The Vanderbilt University Developmental Stuttering Project (DSP)

Overview

The Developmental Stuttering Project (DSP) is a 5-year longitudinal study sponsored by the National Institutes of Health (NIH). The primary investigator (PI) for this project is Dr. Tedra Walden, a Professor in the Psychology and Human Development Department and Hearing and Speech Sciences Department at Vanderbilt University. Her main collaborator is Dr. Robin Jones, an Assistant Professor in the Hearing and Speech Sciences Department at Vanderbilt University. The goal of the project is to learn more about the linguistic, emotional, and physiological contributions to developmental stuttering.

Developmental stuttering accounts for the vast majority of stuttering cases, and typically begins around the age of 3. The specific reasons for its onset are not well understood. Additionally, the majority of children with developmental stuttering spontaneously recover by early childhood without ever receiving formal speech therapy. The reasons for such recovery are still being researched. The data in this dataset are from the first occasion of measurement. It is expected that the data from this study will aid in understanding this disorder.

The participants are 3-7 year-old children who stutter (CWS) and children who do not stutter (CWNS). Data are collected from two talker groups (CWS and CWNS) in order to see if CWS differ in their linguistic ability or emotional behaviors from CWNS. An additional objective is to learn if any of these factors relate to the persistency, severity, and recovery of stuttering in children who do stutter.

Each child participated in 2 campus visits. The first visit is a diagnostic campus visit (CVD) and the second is an experimental visit (CVJ), in which children viewed emotionally arousing videos, (baseline, positive, and negative). Ideally, these two visits occur as close together as possible. For most participants, the two visits are scheduled approximately 1 week apart from one another. However, in some cases the visits might occur within the same week (even the following day), and in others as far as 5 weeks apart.

Inclusion Criteria

At the time of enrollment, participants were between the ages of 3 years old and 5 years and eleven months old. Children with speech, language, or developmental disorders (other than stuttering), children with cognitive, neurological, or physical impairments, or children who are bilingual, are not included. Occasionally, speech-language deficits are detected during screening/testing procedures. If this occurs, the needed recommendations and referrals for evaluation or treatment are made. In some instances, these deficits will make a child ineligible for continuing in the study. Requirements for inclusion in the present study are that children score at or above the 16th percentile rank on all of the standardized speech and language tests for their age group.
Participants & Criteria for Diagnosing Stuttering

To be considered as a CWS (children who stutter) a child has to exhibit three or more within-word sound/syllable repetitions, sound prolongations, broken words and/or monosyllabic whole-word repetitions per 100 words of conversational speech (based on a 300-word conversational sample obtained through child-examiner play interaction) (Conture, 2001), and receive an overall score of 11 or higher (a severity equivalent of at least “mild” for preschool children) on the Stuttering Severity Instrument-4 (SSI-4; Riley, 2009). To be considered a CWNS (children who do not stutter), a child has to exhibit two or fewer sound/syllable repetitions, sound prolongations, broken words and/or monosyllabic whole word repetitions per 100 words of speech, and receive an overall score of 10 or below on the SSI-4.

Variables In Dataset

Personal Characteristics

The dataset includes both males and females who participated in the study. Age is determined by the number of months between the child’s date of birth and the date that the child participated in the study. The participant’s race was obtained via caregiver interview.

Socioeconomic status (SES) was determined by scoring parent education and occupation levels on a 7-point scale, taken from Hollingshead (1975). The Hollingshead Four-Factor Index of Social Position classified socioeconomic status (SES) based on the caregiver interview. It is determined by report of occupation and education on the “Four-Factor Index of Social Position”, which takes into account both maternal and paternal occupation and educational level. Hearing abilities were examined with a pure tone and all participants passed a bilateral pure tone screening at 20 dHL at 1000, 2000, and 4000 Hz.

