, topic, person, and so forth. Perhaps such attempts to regulate or cope with his/her reaction to change, difference, or novelty (see Eisenberg & Fabes, 1992; Rothbart & Bates, 1998, for discussion of coping or regulatory strategies pertaining to emotional reactivity) may actually become part of the problem rather than the solution. That is, such strategies may make him/her less, rather than more, adaptable to any "changes" in their speech or language during these situations. For example, CWS may be more prone to react to errors in speech-language planning and/or production when they try to find and/or use new, less well-established or less frequently used sound/sound combinations, words, grammatical constructions, and so forth.

A second, "stuttering drives temperament" explanation suggests that CWS are reluctant to step out of this communication safety zone in which communication is predictable, if not necessarily easier or easy for him or her. When forced to speak/socially interact outside this communication safety zone (e.g., a change in routine, new daycare setting, start of school, visiting relatives, etc.), the child may stutter more. So the child, apart from his or her temperament, may prefer to stay where he or she feels safe and/or appears to them to be easier or more comfortable to communicate. Whereas children have been shown to be aware, at some level, of differences between fluency and stuttering in the speech of others (e.g., Giolas & Williams, 1958), the preceding scenario must assume that 3- to 5-year-old CWS, at some level are aware if not concerned about their own speech, its fluency, and other characteristics. This assumption, while seemingly reasonable, may not be all that easy to objectively measure and test with preschool CWS, particularly those within 1 to 2 years of onset of stuttering (see Vanryckeghem & Brutten's, 2002, use of self-reports of children younger than 6 years old who do and do not stutter, in attempts to objectively measure such speech-associated attitudes).

The third, and perhaps most reasonable, explanation and one that seemingly rests midway between the first (temperament drives stuttering) and second (stuttering drives temperament) explanations is the notion that stuttering interacts with temperament. Indeed, this is similar to Rothbart and Bates's (1998) suggestion that temperament is an "open" variable that can be and is influenced by, and/or interacts with, environmental events. Within this conceptualization, the combination of stuttering and nonadaptability to change may result in a child who is even more likely to avoid new situations and to stutter when he or she is exposed to them. In this scenario it may be, at least once stuttering becomes more habituated, difficult to nearly impossible to disambiguate the influence of temperament versus stuttering on a person's reluctance to enter changing, different, or new situations.

CWS, as a Group, Appear to Exhibit Minimal Distractibility

The finding that CWS were more vigilant or less likely to permit extraneous environmental stimuli from interfering with ongoing behaviors than CWNS (i.e., CWS were less distractible than CWNS) is seemingly inconsistent with that of Embrechts et al. (2000) who reported, using the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, & Hershey, 1994), that CWS are less successful in maintaining attention. On the surface, there is no apparent reason for the differences between the Embrechts et al. study of Dutch children and the current study of

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American children. Although these differences could simply be culturally related, it may be of interest in future studies to use both temperament scales—BSQ and CSQ—on the same children. If differences in attention/distractibility emerge, it may be more convincingly argued that the two scales tap somewhat different dimensions of temperament.

The present findings that CWS exhibit low distractibility, based on parental responses to a standardized test of childhood temperament, can be initially construed to be quite positive in that low distractibility is a highly desirable temperamental characteristic in older children and adults. That is, older individuals with low distractibility can give concentrated attention to a task until it is completed, especially in academic and vocational settings. However, in younger children it may actually make for more difficult parental management (Chess & Thomas, 1991). For example, according to Chess and Thomas, a more distractible child who initially resists participation in daily activities such as dressing or bathing may be distracted with a toy and the task can be completed. However, the less distractible child cannot be as easily diverted by environmental stimuli such as parental requests, instructions, and so forth. In essence the less distractible child may be less easy to “move along” in tasks of daily living and may prefer not to take the next steps in activities directed by parents or other adults. Therefore, children who are minimally distractible may require a considerable amount of energy on the part of the child, as well as the parent(s), simply dealing with or responding to change in routine, daily activities. Extending the above notions of low distractibility among CWS to communication, perhaps CWS may be less likely to allow external stimulation to divert their attention from disruptions or mistakes in their own speech (i.e., they give concentrated attention to their speech disfluencies/errors). Coupled with the aforementioned relative inability to adapt to new, different, or changing situations, a child who is relatively unwilling or unable to be so diverted may “stay longer,” struggle, or increase physical tension during an instance of speech disfluency or speech error. In subsequent research, one might empirically assess this assumption by measuring the correlation between the duration of stuttering and parent-measured adaptability and distractibility, as well as the ability of CWS to shift and refocus their attention from one task or demand to another task or demand.

Guitar (1998) discussed that Kagan and colleagues (Kagan, Reznick, & Snidman, 1987) have demonstrated experimentally that children who are more sensitive tend to “manifest their reactivity by generating higher levels of physical tension, particularly in laryngeal muscles, when they are speaking in unfamiliar or threatening situations” (p. 83). Addition of such physical tension in their speech musculature could compound the duration/severity of their stuttering, thereby transforming them into perceptibly more effortful, physically tense repetitions, blocks, prolongations, and escape/avoidance behaviors. Therefore, regardless of whether the focus is on reactivity or nondistractibility, according to this conceptualization, the temperamental tendency to be less adaptive to changes in routine and/or less distractible from changing this reaction may result in an increase in physical tension in the speech musculature. If such increases in physical tension are present, this change may affect aspects of the child's speech disfluencies (e.g., lead to more severe, longer duration stutterings).

On the other hand, slow adaptability and minimal distractibility may be opposite sides of the notion that “a body at rest stays at rest.” That is, CWS, because of their slow adaptability to novelty, do not readily respond to environmental suggestions to change (e.g., parental instruction to stop playing and come inside for dinner), a tendency further compounded by these children's minimal distractibility or tendency to maintain whatever they are doing once it has started. For example, during the course of this study, parents of CWS frequently made the following types of statements to the examiners: “If we change or ask him to change his bedtime or dinnertime routine, he pitches a fit,” or “once he asks for something and is refused, he will repeatedly ask for the same thing, no matter what we say,” or “her biggest problem is that once she starts something like playing with a friend she has real trouble stopping play,

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changing, or doing something different." Such apparent behavioral tendencies on the part of children who stutter and/or their possible influence on stuttering itself would appear to warrant further exploration. Likewise, a child who is minimally distractible may be relatively impervious to environmental suggestions to change, for example, from a speech-language pathologist, making it more difficult to successfully and quickly change his/her behavior.

CWS, as a Group, Appear to Exhibit Irregular Biological Patterns

The finding that parents of CWS tended to judge their children as being more irregular in their biological functions than the parents of CWNS is, on the surface, rather difficult to interpret. However, children who are irregular in their biological functions (e.g., hunger, sleep, elimination patterns) are less predictable, such that they may, for example, get tired or hungry at different times throughout the day. Perhaps this apparent lack of structure in the daily, biological functions of CWS contributes, albeit indirectly, to a child's difficulties establishing fluent speech-language planning and production. In other words, relative unpredictability, uncertainty, or lack of structure in a child's daily biological routine may lead to more anxiety, stress, and so forth, on the part of the child, as well as parents who must manage the child. This speculation is consistent with the findings of Fowlie and Cooper (1978) and Glasner (1949), who reported that parents of children who stutter perceive their children to be more anxious than do parents of children who do not stutter.

Additional Considerations

Although perhaps obvious, it should be noted that the present findings represent central or group tendencies, from which individual CWS and CWNS may vary considerably (see Conture, 2001, pp. 115–118). That is, there are CWNS who are, for example, minimally distractible and, likewise, CWS who are quite distractible. However, what is interesting, based on the present findings, is that CWS as a group scored higher on the adaptability and rhythmicity dimensions and lower on the distractibility dimension, compared to age-, gender- and racially matched CWNS as a group, suggesting that they may be slower to adapt, and less distractible and regular (temperamental characteristics that could potentially contribute, in some as yet unknown fashion, to the onset and development of stuttering).