Diagnostic Visit

Speech Fluency Measures

Disfluency Counts were based on a 300-word conversational speech sample. The following speech disfluency measures were calculated: number of total words; number of single syllable repetitions; number of whole word repetitions; number of audible sound prolongations; number of inaudible sound prolongations; other stutter-like disfluencies; number of phrase repetitions; number of interjections; number of revisions; number of "other" non-stutter-like disfluencies; and the most common disfluency type. Other fluency measures include: the frequency of all speech disfluencies (within-and between-word disfluencies) per 100 words; and the frequency of within-word disfluencies (i.e., sound/syllable repetitions, sound prolongations, broken words) and monosyllabic whole-word repetitions per 100 words.

The Stuttering Severity Instrument (SSI-4; Riley, 1994) is a widely used reliable and valid norm-referenced stuttering assessment. The SSI derives scores from measures made on both a speech sample and physical observations of made at the time of the recording. It measures
stuttering severity in three areas of speech behavior: (1) frequency, (2) duration, and (3) physical concomitants.

Frequency refers to the percentage of stuttering that occurs within a period of time, measured in conversational speech. Frequency is expressed in percent syllables stuttered and converted to scale scores of 2-18.

Duration of stuttering refers to how long a stutter event lasts over time (e.g., 3 seconds). It is calculated by averaging the three longest instances of stuttering in the conversational speech sample. Duration is timed to the nearest one tenth of a second and converted to scale scores of 2-18.

Physical concomitants are associated physical behaviors that are associated with moments of stuttering. These include behaviors such as distracting non-speech sounds; facial grimacing; head movements; and movements of the extremities. Each of these four criteria is given a score from 0 (none) to 5 (severe and painful looking). The four types of physical concomitants are converted to scale scores of 0-20. The ratings are then summed which allow a maximum total score of 56.

Speech and Language Tests

**Goldman Fristoe Test of Articulation** (GFTA-2; Goldman & Fristoe, 2000) assesses receptive and expressive vocabulary, receptive and expressive language skills, and articulation abilities, respectively. The GFTA–2 test provides information about a child's articulation ability by sampling both spontaneous and imitative sound production. Children respond to picture plates and verbal cues from the examiner with single-word answers that demonstrate common speech sounds. “Sounds-in-Sentences” provide further measures of contextual articulation. The GFTA–2 test is used to measure articulation of consonant sounds, determine types of misarticulation, and compare individual performance to national, gender-differentiated norms.

**Peabody Picture Vocabulary Test** (PPVT; Dunn & Dunn, 1959) is an untimed test of receptive (hearing) vocabulary for Standard American English intended to provide a quick estimate of verbal ability and scholastic aptitude. The PPVT is a norm-referenced, wide-range instrument that is available in two parallel forms (Form A and Form B) and administered individually. Both forms contain 228 test items, each consisting of four full-color pictures as response options. For each item, the examiner says a word, and the child responds by selecting the picture that best illustrates that word’s meaning.

**Expressive Vocabulary Test** (EVT) is a norm-referenced instrument that assesses expressive vocabulary and word retrieval for both children and adults. The EVT is available in two parallel forms (Form A and Form B) that are administered individually. Each form contains 190 test items arranged in increasing difficulty. For each item, the examiner presents a picture and reads a stimulus question, and the child responds with one word that provides an acceptable label, answers a specific question, or suggests a synonym for a word that fits the picture.
Test of Early Language Development (TELD-3) is a standardized measure of the early development of oral language in the areas of receptive and expressive language, syntax, and semantics. It utilizes two subtests: Receptive Language and Expressive Language; and yields an overall Spoken Language score. The Receptive Language subtest contains 37 items and the Expressive Language subtest contains 39 items. For each item, the child is given a verbal direction and then shown a stimulus object or a picture. Then, the child is invited to respond to prompts for each item. The child's responses generate a standard score (with a mean of 100 and a standard deviation of 15), which differentiates groups with known language problems from those without such problems.

Test of Childhood Stuttering (TOCS) provides clinicians and researchers with a sound method for assessing a child’s speech fluency skills and stuttering-related behaviors. TOCS helps identify children who stutter, determines the severity of the stuttering, and documents changes in a child’s fluency functioning over time. TOCS has three major components: The Standardized Speech Fluency Measure; The Observational Rating Scales; and The Supplemental Clinical Assessment. For the Standardized Speech Fluency Measure, four speech fluency tasks identify children who stutter and rate the severity of their stuttering. These tasks include: Rapid Picture Naming; Modeled Sentences; Structured Conversation; and Narration. The Observational Rating Scale enables the examiner to gather information about stuttering and related behaviors from parents, teachers, and other individuals who have known the child for an extended period of time. The Supplemental Clinical Assessment involves eight supplementary fluency-related assessments which enable examiners to probe disfluency-related data in greater detail.

KiddyCAT is the Communication Attitude Test for Preschoolers and Kindergarteners (Vanryckeghem & Brutten, 2007). The KiddyCAT is a 12-item questionnaire designed to “provide cognitive data about the belief system” (interpreted as “attitudes”) of children ages three to six regarding their own speech. The KiddyCAT is also an assessment of “Attitudes Toward Speaking”, which discriminates between CWS and CWNS, regardless of age or gender (Clark et al. 2011). The 12 statements in the test are read aloud by the examiner, to which children respond with ‘yes’ or ‘no’ indicating what they think about their speech (e.g., “I like the way I talk.”). Scores for the ‘yes’ responses for the 12 items are summed.

Parent Questionnaires

Temperament Traits

Temperament is an important causal factor in stuttering. 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). These temperamental characteristics interact with other developmental influences, particularly from the social environment, to yield the totality of personality (Thompson, 1999). Caregiver rating scales have been the most widespread tools used to study children's temperament. This dataset utilizes the Temperament Characteristic Scale; the Behavioral Style
Questionnaire; The Children’s Behavior Questionnaire; the Child Behavior Checklist; and the Child Coping Scale. These questionnaires assess various aspects of temperament, emotional reactivity, and emotion regulation.

**Temperament Characteristic Scale** (TCS) (Oyler, 1996) is a list of personal traits or characteristics that describe children. The questionnaire has 7 questions which assess the child’s temperamental and sensory responsiveness and susceptibility to people and the environment (Oyler, 1999). The construct of temperamental characteristics include the following components: emotional sensitivity, reactivity, stress awareness and coping ability, and sensitivity to time pressure, noise, light, and touch. Parents respond to the questions by selecting the number most accurately describing their child. The numbers are rated on a 1 to 5 scale, and the sum of the total is included in the dataset.

**Behavioral Style Questionnaire** (BSQ) (McDevitt & Carey, 1978) is a caregiver rating scale of child temperament based on the well-established temperament domains. The BSQ is a 110-item measure using a six-point scale of nine temperament dimensions. These nine dimensions include: Activity; Rhythmicity; Approach; Adaptability; Intensity; Mood; Persistence; Distractibility; and Threshold (Thomas and Chess, 1996). Items are phrased as statements about a child’s behavior, and parents rate how often the child behaves in the way described in the statement, using a score ranging from 1 (almost never) to 6 (almost always). Items are recoded as necessary so that higher dimension scores indicate a greater challenge or difficulty. For example, a high score on the Approach dimension indicates more withdrawal from novelty; and a high score on Rhythmicity indicates more irregular, or less rhythmic daily functions. Summary scores for each dimension are computed by dividing the sum of items on each dimension by the number of ratings available.

The BSQ also has three higher order factor scales (Karrass et al., 2006). These are three groups of items measuring emotional reactivity, emotion regulation, and attention regulation as identified by experts in children's emotions. Emotional reactivity is defined as the degree of emotional responses. Examples include frequency and intensity of emotion, threshold of arousal, negative response to challenge, and autonomic reactivity. Emotion regulation is defined as management of emotional responses to situations. Examples are modulation (redirection, control, or modification) of emotional expressions, behaviors that manage emotional action tendencies, duration of emotion, and control of emotion. Attention regulation refers to the tendency of shifting one’s attention away from something that is emotionally arousing in order to limit the emotional effects of the stimulus.