Second, the means by which temperament in young children is measured is a subject of much debate among experts in the field of temperament (see Kagan, 1994; cf. Rothbart & Bates, 1998). Some (e.g., Kagan, 1994) have suggested that it is problematic to use parental reports to measure temperament in children, whereas others (e.g., Rothbart & Bates, 1998) believe just the opposite, with the latter individuals suggesting that "evidence to date is supportive of the use of parent-report measures of temperament…that they (parent-reports) have established a fair degree of objective validity" (p. 126). Parent-report questionnaires are reportedly advantageous in that they are relatively inexpensive and convenient, parents are likely to have considerable insight into the temperamental attributes of their children, and they have established a fair degree of objective validity (Rothbart & Bates, 1998; Thompson, 1999; Wachs, 1999). On the other hand, they have been criticized on the basis that parents may be biased informants (i.e., they may try to present their children in a positive light, may have inaccurate memory, etc.), and only modest levels of interparent agreement have been found (Strelau, 1998).

As mentioned above, the use of parent-report is not the only way to measure temperament in young children. Some other ways of measuring temperament include naturalistic observations of children in the home and school environments and the use of laboratory measures to elicit temperament-related reactions through structured age-specific tasks (Strelau, 1998). However, both of these measures have their own set of advantages and disadvantages. For example, although laboratory measures allow researchers to precisely control the conditions in which

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children are studied, they may be constrained in the particular kinds of behavior that can be elicited. Furthermore, a laboratory setting, by definition, constitutes a new environment for children that could potentially evoke reactions to novelty, difference, or change and/or disturb/inhibit typical reactions (Strelau, 1998). Similarly, researchers in the field of stuttering have, for example, used self-report measures to assess temperament-related constructs, such as attitudes and emotions, in school-age children who stutter (e.g., De Nil & Brutten, 1990; Vanryckeghem, Hylebos, Brutten, & Peleman, 2001) and preschool kids who stutter (Vanryckeghem & Brutten, 2002). Furthermore, some (Guitar, 2003) have reported the combined use of standardized temperament tests and physiological measurements in adults who stutter. Although it would be ideal to use all of these various methods of measuring temperament, it is clearly not practical or feasible to do so in a single study. So, although the use of parent-report to measure temperament in young children is not without its concerns (and of course, no measures of temperament are), such measures would seem to be a relatively reasonable means to begin initial exploration of the relationship of temperament to childhood stuttering.

Finally, it should be pointed out that differences in temperamental characteristics between children who do and who do not stutter should not be construed to explain the “cause” of stuttering. Furthermore, it should be noted that temperament, like stuttering, has affective, behavioral, and cognitive, not to mention neurophysiological manifestations, which may correlate in some situations but not in others (see Kagan, 1994, for further discussion of correlations among different measures of temperament, as well as Guitar [2003] for empirical evidence regarding adults who stutter). Thus, the relationship between these various temperamental dimensions and instances of stuttering will undoubtedly vary from speaking situation to speaking situation.

Conclusions

Based on a parent-completed, 100-item, norm-based inventory of behavioral characteristics related to specific dimensions of temperament, young CWS were found to be slower to adapt to changes in the environment, less distractible, and more irregular in biological functions than CWNS, findings generally consistent with those of other investigations (e.g., Embrechts et al., 2000; Fowlie & Cooper, 1978). Although we still are uncertain as to the exact mechanism(s) by which these temperamental characteristics might relate to or influence childhood stuttering, such dimensions would seem to have some potential for contributing to childhood stuttering, particularly its exacerbation, as well as the ability of some CWS to eventually recover from stuttering. Thus, it seems reasonable to suggest that further empirical study of the temperamental characteristics of children who stutter is needed and that such characteristics should be considered in any comprehensive account of the onset and development of childhood stuttering.

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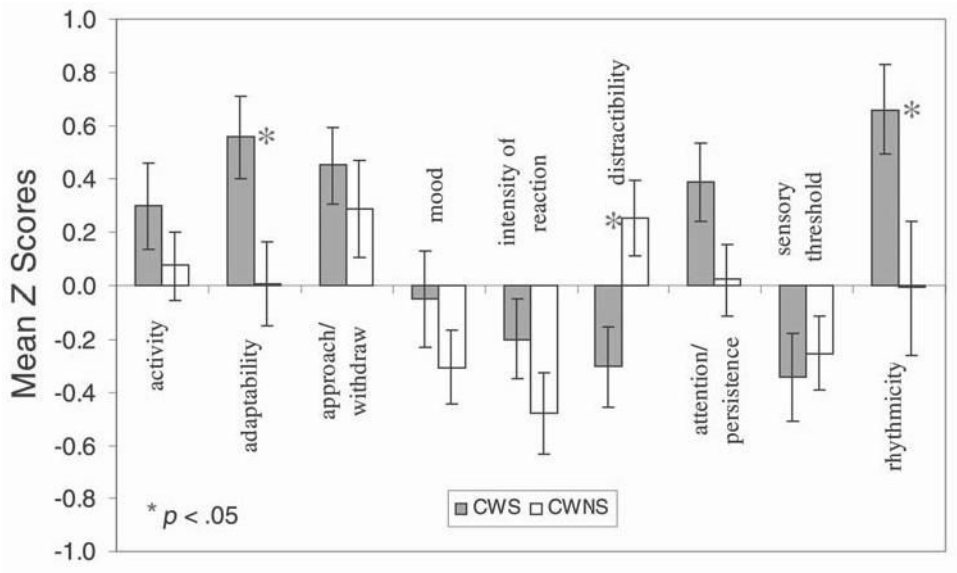

Figure 1.

Mean (SEM = brackets) scores on the nine dimensions of the Behavioral Style Questionnaire (McDevitt & Carey, 1978) for children between the ages of 3;0 (years;months) and 5;4 who do (CWS; n = 31) and do not stutter (CWNS; n = 31). Descriptors (e.g., “activity”) of the nine temperamental dimensions are listed above or below the data bars, depending on height and direction of data bars.

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Table 1

Mean and standard deviation *z* scores for the nine temperament dimensions of the Behavioral Style Questionnaire (BSQ; McDevitt & Carey, 1978) for children who do (CWS; *n* = 31) and do not stutter (CWNS; *n* = 31), with range of BSQ *z* score norms = ±4.

Dimension	CWS		CWNS	
	M	SD	M	SD
Activity	0.297	0.890	0.074	0.697
Adaptability	0.558	0.872	0.008	0.874
Approach or withdrawal	0.450	0.826	0.287	1.008
Quality of mood	−0.050	1.007	−0.305	0.769
Intensity of reaction	−0.198	0.828	−0.477	0.839
Distractibility	−0.303	0.827	0.255	0.781
Attention span/persistence	0.387	0.815	0.023	0.736
Sensory threshold	−0.342	0.921	−0.252	0.765
Rhythmicity (regularity)	0.660	0.934	−0.009	1.393

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Table 2

Number (and %) of children who do (CWS; *n* = 31) and do not stutter (CWNS; *n* = 31) scoring between 2.0 *SD*s above and below the mean for the adaptability, distractibility, and rhythmicity dimensions of the Behavioral Style Questionnaire (McDevitt & Carey, 1978).

	Adaptability				Distractibility				Rhythmicity			
	CWS		CWNS		CWS		CWNS		CWS		CWNS	
SD	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
2.0+	1	3.23	1	3.23	0	0.00	0	0.00	4	12.90	0	0.00
1.5 to 2.0	4	12.90	0	2.78	0	0.00	1	3.23	1	3.23	2	6.45
1.0 to 1.5	3	9.68	3	9.68	2	6.45	5	16.13	6	19.35	4	12.90
0.5 to 1.0	10	32.26	4	12.90	4	12.90	7	22.58	6	19.35	6	19.35
−0.5 to 0.5	9	29.03	14	45.16	13	41.94	14	45.16	12	38.71	12	38.71
−0.5 to −1.0	1	3.23	6	19.35	6	19.35	3	9.68	1	3.23	4	12.90
−1.0 to −1.5	3	9.68	3	9.68	4	12.90	0	0.00	1	3.23	1	3.23
−1.5 to −2.0	0	0.00	0	2.78	1	3.23	0	0.00	0	0.00	0	0.00
−2.0–	0	0.00	0	0.00	1	3.23	1	3.23	0	0.00	2	6.45