**Children’s Behavior Questionnaire** (CBQ) (Rothbart & Derryberry, 1981). The CBQ was developed to provide a caregiver report assessment of temperament in children three to eight years of age. The current dataset includes parental responses to items from the CBQ. These measures were specifically designed to assess reactivity and regulation in young children. Individual differences are assessed on 15 primary temperament characteristics (see data definitions). All items are rated on 7-point scales ranging from 1 (extremely untrue of your child) to 7 (extremely true of your child). Parents are also provided with a “Not Applicable” response option when the child has not been observed in the situation described. Factor
analyses of CBQ scales reliably recover a three-factor solution indicating three broad dimensions of temperament which are included in this dataset: Extraversion/Surgency; Negative Affectivity; and Effortful Control.

**Child Behavior Checklist (CBCL)** (Achenbach, 1991) is a parent-report questionnaire on which the child is rated on various behavioral and emotional problems. The CBCL measures a child’s competencies by using their parent’s perception of their performance on three scales, which include activities, social and school. There are two versions of the checklist. The preschool checklist (CBCL/1½-5) is intended for use with children eighteen months to five years of age. The checklist consists of a number of statements about the child’s behavior, e.g. “Acts too young for his/her age.” The preschool checklist contains 100 questions. These questions measure children's emotional, behavioral, and social aspects of life.

The Child Behavior Checklist problem items are scored from 0 to 2 (0=not true, 1=somewhat or sometimes true, and 2=very true or often true, on the basis of the preceding 6 months). A syndrome score is the sum of scores on all items included in the syndrome scale. Items are scored on the following syndrome scales: Emotionally Reactive; Anxious/Depressed; Somatic Complaints; Withdrawn; Attention Problems; Aggressive Behavior; and Sleep Problems. Some patterns are further summed to provide scores for “Internalizing” (i.e., anxious, depressive, and overcontrolled) and “Externalizing” (i.e., aggressive, hyperactive, noncompliant, and undercontrolled) problem scales.

**Child Coping Scale (CCS)** (Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L., 1993) rates children’s coping behaviors on 7-point scales. Parents answer questions indicating the likelihood that the child would engage in each of 13 types of coping in three anger/frustration scenarios and one general context (no scenario). A total of 42 items are combined into five classes of coping strategies: Distancing, Aggression, Venting, Social Support Seeking, and Instrumental Problem Solving.

Distancing is associated with positive social functioning. The child keeps himself/herself busy so as not to think about the problem; or leaves/avoids a problem situation. Aggression is associated with negative social functioning. The child may resolve problems through physical or verbal aggression; or uses physical or verbal aggression to release pent-up feelings. Venting is associated with negative social functioning. The child cries to release pent-up feelings or elicit comfort from others. Support Seeking is associated with positive social functioning. The child talks about his/her problems with friends or a teacher in hope of getting support or to help find a solution. Instrumental Coping is associated with positive social functioning. The child takes some constructive action to improve a problem situation.

**Experimental Visit**

*Supporting Disfluency Measures*

A second participant visit occurs approximately one week after the initial visit. Disfluency counts are calculated as the average of three 7-minute conversations. The first 7-minute conversation is led by the participant and is general small talk. The examiner is not
leading the conversation. General statements may be contributed, such as, “I like that truck”; however, the participant is directing the conversation. The participant may build on topic or change it completely. The second 7-minute conversation is led by the examiner, and involves short answer questions and responses. The participant provides short utterance responses to questions such as, “What did you do today?” The third 7-minute conversation is a longer narrative. The examiner gives topics such as: descriptions of movies seen, recent events, or a birthday party attended, etc. This conversation provides a longer narrative with answers produced by the participant.

Certain disfluency types are monitored and recorded by an observer across the entire 21-minute conversation. The observer documents the following disfluency measures during the experimental visit (CVJ): number of total words; number of single syllable repetitions; number of whole word repetitions; number of audible sound prolongations; number of inaudible sound prolongations; other stutter like disfluencies; number of phrase repetitions; number of interjections; number of revisions; number of "other" non-stutter like disfluencies; most common disfluency type; number of stutter like disfluencies per 100 words; and the talker group based on CVJ disfluency count (SLD's per 100 words) – the details are provided in the definition file.